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Eureka County Nuclear Waste Page

Congressional Hearings on Yucca Mountain

Testimonies available in HTML (online-viewing) and PDF format

Print or view all documents (One Adobe PDF File - 140 pages, 573KB)

House of Representatives

April 18, 2002 --The Committee on Energy and Commerce, Subcommittee on Energy and Air Quality held a review of President Bush's recommendation to develop a nuclear waste repository at Yucca Mountain. Testimony was heard from both Nevada lawmakers and representatives of the Nuclear Industry:

The Honorable Jim Gibbons, 2nd District, Nevada
- Read testimony online
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The Honorable Shelley Berkley, 1st District, Nevada
- Read testimony online
- Download testimony in PDF format

The Honorable John Ensign
- Read testimony online
- Download testimony in PDF format

The Honorable Spencer Abraham, Secretary, Department of Energy
- Read testimony online
- Download testimony in PDF format

note: testimony is identical to the May 16th version Abraham delivered in the Senate

The Honorable Greta Joy Dicus, Commissioner, U.S. Nuclear Regulatory Commission
- Read testimony online
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note: testimony is identical to Richard Merserve's May 23rd testimony before the Senate

The Honorable Jeffrey R. Holmstead, Assistant Administrator for Air and Radiation, U.S. Environmental Protection Agency
- Read testimony online
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note: testimony is identical to Holmstead's May 23rd testimony before the Senate

Dr. Jared L. Cohon, Chairman, Nuclear Waste Technical Review Board
- Read testimony online
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Mrs. Gary Jones, Director, Natural Resources and Environment Team, U.S. General Accounting Office
- Read testimony online
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note: testimony is identical to Jones' May 23rd testimony before the Senate

The Honorable Laura Chappelle, Chairwoman, Michigan Public Service Commission
- Read testimony online
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Mr. Joe F. Colvin, President and CEO, Nuclear Energy Institute
- Read testimony online
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Mr. Jim Dushaw, Director, Utility Department, International Brotherhood of Electrical Workers
- Read testimony online
- Download testimony in PDF format

Ms. Joan Claybrook, President, Public Citizen
- Read testimony online
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April 25, 2002 -- a Subcommittee on Highways and Transit and Subcommittee on Railroads held a joint hearing on transportation of spent rods to the proposed Yucca Mountain storage facility. The subject of the hearing was to examine the issues associated with the transportation of spent nuclear fuel to the proposed Yucca Mountain storage facility in Nevada.

Honorable Shelley Berkley, 1st District, Nevada
- Read her Opening Statement online
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Honorable Jim Gibbons, 2nd District, Nevada
no statement available

Honorable Dennis J. Kucinich, 10th District, Ohio
- Read testimony online
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Honorable John Ensign, U.S. Senator, Nevada
- Read testimony online
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Honorable Kenny Guinn, Governor, State of Nevada
- Read testimony online
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Honorable Jon C. Porter, District 1, Nevada State Senate
- Read testimony online
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Honorable Dario Herrera, Chairman, Clark County Commission, Nevada
- Read testimony online
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Honorable Ellen G. Engleman, Administrator, Research and Special Programs Administration
Department of Transportation
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Honorable Allen Rutter, Administrator, Federal Railroad Administration
Department of Transportation
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Mr. Lake Barrett, Deputy Director, Office of Civilian Radioactive Waste Management
Department of Energy
- Read testimony online
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Dr. Carl J. Paperiello, Deputy Executive Director for Operations, US Nuclear Regulatory Commission
- Read testimony online
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Mr. Ed Hamberger, President, Association of American Railroads
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Mr. Robert H. Halstead, Transportation Advisor, State of Nevada's Agency for Nuclear Projects
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Mr. Edward M. Davis, President/CEO, NAC International
- Read testimony online
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Dr. James David Ballard, Grand Valley State University, Grand Rapids, Michigan
- Read testimony online
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Dr. Marvin Resnikoff, Radioactive Waste Management Associates
- Read testimony online
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Senate

May 16, May 22, and May 23, 2002 -- congressional hearings were held on S.J. Res. 34, a joint resolution approving the site at Yucca Mountain, Nevada, for the development of a repository for the disposal of high-level radioactive waste and spent nuclear fuel, pursuant to the Nuclear Waste Policy Act of 1982; to consider the President's recommendation of the Yucca Mountain site for development of a repository and the objections of the Governor of Nevada to the President's recommendation. Below are the testimonies from the hearings.

Hearing 1: May 16, 2002

Honorable Spencer Abraham, Secretary, Department of Energy
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Hearing 2: May 22, 2002

Robert J. Halstead, Transportation Advisor, Nevada Agency for Nuclear Projects, Portage Wisconsin
- Read testimony online

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Dr. James David Ballard, Grand Valley State University, Grand Rapids Michigan
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Dr Victor Gilinsky, Former Member, U.S. Nuclear Regulatory Commission, Glen Echo MD
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Hon. Rocky Anderson, Mayor, Salt Lake City, Utah
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Michael Ervin, Sr., Vice President, Peace Officers Research Association of California, Sacramento CA
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Dr. Stephen Prescott, Executive Director, Huntsman Cancer Institute, Salt Lake City Utah
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Mr. Kenny Guinn, Governor, State of Nevada
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Hearing 3: May 23, 2002

Hon. Richard A. Meserve, Chairman, Nuclear Regulatory Commission; Hon. Nils J. Diaz, Commissioner, Nuclear Regulatory Commission; Hon. Greta Joy Dicus, Commissioner, Nuclear Regulatory Commission; Hon. Edward McGaffigan, r., Nuclear Regulatory Commission
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Dr. Jared L. Cohon, Chairman, Nuclear Waste Technical Review Board
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Ms. Gary Jones, Natural Resources and Environment Team, General Accounting Office
- Read testimony online
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Hon. Jeffrey R. Holmstead, Assistant Administrator for Air and Radiation, Environmental Protection Agency
- Read testimony online
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Hon. Robert Card, Under Secretary, Department of Energy
no testimony available

Mr. Jim Hall, Former Chairman, National Transportation Safety Board
- Read testimony online
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Further reading and related documents:

April 4, 2002 -- Governor Kenny Guinn Vetos Yucca Mountain

May 23, 2002 -- General Accounting Office Testimony (pdf file 141KB)

June 6, 2002 -- Senate Energy and Natural Resources Committee passes Yucca

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United States House of Representatives

The Committee on Energy and Commerce
2125 Rayburn House Office Building, Washington, DC 20515
(202) 225-2927

Testimony of Jim Gibbons

U.S. Representative, Nevada

April 18, 2002

Mr. Chairman, thank you for allowing me to testify at this important hearing.

The disposal of our nation's high-level nuclear waste is an important issue to many Americans. However, for the past 20 years, it has been the most important issue to the State of Nevada.

As you know, the Nuclear Waste Policy Act of 1982 was amended in 1987 – selecting Yucca Mountain, Nevada, as the sole site to be studied for construction of a nuclear repository. Under this law and its subsequent amendment, a finding that the site is "suitable" to become a high-level waste repository for the next 10,000 years would require that the site be determined "geologically" sound.

Mr. Chairman, I hold a Masters of Science Degree in Geology, and I must tell you, Yucca Mountain is not, nor will ever be, geologically sound.

Now, whether Americans support a sole, permanent repository for high-level nuclear waste or not is an issue that can be debated. But nobody in this room can predict what the next 10,000 years will bring at Yucca Mountain – no matter whether we are discussing seismic activity, volcanic activity, meteorological activity, or otherwise.

Regardless of what the DOE crystal ball may show, the future stability of Yucca Mountain is in question – even by its own scientists. Mr. Chairman, the DOE has a duty to ensure the safety and suitability of this repository and the area surrounding Yucca Mountain. The Nevadans I represent deserve promises that can be kept by the DOE – and frankly, they don't have much credibility in our State when it comes to being truthful with our citizens.

Just look at the billions of dollars that have been spent by the DOE at Yucca Mountain. They are trying to spend their way into ensuring compliance with the Nuclear Waste Policy Act. That alone begs the question – if the site is geologically sound, why so much cost on the engineering aspect of this project?

The answer is that you cannot spend enough money to make a mountain geologically sound. What the DOE realizes is that they can spend enough to make the man-made, engineering barriers sound. Problem is, that is not what the law requires.

If you look hard enough, you will see that the DOE has failed to prove Yucca Mountain's geologic suitability, and they have made promises that they cannot keep.

How do I know this – and how do the American people know this?

Because once the DOE started digging and actually studying Yucca Mountain, they realized they would have to change the rules in order to meet the suitability standards mandated by Congress.

What the DOE found out was this:

Rates of water infiltration into the mountain are on the order of 100 times higher than previously thought.

Credible studies indicate a significant presence of basaltic volcanism in and around Yucca Mountain.

With Nevada ranking third in the nation in seismic activity, it has been determined that there have been nearly 700 cases of seismic activity of 2.5 magnitude or more, near Yucca Mountain, since 1976.

In fact, about 10 years ago, a 5.6 level earthquake near Little Skull Mountain – less than 10 miles from Yucca Mountain – actually caused some damage to a nearby DOE facility.

So what has been the DOE response to these findings – findings that even the DOE themselves acknowledge? They retroactively change the rules for site suitability. You see, the DOE cannot prove Yucca Mountain's capability of serving as a long-term, high-level waste repository that is geologically sound.

Their response: Adopt new rules permitting the agency to rely entirely on man-made waste packages. Mr. Chairman, is this what Congress intended? I think not.

As Members of Congress, we have an oversight role in this process – and we have a responsibility to rein-in such administrative abuse.

Congress wrote the law clearly to state that the site must be … not should be … or ought to be … but must be geologically suitable. As with any legislation we debate and eventually pass in Congress, we have a responsibility to ensure that all of our laws are thoroughly and responsibly carried out. Congress must not allow ourselves to be motivated by carelessness, convenience or political expediency.

Unfortunately, this is what the DOE has done.

Again, the Yucca Mountain project has become focused on nothing more than an array of engineered waste packages – that will just happen to buried at Yucca Mountain. This policy has more to do today with the man-made capabilities in storing this waste, and far less to do with the natural geologic capabilities – as was mandated by Congress. If this was the intent of Congress some 20 years ago, why have we spent nearly $8 billion even studying Yucca Mountain.

Mr. Chairman, we can and should be debating the future of nuclear power in this nation.

As a matter of fact, I would like to be a part of that debate because I see nuclear power as being a valuable part of our overall energy portfolio in America. We can, and should be debating a waste disposal policy in this nation … so long as we consider today's technological advancements, and how these technologies can assist us in our disposal efforts.

Instead, we are pushing head-long towards a policy that doesn't come close to passing the "smell-test" and is severely out-dated by today's scientific standards. The DOE continues to rely on several decades-old science to push for deep, geologic burial of high-level waste. Bright, innovative minds all across this nation – and in fact the world, are proving that there are better ways, cleaner ways, a safer ways to dispose of high-level waste.

Unfortunately, the DOE offers nothing but roadblocks.

Here in America, we pride ourselves on being a beacon of technological advancements, scientific advancements, and medical advancements. Yet, we find ourselves cemented in a policy that offers us nothing but a policy of 30 years of transporting high-level nuclear waste to a hole in a desert mountain for burial – where we expect it to remain safe for the next 10,000 years.

Mr. Chairman, the State of Nevada and our Governor issued a Notice of Disapproval of the President's recommendation. Above all the rhetoric and the different reasons why many of us oppose the Yucca Mountain Project, this committee and this Congress must ask itself whether the Nuclear Waste Policy Act has been followed … as Congress intended.

As a proponent of nuclear power and its use in this country, I would, without hesitation, take the opportunity to discuss with this committee some of the innovative, technological advancements that I have had the opportunity to study. These advancements can provide us a more reasonable, less costly, and more expedient solution to dealing with the tens of thousands of metric tons of high-level nuclear waste piling up at our nation's nuclear power plants.

Mr. Chairman, I want to be a part of the solution … but I believe the dangerous, costly and irresponsible path to Yucca Mountain does not – and should not – represent the best that this country has to offer. My only request is that members of this committee, and of Congress as whole, take one last look at the law, and ask whether you think the DOE has met the standards mandated to them by this body.

I trust that, in your gut, you will realize that we as a nation can do much better in solving the waste-disposal problem. Thank you, Mr. Chairman.

BACK

United States House of Representatives

The Committee on Energy and Commerce
2125 Rayburn House Office Building, Washington, DC 20515
(202) 225-2927

Testimony of Shelley Berkley

U.S. Representative, Nevada

April 18, 2002

I would like to thank chairman Barton and Ranking Member Boucher for offering me the opportunity to testify today.

Let me begin by expressing the outrage felt throughout Nevada about this ill-advised project. Over 83 % of the people I represent vehemently oppose Yucca Mountain. We don't want the dump, and our country does not need this dump. Yucca mountain is not the solution to what is the problem of disposal of the bi-product of nuclear energy....nuclear waste.

There is a myth that the approval of Yucca Mountain as a high-level nuclear waste repository will solve the problems of on-site storage. Nothing could be further from the truth. Yucca mountain's former acting director lake Barrett recently testified that nuclear waste will always be stored at, or near, reactor sites. The u.s. currently produces 2,000 tons of nuclear waste a year. By the time a repository opened (somewhere between 2010 and 2016) there will be 62,000 tons of nuclear waste stored at on-site reactors around the country. The maximum amount of transport per year will be 3,000 tons. At sites where waste is produced, there will be as much waste there 50 years from now as there is today.

The claims that Yucca Mountain reduces the threat of terrorism by eliminating waste at 131 sites in favor of one site is completely untrue. Yucca mountain will not reduce the threat of terrorism at operating reactors. It adds one more site to protect.

The real dirty secret that the DOE has tried desperately to ignore is the immense vulnerability of nuclear waste transports. Of the 33 members of this committee, the DOE plan calls for transport of nuclear waste through 30 of your districts. According to the DOE, Ohio will have more then 12,000 shipments, with 13 of the 19 congressional districts affected. According to experts who have analyzed the doe's transportation data, more than 123 million people live in the 703 counties traversed by doe's proposed highway routes, and 106 million live in counties along doe's rail routes. DOE predicts that between 10 and 16 million people will live within just one-half mile of a transportation route in 2035. Given the frequency of these shipments, even routine radiation from the casks, given off while passing on the highway, or stuck at a red light, would be a health concern for people living and working in the vicinity of the transportation routes -- roughly 16 millions Americans who own homes, and go to school, and go to houses of worship in the communities immediately alongside the routes.

Of even greater concern is the threat of an accident -- or even worse, a terrorist attack. If Yucca Mountain is approved there could be more then 108,000 cross-country truck shipments of spent nuclear fuel and high-level radioactive waste over 38 years. There will be between 957 and 2,855 shipments per year over 38 years, depending on whether and how much rail access is developed. For comparison, over the past 40 years, there have been less than 100 shipments per year in the united states.

A terrorist attack or accident would release radioactive materials from the cask that would prove disastrous to the environment and human health, and cost billions of dollars to try to clean up. The DOE acknowledges in the environmental impact statement that we can expect anywhere from 50 to over 300 accidents. Additionally, two separate tests, one done at Sandier National Laboratory and the other at Aberdeen Proving Grounds, demonstrate that readily available munitions can breach a nuclear waste canister. Currently, casks are only licensed through a combination of scale-model testing and computer simulations. Do we really think it is good policy to ship 108,500 shipments in casks that have never actually been tested?

According to independent studies, the risks of transportation could result in massive economic costs for communities along transportation routes. Even without an accident or incident, property values near routes could decline by 3% or more. And in the event of an accident or terrorist attack, residential property values along shipping routes could decline between 8% and 34 %, depending upon the severity of the accident.

The DOE does not publicize the transportation routes or the transportation problems related with the project because they know that if members know how much waste is going to be transported through their districts, we would be more likely to oppose the project. More significant, when our constituents find out that they live along the transportation routes, they will demand that we oppose this project. Make no mistake about it, this is our last chance to vote on the Yucca Mountain issue. If we learn a few years from now that our district is a transportation hub, our hands are tied. We will not be able to unring this bell.

an honest evaluation of the Yucca Mountain project suggests that the rewards simply don't match the risks. Yucca does nothing to alleviate the on-site storage problems across the country, and created a tremendous amount of concern for national security.

The projected cost of this boondoggle is any where from $56 billion to $309 billion. The nuclear waste fund has $11 billion. How are we going to pay for this? Raise taxes? Dip into the social security trust fund? And once Yucca Mountain is full, what then do we do? After spending hundreds of billions of dollars we will still be exactly where we are today.

A recent GAO report concluded that there are 293 unfinished scientific and technical studies that cannot be concluded until 2006. The nuclear waste technical review board, a congressionally mandated scientific oversight board said, "when the doe's technical and scientific work is taken as a whole, the board's view is that the technical basis for the doe's repository performance estimates is weak to moderate." and that because of "gaps in data and basic understanding...the board has limited confidence in current performance estimates generated by the doe's performance assessment model"

As early as 1987, representative Morris Udall, one of the main architects of the original 1982 nuclear waste policy act said, "the public and many of us in congress have lost all faith in the integrity of the process." that was the case in 1987, and it remains the case today. Yucca mountain is a political solution to a problem that requires real science. We should empower our nation's scientific community to find real solutions to this serious problem, and give them the resources and political freedom they need to discover the safest, most effective way of solving our nuclear dilemma.

Nevadans were promised that sound science and not politics would drive this process. Sound science? While 293 scientific studies have not been concluded? Sound science? When we still can't guarantee the safe transport of nuclear waste? Sound science? When the canisters needed to transport the nuclear waste have yet to be invented?

I ask you to join the state of Nevada and vote to protect your own constituents by opposing Yucca Mountain.

BACK

United States House of Representatives

The Committee on Energy and Commerce
2125 Rayburn House Office Building, Washington, DC 20515
(202) 225-2927

Testimony of John Ensign

U.S. Senator, Nevada

April 18, 2002

INTRODUCTION

Thank you, Mr. Chairman, for the opportunity to testify today on behalf of the people of Nevada.

Nevada is a diverse state, with people of many races, religions and political persuasions. But no single issue unites Nevadans–no single issue transcends region, political party, or industry–like our fight against becoming the nation's nuclear dumping ground.

Nevada's slogan is Battle Born. It is on our state flag. It reflects the firmness of purpose and the willingness to fight for what is right that is so much a part of the character of Nevadans. This is as true today as it was when our state entered the Union during the Civil War. And when it comes to Yucca Mountain, we intend to fight.

HISTORY

From the beginning of this process, our state has been the victim of Washington power politics. The 1982 Nuclear Waste Policy Act gave the Energy Department until 1998 to open a permanent underground geologic repository for high-level nuclear waste. By the late 1980s, the Energy Department had narrowed its search to just three western states: Nevada, Washington, and Texas. The DOE had not reached a scientific determination as to which location was most suitable, but, truth be told, science really was not the issue. At the time, the House Speaker was a Texan, Jim Wright, and the Majority Leader was from Washington–Tom Foley.

Guess which state got picked as the dump site?

In 1987, Congress directed the Energy Department to study a single site: Yucca Mountain. Even supporters of the deal conceded that Nevada was a victim of a raw power play. "We've done it in a purely political process," former Washington Rep. Al Swift said at the time. "We are going to give somebody some nasty stuff."

That "somebody" is the people of Nevada. They are not happy–and rightly so.

WHY YUCCA?

Since then, successive Administrations, Democrat and Republican, have spent billions of dollars trying to justify this blatantly political decision. Having come to their predetermined conclusion, they commissioned all sorts of junk science to justify using a site like Yucca Mountain–which is obviously such a poor geologic repository, and thus would have been disqualified under the 1982 Act.

Only junk science could explain the logic of storing thousands of tons of dangerous, radioactive waste on a earthquake fault-line. There are 32 known active faults at or near Yucca.. In 1992, an earthquake that measured 5.6 on the Richter scale occurred just eight miles from Yucca–damaging DOE's Yucca Mountain Project office.

There also appears to have been recent volcano activity near Yucca. And we now know that the rock at Yucca Mountain–which the scientists promised was so solid that water could not possibly reach the underground storage tunnel for 1,000 years–is in fact quite porous. Rainwater, the scientists now tell us, could reach the stored waste in just 50 years–about 20 times more quickly than expected.

With all this information, DOE was in a quandary. The science they had depended on to justify choosing Nevada as America's nuclear dumping ground had come apart like a cheap suit. But instead of doing the honest thing–admitting their mistake and disqualifying the site–DOE decided to do a typically Washington thing: move the goal posts. They retroactively changed the site suitability rules to rely not on geology but instead on "man-made" barriers.

In other words, they could no longer justify discarding the nation's nuclear refuse in Nevada on scientific and geological grounds. But they decided to go ahead and do it anyway.

John Bartlett, who used to head the Yucca Mountain project, has said that, at this point "the project has become simply an array of engineered waste packages that happen to be 1,000 feet underground." In other words, there is nothing unique about Yucca Mountain that requires us to dump the waste there. It could be stored anywhere. But the politics dictates that the people of Nevada get the short straw–so their children get to grow up in the warm glow of the nation's radioactive refuse.

But even the man-made solutions DOE came up with are faulty. The U.S. General Accounting Office has criticized DOE's decision to move ahead with recommending the Yucca Mountain site as unfounded and premature. The U.S. Nuclear Regulatory Commission had advised DOE that there are 293 unresolved technical issues that directly impinge upon the suitability of the site. And the Nuclear Waste Technical Review Board, an independent agency, reported, " the technical basis for DOE's repository design is weak to moderate at this time."

TRANSPORTATION

Aside from the safety and suitability of Yucca mountain is the safety of transporting the waste. The Department of Energy and the nuclear industry want Americans to believe that taking tens of thousands of tons of dangerous radioactive nuclear waste, removing it from reactor sites around the country, putting it on trucks and trains and barges, and moving it through cities and towns and waterways across America so it can be buried on an earthquake fault line in southern Nevada is a good idea.

It's not.

The government is trying to convince us that this project is going to be safe–more than safe; the government would have us believe that it is the key to keeping our children safe from radioactive waste that's going to be dangerous for 10,000 years.

Anyone who believes the argument that this dangerous waste can be transported without incident only needs to look at what happened last July in the Baltimore tunnel, when a CSX freight train carrying hazardous waste derailed and set off fires that burned for five days. Imagine a similar incident, only the waste is radioactive.

But forget an accident–what about a terrorist attack? In the midst of a global war on terrorism that could last for years, and perhaps decades, trucks and trains carrying radioactive fuel would be prime targets for terrorists. Consider this: Some 3,000 people died when terrorists hijacked planes and crashed them into the Pentagon and World Trade Towers on September 11. Hijacking or blowing up a truck of nuclear waste would be an easy way for terrorists to kill not just thousands, but tens of thousands of our citizens.

Nuclear power plant sites are among the most secure commercial facilities in the country. Following the events of September 11, they are being made even more secure, and there are even proposals for military protection at these sites. Modest infrastructure improvements can further increase the level of protection against any conceivable terrorist threat.

After building up all that security, what is the logic of removing spent fuel from this safe and secure storage and putting it on the nation's roads and railways within easy reach of terrorists? Secretary Abraham asserts these shipments will be "a secret." They will not–they will be extremely high profile and, because of the long duration of the campaign and large numbers of repetitive shipments, they will be easily predictable.

And even if they were "secret," let's all reflect for a moment about what it means to the people of the towns and communities that will play temporary host to this radioactive refuse. The federal government intends to take highly dangerous nuclear waste and bring it through your towns and cities, without your even knowing about it. No warnings to local governments. No opportunities for local communities to prepare safety precautions. No chance for parents to protest the shipment routes. An accident or terrorist incident in their backyard would be the first time they learned that their children were in proximity to radioactive waste. In other words, the federal government is treating every community in America with the same contempt as they are the people of Nevada. In fact, they are treating them with even greater contempt. At least they have had the decency to tell us that we Nevadans will be exposed to radioactive material–the rest of the country will just have to wait for disaster before they find out.

THE GOVERNMENT'S BIG LIE

Not only is the government's plan dangerous for both Nevada and the rest of America–it also won't solve the problem.

The government's big lie is that we Americans have a choice: to have one central nuclear waste storage site at Yucca Mountain or to have waste stored at reactor sites all around America.

That sounds like an easy choice–except that it's not true.

Even if, by some stroke of luck, waste is shipped across the country safely to Yucca Mountain, there will continue to be nuclear waste stored at all operating reactor sites.

You see, even if it were possible to immediately and magically remove all of the existing spent fuel from commercial nuclear power plant locations, there would still continue to be spent fuel stored at each and every operating reactor in the country. That's because nuclear waste is highly radioactive and thermally hot and must be kept at the reactor sites in water-filled cooling pools for at least five years. The only way spent fuel storage can be eliminated from a reactor location is to shut down the reactor.

The DOE only plans to transport to Yucca Mountain 1,000 metric tons a year more nuclear waste than our reactors produce. Plus there's going to be a backlog of around 62,000 tons of waste by the time Yucca opens. All that moving waste to Yucca will do is create one more large storage facility. But to do that, the cost will be tens of thousands of shipments of deadly radioactive waste on the nation's highways and railroads, day after day, month after month, that will travel constantly through cities and communities in 45 states–a

permanent convoy of nuclear refuse that will never end.

COST

So Yucca Mountain isn't safe, and it doesn't solve the problem. But here's the kicker–it's also a multi-billion dollar boondoggle.

To date, the U.S. government has spent about $8 billion on this fiasco–$4 billion evaluating sites and another $4 billion on Yucca Mountain itself. So admitting they were wrong would amount to an awfully expensive mistake.

But not half as expensive as proceeding with this dangerous, ill-considered and flawed storage plan. The DOE current cost estimate for Yucca Mountain is $58 billion–a dramatic increase from the 1998 estimate of $46 billion and over double Yucca Mountain's projected cost in 1983. According to a December 2001 GAO report, we have no idea what it will really cost by the time it is ready to receive waste.

When bureaucrats come up with plans that have those kinds of numbers attached to them, the contractors and industry-types start salivating–and the bureaucratic and commercial self-interests take over.

Either way, the American taxpayers get the bill. If industry were to carry the cost, nuclear power could become much more expensive and ratepayers would be forced to take on that burden. If not, the taxpayers will be on the hook for the most expensive public works project in the history of our country–equal to the cost of our entire fleet of aircraft carriers. It's a sobering picture, either way you look at it.

ALTERNATIVES

So if Yucca Mountain isn't the answer, what is?

The federal government should offer to take title and liability to the waste stored on site at nuclear reactors, just as it did in Pennsylvania under the PECO settlement. The NRC has stated fuel can be stored safely on site for at least 100 years in dry cask storage. That leaves plenty of time to continue to develop new technologies at our national labs to reprocess the waste without producing weapons-grade plutonium as a byproduct. Accelerator technology and new fuels are promising alternatives to burying this valuable resource.

A recent Wall Street Journal article noted that the Department of Energy's own scientists from Argonne National Laboratory have come up with a way to recycle nuclear waste called pyroprocessing. And a scientist from Los Alamos in New Mexico agreed that process is possible.

Nuclear waste is going to be a valuable resource; we shouldn't bury it. Once it is buried, the opportunity will be lost forever to reduce its hazards through recycling. Nuclear waste is one of the most deadly substances known to man, and our nation needs to find a long-term solution that will protect the American people, our land, and our water from its harmful effects.

CONCLUSION

Mr. Chairman, as you well know, our Founding Fathers established a complex set of procedures in Congress. It is not easy to take legislation and turn it into law. They did this with an explicit reason in mind–to prevent what they called the "tyranny of the majority." There are all sorts of procedures available to us as members of the House and Senate that allow us to prevent a bunch of bigger states from getting together and ganging up on us to do something that would harm the interests of our constituents.

That is what is happening today with Yucca Mountain. But with the help of my colleagues and the Senate Majority Leader, I am going to try to stop it. Yucca Mountain was originally chosen because of a political power play. How fitting that it could die because of one too.

People have been asking me whether it is tough to go against my President and many of my colleagues on this issue. I had to fight the Republican leaders in the House in 1998 on this issue, and I have to fight the Republican leaders in the Senate right now. That doesn't matter. When it comes to choosing between the interests of my party and the interests of my state, I always will choose my state.

I am a fourth-generation Nevadan. I know that the fighting spirit of our settlers has been passed on from one generation of Nevadans to the next. Our battle-born state was formed by facing up to difficult challenges. And we are up for the challenge of making sure that, when it comes to nuclear waste, it's not going to go in Yucca Mountain.

Thank you.

BACK

Statement of
the Honorable Spencer Abraham
Secretary of Energy

Before the
Energy and Natural Resources Committee
United States Senate -- May 16, 2002

Mr. Chairman and Members of the Subcommittee, I am pleased to appear before you today.

On February 14, I forwarded a recommendation to the President, based on approximately 24 years of federal research, that Yucca Mountain, Nevada, is suitable for development as the nation's geologic repository for spent nuclear fuel and high-level radioactive wastes. The President officially recommended the site to Congress on February 15, and pursuant to the Nuclear Waste Policy Act of 1982 (NWPA), the State of Nevada has exercised a disapproval of the President's recommendation.

I am greatly encouraged that on May 8 the House of Representatives voted, by an overwhelming margin, to pass the Joint Resolution before you today. The expeditious manner in which the House acted, and the wide margin and bipartisan manner by which the Joint Resolution passed, clearly signal this Nation's confidence and readiness to take the next step toward resolving the challenges of permanent waste disposal. Without delay, I ask that the Senate also pass the Joint Resolution, so that the Department may enter the next phase of repository development an expert and independent scientific and technical examination of the safety of the site by the Nuclear Regulatory Commission.

Passing this Joint Resolution, thus overriding the State of Nevada's disapproval, hardly needs emphasis. Twenty years ago, Congress established in law the Federal government's responsibility for the disposal of spent nuclear fuel and high-level radioactive waste. In doing so, Congress foresaw the fundamental national security and energy policy considerations that weigh heavily in favor of proceeding with a geologic repository, and mandated that a repository program be based upon a thorough scientific evaluation of several candidate sites. In 1987, Congress limited that evaluation to the site we consider today: Yucca Mountain.

In formulating this recommendation, I first considered whether sound science supported a determination that the Yucca Mountain site was scientifically and technically suitable for the development of a repository. The scientific evaluation of the Yucca Mountain site had been conducted over a 24-year period; as part of the study, some of the world's best scientists examined

every aspect of the natural processes-past, present, and future-that could affect the ability of a repository beneath Yucca Mountain to isolate radionuclides released from any spent fuel and radioactive waste disposed of there.

The Department's scientific inquiries and modeling clearly demonstrate that a repository at Yucca Mountain can meet the Environmental Protection Agency's standards for protecting the health and safety of our citizens. These extremely stringent standards were based on the recommendations of the National Academy of Sciences. What they mean, in terms of the Yucca Mountain site, is that a person living 11 miles away from the site cannot receive more annual radiation exposure during the 10,000-year regulatory period than a traveler receives today from natural sources in three round trip flights from Las Vegas to New York.

In evaluating whether the repository can comply with the Agency's standards, our scientists employed extremely conservative assumptions and considered the impact of events with extremely low probability of occurrence, all erring on the side of public safety. For example, earthquakes were assumed to occur, and volcanic eruptions were evaluated-even though the likelihood of a volcanic event affecting the repository during the first 10,000 years is just one in 70 million per year. Even with these unlikely events analyzed into the Agency's 10,000 year compliance period, Yucca Mountain still meets the EPA standards.

A review of the documentation that accompanied the recommendation clearly reveals that the Department has carefully evaluated the extent to which Yucca Mountain's substantial natural geologic barriers work in concert with the robust engineered systems. We know that Yucca Mountain is in a closed hydrologic basin, a geologic feature that greatly limits the potential migration of radionuclides. Between the emplacement tunnels and the water table, which is approximately 2000 feet below the surface, the geology provides natural adsorption retarding any potential radionuclide movement. The hydrologic features at this site suggest that more than ninety percent of the annual rainfall runs off or is evaporated, meaning less than a half an inch of water travels beneath the surface. Our studies indicate that the vast majority of water samples taken from the mountain are thousands of years old.

Even with this robust geology, our scientists again conservatively considered how engineered barriers 1,000 feet below the surface and 1,000 feet above the water table might corrode by analyzing what would happen during an ice age, if Nevada's climate changed and rainfall increased dramatically. Even including these scenarios, Yucca Mountain still meets the EPA standards.

After thoroughly examining the relevant scientific and technical materials, I have concluded that they demonstrate that the site is scientifically and technically suitable for construction of a repository. As I stated in my recommendation to the President:

"Irrespective of any other considerations, I could not and would not recommend the Yucca Mountain site without having first determined that a repository at Yucca Mountain will bring together the location, natural barriers, and design elements necessary to protect the health and safety of the public, including those Americans living in the immediate vicinity, now and into the future." Having reached this conclusion, I went on to evaluate whether compelling national interests counseled in favor of moving forward with a geologic repository at Yucca Mountain, and if so, whether there were countervailing arguments so strong that I should nonetheless decline to proceed. This evaluation argued strongly in favor of proceeding, and certainly that there was no basis for abandoning the

policy decisions made by the Congress in enacting the 1982 Nuclear Waste Policy Act and the 1987 amendments to that Act. In short, the relevant considerations are as follows.

First, Yucca Mountain is critical to our national security. Today, over forty percent of our Navy's combatant vessels, including aircraft carriers and submarines, are nuclear powered. The additional capabilities that nuclear power brings to these platforms is essential to national security. To maintain operational readiness, we must assure disposal of spent fuel to support refueling of these vessels. We are in the midst of advancing the non-proliferation objectives that have been the welcome result of the end of the Cold War. A geologic repository is an integral part of our disposition plans for surplus weapons grade materials.

Yucca Mountain is an important component of homeland security. More than 161 million people live within 75 miles of one or more nuclear waste sites, all of which were intended to be temporary. We believe that today these sites are safe, but prudence demands we consolidate this waste from widely dispersed, above-ground sites into a deep underground location that can be better protected.

A repository is also important to our nation's energy security. Nuclear power provides 20 percent of the nation's electricity and emits no greenhouse gases. The reactors we have today give us one of the most reliable forms of carbon-free power generation, free from interruptions due to international events and price fluctuations. This nation must develop a permanent, safe, and secure site for disposal of spent nuclear fuel if we are to continue to rely on our 103 operating commercial reactors to provide us with electricity.

And a repository is important to our efforts to protect the environment. A repository is indispensable to implementing an environmentally sound disposition plan for high-level defense wastes, which are located in Colorado, Idaho, South Carolina, New Mexico, New York, Tennessee, and Washington. The Department must move forward and dispose of these materials, which include approximately 100 million gallons of high-level radioactive waste and 2,500 metric tons of defense production spent nuclear fuel.

Finally, I carefully considered the primary arguments against locating a repository at Yucca Mountain. None of these arguments rose to a level that outweighs the case for going forward with the site designation.

Of these, the only one I shall address in my prepared testimony is the concern critics of the project have raised about the "transportation issue." I wish to address this issue briefly, not because I believe there is any real basis for believing these concerns are warranted, but rather, because I believe that simply by incanting the words "transportation of nuclear waste," opponents are hoping they can incite public fear, without any basis in fact, and that this hope has become the last refuge for opposition to the project. The facts, however, are these.

First, the Nuclear Regulatory Commission, working with the Departments of Transportation and Energy, has overseen approximately 30 years of safe shipment of spent nuclear fuel in this country. The Department and commercial nuclear industry have substantial experience to date - some 1.6 million miles-- without any harmful radiation release. And the successful and extensive European experience in transporting this type of nuclear material corroborates our experience. The transportation of this material will involve approximately 175 shipments per year, not the 2,800 that

the opponents allege. It would also constitute 0.00006% of the annual hazardous material shipments, and 0.006% of the annual radioactive material shipments that occur in this country today.

Second, because the site has not yet been designated, the Department is just beginning to formulate its preliminary thoughts about a transportation plan. There is an eight-year period before any transportation to Yucca Mountain might occur. This will afford ample time to implement a program that builds upon our record of safe and orderly transportation of nuclear materials and makes improvements to it where appropriate. Thus any suggestion that the Department has chosen any particular route or mechanism is completely fictitious. -- Those decisions have not been made, and cannot possibly start to be made until the site has been designated and the Department has the opportunity to work with affected States, local governments, and other entities on how to proceed.

Third, even without a repository at Yucca Mountain, the need to find a place to put the spent fuel that is continuing to accumulate will lead to the transportation of these materials, and likely quite soon. On-site storage space is running out and not all utilities can find new adjacent land where they can put this material. Therefore, they will devise ad hoc off-site consolidated storage alternatives. Already a consortium of utilities is working on a facility that they have presented to the NRC. Whether or not this effort ultimately succeeds, it is likely that some similar effort will. Thus the transportation of nuclear materials is not a function of a repository at Yucca Mountain, but rather is a necessary consequence of the material that continues to accumulate at the 131 sites in 39 States that are running out of room for it.

Finally, Yucca Mountain critics argue that nuclear materials in transit could be a terrorist target. But they are forgetting the obvious: spent fuel in secure transit to a permanent repository is certainly less susceptible to terrorist acts than spent fuel stranded at the temporary, stationary sites -- many very close to major cities and waterways -- where it now resides.

Let me close with one last thought. The critics of this program would have Congress overturn the fundamental decisions it legislated 15 years ago - that a single underground repository located at Yucca Mountain holds the greatest promise for the long-term safety and security for the Nation. The great body of scientific work done since then has confirmed the fundamental soundness of the Yucca Mountain site. The only issues remaining are the type that only can be resolved in a Nuclear Regulatory Commission licensing proceeding.

The critics who would upend this path to resolution of the remaining issues have a heavy burden of proof in urging that the policy decision made by Congress in 1987 and the findings of the body of scientific work that examined Yucca Mountain both be abandoned before the NRC has even had the opportunity to pass on whether a repository can safely be sited there. Given the history and the work to date, their burden would be substantial even if this project were not critical to many important national interests. But it is. Rejection of the proposed resolution would leave the country with no ultimate destination for our spent naval fuel, no adequate path for disposing of our own surplus plutonium, thereby making it hard for us to press other countries to dispose of theirs, and no means to complete the environmental cleanup of our defense complex. Utilities may have to start planning to decommission existing nuclear reactors and figuring out how to replace them. Congress would still have to formulate an alternative in view of the statutory obligation that the Government dispose of commercial spent fuel that was legislated in 1982, but that would be no easy task.

In short, a decision to oppose this project's going forward at this stage is a decision to abandon the repository program and subject the country to these consequences without ever letting neutral experts at the Nuclear Regulatory Commission decide whether that is the right course. Nothing the critics of this project have advanced comes close to meeting the burden of proof they should have to satisfy to warrant proceeding in this fashion. Opposition to nuclear power is not a sufficient ground, since we all, and the United States Government in particular, have an obligation to safely dispose of this waste regardless of any such policy view. Nor are concerns about transportation, for all the reasons outlined above. Rather, opposition to this resolution, and to submitting this question to the NRC, seems warranted only if one is convinced that there is such overwhelming evidence that a repository at Yucca Mountain cannot meet the NRC and EPA standards that it would be a waste of time and money to use the ordinary NRC processes to find out.

Support for the proposed resolution, on the other hand, does not require being convinced that the Department of Energy is right in believing that a repository at Yucca Mountain will meet the applicable standards or that the NRC will decide it should be licensed -- although in my judgment the scientific work to date provides ample basis for reaching that conclusion. Indeed, it doesn't even require being convinced that this outcome is the most likely. Rather, all that is required to support the resolution is to believe there is enough of a serious possibility that $4 billion and 24 years of scientific research have produced a sufficient basis for our conclusion that the site can be safely developed as a repository. That conclusion will then subject the extensive scientific basis for the President's recommendation to objective testing in the only official context it can be -- an NRC licensing proceeding.

I urge the Senate now to act promptly and favorably on the proposed joint resolution, as the House has done so overwhelmingly on May 8. This will allow the Department to proceed with the next stage of addressing the merits of all remaining issues, by applying the independent expertise of the Nuclear Regulatory Commission.

Additional Reading

State of Nevada -- Testimony Before The U.S. House of Representatives Committee on Transportation and Infrastructure Subcomittees on Railroads and Transportation and Hazardous Materials, April 25, 2002

State of Nevada - A Mountain of Trouble: A Nation at Risk - Report on Impacts of the Proposed Yucca Mountain High-Level Nuclear Waste Program

United States Senate

Committee on Energy and Natural Resources
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Testimony of Richard A. Meserve, with Nils J. Diaz, Greta Joy Discus and Edward McGaffigan, Jr.

on behalf of the Nuclear Regulatory Commission

May 23, 2002

Mr. Chairman, members of the Committee, I am pleased to join you to testify on behalf of the Nuclear Regulatory Commission (NRC) concerning the NRC's regulatory oversight role in the U.S. program for management and disposal of high-level radioactive waste and spent nuclear fuel.

The Commission has long believed that a permanent geologic repository can provide the appropriate means for the United States to manage spent nuclear fuel and other high-level radioactive waste in a safe manner. We also believe that public health and safety, the environment, and the common defense and security can be protected by deep underground disposal of these wastes. However, the Commission takes no position on whether such a repository should be located at Yucca Mountain, Nevada. Our views on that question must be shaped by the results of the Congressionally mandated licensing process.

Congress provided in the Nuclear Waste Policy Act of 1982 (NWPA) and the Energy Policy Act of 1992 that the NRC would serve as an independent regulator to ensure that any repository adequately protects the public health and safety and the environment. I am pleased to state that the NRC has consistently met the obligations established by these Acts. We are now in the midst of preparations for an important transition - - from the pre-licensing role defined for NRC in statute, to the role of regulator and licensing authority - - if a decision is made to authorize the Department of Energy (DOE) to submit a license application for Yucca Mountain.

The President's Recommendation

As you know, on February 15 of this year, President Bush accepted the Secretary of Energy's recommendation that the Yucca Mountain site be developed as a potential repository for the disposal of high-level nuclear wastes and spent nuclear fuel. If the Congress approves a resolution of siting approval, the President's recommendation becomes a final decision and DOE could then apply to the NRC for construction authorization. If DOE does so, several important steps must be taken before the Commission can decide whether to authorize construction of a potential repository at Yucca Mountain. First, DOE must submit a high-quality application. Second, staff at the NRC must conduct an independent safety review and issue a safety evaluation report. Third, we must conduct a full and fair public hearing on the DOE application. Only after these steps are complete will NRC be in a position to determine whether the DOE's license application complies with NRC regulations. Our decision will be based on the information before us at that time.

The Nuclear Waste Policy Act provides that it is NRC's responsibility to establish licensing criteria for a potential repository, to provide our preliminary views on the sufficiency of certain DOE information collected during site characterization, and to comment, along with other federal agencies, on the Environmental Impact

Statement prepared by DOE for Yucca Mountain. It is also the Commission's obligation to be prepared to make a fair, informed, and timely licensing decision, if the Congress should approve the President's recommendation. I will discuss each of these activities in turn.

The Regulatory Framework

Under the Energy Policy Act of 1992, the Environmental Protection Agency (EPA) was directed to establish dose-based environmental standards for Yucca Mountain. Congress required EPA to base these standards on the recommendations of the National Academy of Sciences. The NRC was directed to modify its regulations to be consistent with final EPA standards within one year of their issuance. Because of the short period given to NRC to issue final implementing regulations, the Commission initiated its own rulemaking in parallel with that of the EPA.

Immediately upon publishing our proposed regulations at 10 C.F.R. Part 63 for public comment in February 1999, our staff embarked on a series of public meetings to encourage involvement by members of the public in Nevada. From these meetings, together with written submittals, we received more than 1000 comments on our proposed criteria. The Commission carefully considered and analyzed these comments, and last November promulgated the health and safety regulations that will guide any licensing decision on Yucca Mountain. Our regulations are consistent with the health and safety standards established by the EPA. We are confident that any repository that can be shown by DOE to comply with these demanding standards and regulations will protect the people living near the proposed repository today and in the future.

DOE's Collection of Information

In forwarding his recommendation to the President, Secretary Abraham included the Commission's preliminary comments on DOE's examination of Yucca Mountain. As required by the NWPA, our comments addressed ". . . the extent to which the at-depth site characterization analysis and waste form proposal . . . seem to be sufficient for inclusion in [a license application to the NRC]." 42 U.S.C. §10134(a)(1)(E). In offering these comments, the NRC drew no conclusions about the suitability of the Yucca Mountain site. Rather, we commented on whether sufficient information will exist to begin a potential licensing review, if the President's recommendation becomes a final decision and if DOE submits an application. To evaluate the adequacy of DOE's information for this purpose, the NRC staff reviewed all major program documents for Yucca Mountain, as well as the available supporting technical documents. Our staff's reviews of DOE's program documents and technical material were performed over many years of extensive pre-licensing interactions with DOE staff and various stakeholders, including the State of Nevada, Indian Tribes, affected units of local government, representatives of the nuclear industry, and interested members of the public.

Based on our technical reviews and pre-licensing interactions, we believe that sufficient information can be available at the time of a license application. The DOE and NRC have reached and documented numerous agreements regarding additional information that will be needed for a licensing review. Approximately two-thirds of these agreements call for DOE to document the bases for assumptions or conclusions. The remainder oblige DOE to perform specific tests or analyses, to document prior tests or studies, or to provide other information. As DOE completes the actions necessary to fulfill these agreements, NRC will review the results promptly and notify DOE of our findings. Based on these agreements, we are confident that DOE can assemble the information necessary for an application that NRC can accept for review.

It is important to note that NRC is as concerned about the quality of documentation supporting the recommendation of the Yucca Mountain site as about the quantity of information. Over the course of our pre-licensing interactions we have discussed with DOE the need to verify the quality of the documents it has

generated to support the site recommendation. We are aware that DOE performed extensive reviews of this documentation, including dedicated reviews to determine the root causes of any errors. We acknowledge DOE's intention to qualify all data, software, and models fully if they are to be used to support a license application. Quality management continues to be a challenging program area for DOE, one which the NRC staff routinely monitors.

DOE's Final Environment Impact Statement

As required by the NWPA, Secretary Abraham included a final Environmental Impact Statement (EIS) with his recommendation to the President along with the comments agencies provided on the final EIS, including those of NRC. Our comments were developed on the basis of reviews of DOE's draft EIS for Yucca Mountain, the supplement to the draft EIS and the final EIS. Like the sufficiency comments I discussed earlier, our reviews were supported and informed by extensive pre-licensing interactions with DOE, the State of Nevada, Indian Tribes, affected units of local government, representatives of the nuclear industry, and interested members of the public.

As a result of our reviews, we believe that the final EIS contains sufficient information about the environmental impacts of the proposed action to provide a foundation for a site recommendation. The analyses provided in the EIS appear to bound appropriately the range of environmental impacts. We expect that DOE's commitment to refine the repository design and define transportation modes and routes will allow for more precise estimates of impacts and possibly result in future revisions to the National Environmental Policy Act analyses. We expect that any such additional reviews will be completed in support of a license application. If the President's recommendation becomes a final decision, NRC will, of course, continue interactions with DOE and other interested stakeholders, to resolve outstanding technical and environmental issues, as needed.

NRC Preparations for Licensing

As part of our overall pre-licensing strategy, our staff has applied the experience gained in the reviews of DOE documents and pre-licensing interactions to the preparation of a Yucca Mountain review plan that will eventually guide the NRC's review of any license application. The NRC staff recently published a draft of the review plan which is on our website for public comment. This week, members of our technical staff are conducting public information meetings in Nevada to seek public input on our draft review plan. As our preparation for possible licensing progresses, NRC will continue to conduct public technical exchanges between members of the NRC and DOE technical staffs and with NRC's Advisory Committee on Nuclear Waste.

In addition, our Atomic Safety and Licensing Board Panel has begun to evaluate hearing-related aspects, including location, and the development of the automation tools necessary to meet the time restrictions imposed by the Nuclear Waste Policy Act. These activities include development of an electronic hearing docket to expedite a possible hearing and completion of an Internet-based Licensing Support Network (LSN) that will provide access to all the key documents. Noting delays in entering key licensing documents due to security concerns after the events of September 11, it is important that DOE, which is the stakeholder with the most documents, enters its documents into the system as soon as possible. The NRC staff also is working to provide guidance to DOE on developing an electronic High Level Waste repository license application. In late June, NRC will conduct a public meeting with DOE on this issue in Las Vegas.

Safety and Security of Spent Fuel Transportation

The Commission believes that the spent nuclear fuel and high-level radioactive waste stored at multiple sites can be safely and securely transported to a single location for geologic disposal.

Responsibility for federal regulation of spent fuel transportation safety is shared by the U.S. Department of Transportation (DOT) and the NRC. DOT regulates the transport of all hazardous materials, including spent fuel, and has established regulations for shippers and carriers regarding radiological controls, hazard communication, training, and other aspects. For its part, NRC establishes design standards for the casks used to transport licensed spent fuel, and reviews and certifies cask designs prior to their use. Further, cask design, fabrication, use and maintenance activities must be conducted under an NRC-approved Quality Assurance program.

NRC also conducts an inspection and enforcement program, and reviews and approves physical security plans for spent fuel shipments. These plans provide information on how shippers and carriers comply with NRC spent fuel shipment protection requirements, including advance notification of each shipment to Governors' designees, the establishment of redundant communication capability with the shipment vehicle, the arrangement of law enforcement contacts along the route, and provision of shipment escorts.

The Nuclear Waste Policy Act requires DOE to utilize NRC-certified casks for spent fuel shipments to a repository, follow NRC's advance notification requirements, and to provide emergency response training along shipment routes. NRC has reviewed and certified a number of package designs intended to be used for transport of spent fuel to a repository, and has additional designs under review.

The NRC believes the safety protection provided by the current transportation regulatory system is well established. Nonetheless, we continually examine the transportation safety program. In FY 2000, NRC re-evaluated its generic assessment of spent fuel transportation risks to account for the fuel, cask and shipment characteristics likely to be encountered in future repository shipping campaigns. Over two years ago, NRC began the Package Performance Study to study cask performance under severe impact and fire accident conditions. The study plan calls for full-scale testing of a cask to confirm computer models of cask response to severe accident conditions. NRC is also supporting a study by the National Academies' Board on Radioactive Waste Management that will examine radioactive material transportation, with a primary focus on spent fuel transport safety. As a part of its evaluation, the NRC staff is analyzing appropriate national transportation accidents, such as the 2001 train accident in Baltimore, Maryland, to determine if lessons learned from that event should be included in our transportation requirements or analyses. The results of our confirmatory analytical studies, the significant history of safe shipments, the rigor of our pre-certification design reviews, and our inspections form the basis for our confidence that spent fuel can be shipped safely today and in the future. Finally, NRC is sponsoring a study to update its evaluation of cask response to acts of sabotage. NRC plans to utilize the results of these studies as input into its comprehensive review of security in light of the events of September 11. These studies should be available at the time possible licensing is being considered.

Conclusion

The Commission believes that deep geologic disposal is appropriate for high-level radioactive wastes and spent nuclear fuel and that such wastes can be safely and securely transported to a disposal location. We take no position, however, on whether the site recommendation for a Yucca Mountain repository should be approved. Our role is to put in place a licensing system that will ensure adequate protection of public health and safety and the environment and to review and evaluate any license application submitted, to ensure its compliance with regulatory requirements. As I believe this statement makes clear, we take that obligation very seriously.

I will be pleased to answer any questions you may have.

BACK

United States Senate

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Testimony of Jeffery R. Holmstead

Assistant Administrator for Air and Radiation, Environmental Protection Agency

May 23, 2002

Mr. Chairman and Members of the Committee:

Good morning. My name is Jeffrey Holmstead and I currently serve as the Assistant Administrator for Air and Radiation at the U.S. Environmental Protection Agency (EPA). I am pleased to be here today to discuss EPA's role in setting public health and environmental radiation protection standards for the proposed spent nuclear fuel and high-level radioactive waste repository at Yucca Mountain, Nevada. I appreciate this opportunity to discuss EPA's responsibilities related to this important national project.

INTRODUCTION

EPA's roles and responsibilities in the federal government's establishment of a repository for spent nuclear fuel and high-level radioactive waste are described generally in the Nuclear Waste Policy Act, and more specifically for the Yucca Mountain site in the Energy Policy Act of 1992. These statutes assign EPA the task of developing public health and environmental radiation protection standards for the repository. These same statutes assign other roles and responsibilities to other governmental entities. The Department of Energy (DOE) has the responsibility to determine whether the site is suitable for a repository; The Nuclear Regulatory Commission (NRC) has the responsibility to review DOE's application for a license for the repository; and Congress has the responsibility for final approval or denial of DOE's suitability recommendation. EPA issued its final standards for the Yucca Mountain repository on June 13, 2001 (40 CFR 197). These standards were developed through extensive consultation with DOE, NRC, the Office of Science and Technology Policy, and were the subject of significant public comment. DOE must address these standards in its license application. NRC may issue a license only if it determines that DOE demonstrates a reasonable expectation that the repository will comply with all provisions of the EPA standards. EPA believes that disposal in compliance with the EPA standards will be fully protective of public health and the environment. In fact, EPA's standards are both implementable and among the most stringent in the world.

NAS REPORT

The Energy Policy Act of 1992 also directed EPA to contract with the National Academy of Sciences to provide findings and recommendations on reasonable public health and safety standards for establishing a repository for spent nuclear fuel and high-level radioactive waste. NAS issued its report in 1995. I will refer to the NAS report as I discuss the EPA standards further. NAS has provided formal comments to EPA stating that our standards for Yucca Mountain are generally consistent with the NAS recommendations.

OVERVIEW OF EPA STANDARDS

Under EPA's standards, DOE must demonstrate a reasonable expectation of compliance with three separate provisions: an individual-protection standard, a human intrusion standard, and standards that are specifically intended to protect ground water as a natural resource.

The Individual Protection Standard is the core element of EPA's regulation. It is the most basic measure of how well the repository will operate. To meet this standard, DOE must demonstrate a reasonable expectation that the "Reasonably Maximally Exposed Individual," or RMEI, will not incur an annual dose of radiation above 15 millirem, from all exposure pathways combined. The RMEI is a typical individual whose location and lifestyle would place him among the most highly, but not necessarily the highest, exposed members of the population. (Although NAS recommended using a "critical group" approach, it agreed that EPA's approach was "broadly consistent" with its recommendation.) EPA's view is that, by meeting the standard for the RMEI, public health and safety, including the health and safety of those living in the immediate vicinity of Yucca Mountain, will be protected now and for future generations. This approach is preferable to postulating unrealistic scenarios to protect hypothetical individuals for whom lifestyles could be constructed that might lead to unusually high exposures, and thus is consistent with the NAS recommendation to use "cautious, but reasonable" assumptions.

The Human Intrusion Standard accounts for the possibility that future human activity could compromise the integrity of the repository and cause releases of radioactive material. NAS found that there is no credible means of predicting whether, when, or how often such an intrusion might occur at Yucca Mountain, so analyzing a simple event to determine how well the repository responds would be appropriate. In accordance with the NAS recommendation, EPA's Human Intrusion Standards requires DOE to meet the same RMEI standard as in the individual-protection analysis.

EPA adopted separate ground-water protection standards because it is long-standing Agency policy to protect ground water as a natural resource, especially when that resource is a source of drinking water. EPA believes that ground water should be protected to ensure that the Nation's drinking water resources do not present adverse health risks and are preserved for present and future generations. This is particularly important in arid regions, such as southern Nevada, where ground water is precious, and cleaning up the aquifer would be challenging and costly. Therefore, EPA's standards require DOE to demonstrate that ground water will not be radioactively contaminated above certain standards, which are consistent with EPA's radiation standards for drinking water.

To determine the location where the three basic provisions of EPA's disposal standards must be met, EPA's standards set the point of compliance south of the repository at the Nevada Test Site boundary, about 18 kilometers (11 miles) from the repository. EPA used regional ground water flow patterns, current population patterns, and near-term local plans, to identify this location and to calculate potential exposure scenarios. EPA's standards apply at the location outside this boundary where radionuclide concentrations in ground water could be highest.

DOE must demonstrate compliance with each of these provisions for a period of not less than 10,000 years after disposal. In addition, EPA's standard requires that DOE include analyses showing the performance of the repository after 10,000 years in its Environmental Impact Statement, so that the public will have the full record before it.

Finally, although DOE must demonstrate compliance with these standards to the NRC, EPA recognizes that absolute proof in the conventional sense will be impossible to attain for analyses extending ten thousand years into the future. Therefore, EPA requires that DOE demonstrate a "reasonable expectation" that the standards will be met. This standard should not be construed as requiring a less rigorous or scientific process. It is

simply a recognition that there will inevitably be significant uncertainties in projecting the performance of natural and engineered systems over very long time periods, and that these uncertainties must be understood and managed accordingly.

EPA'S ROLE NOW THAT THE STANDARD IS COMPLETE

Although EPA's statutory role was complete with the issuance of its final standards, it continues to be involved in many of the ongoing activities of other agencies. First, EPA is defending its standard in court against challenges brought by several parties. EPA has also reviewed and provided comment on NRC's licensing requirements for the Yucca Mountain repository, DOE's site evaluation guidelines, and DOE's Draft, Supplemental, and Final Environmental Impact Statements. EPA is currently reviewing NRC's draft Yucca Mountain Review Plan, and plans to comment as appropriate. EPA also expects to review DOE's evolving plans for transportation, though the selection of transportation modes and routes is DOE's responsibility. Finally, EPA continues to receive and respond to questions from the public, not only on EPA's standards, but on the other repository-related activities listed above.

Thank you again for the opportunity to appear today before the Subcommittee to present the EPA's views. This concludes my prepared statement. I would be happy to address any questions that you may have.

BACK

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Testimony of Dr. Jared L. Cohon

Chairman, Nuclear Waste Technical Review Board

April 18, 2002

Good morning, Mr. Chairman and members of the Subcommittee. I am Jared Cohon, Chairman of the Nuclear Waste Technical Review Board. All members of the Board are appointed by the President and serve on a part-time basis. In my case, I also am president of Carnegie Mellon University in Pittsburgh, Pennsylvania.

I am pleased to be here today to present the Board's technical and scientific evaluation of the Department of Energy's work related to the recommendation of a site at Yucca Mountain, Nevada, as the location of a permanent repository for spent nuclear fuel and high-level radioactive waste. The Board hopes that the Subcommittee and other policy-makers will find its technical and scientific evaluation useful as you consider the various issues that will affect a decision on whether to proceed with repository development.pan style="mso-spacerun: yes"> With your permission, Mr. Chairman, I will summarize the Board's findings, and I request that my full statement and the Board's January 24, 2002, letter report to Congress and the Secretary be included in the hearing record.

As you know, Mr. Chairman, Congress created the Board in the 1987 amendments to the Nuclear Waste Policy Act. Congress charged the Board with performing an ongoing independent evaluation of the technical and scientific validity of activities undertaken by the Secretary of Energy related to disposing of spent nuclear fuel and high-level radioactive waste. The Board also reviews the DOE's activities related to transporting and packaging such waste. Since the Board was established, its primary focus has been the DOE's efforts to characterize a site at Yucca Mountain in Nevada to determine its suitability as the location of a potential repository.

Early last year, Secretary of Energy Spencer Abraham indicated that he would make a decision at the end of 2001 on whether to recommend the Yucca Mountain site for repository development. As the Secretary's decision approached, the Board decided it was important to comment to the Secretary and Congress, within the context of the Board's ongoing evaluation of the technical and scientific validity of DOE activities, on the DOE's work related to a site recommendation. So, in November 2001, the Board met to review comprehensively the DOE's efforts in this area. In December 2001, the Board sent a letter to the Secretary indicating that the Board would provide its comments within a few weeks. The Board conveyed those comments in a letter, which included attachments with supporting details, that was sent to Congress and the Secretary on January 24, 2002.

I will now summarize the Board's review procedures and the results of the Board's evaluation.

The Board's evaluation represents the collective judgment of its members and was based on the following:

- The results of the Board's ongoing review of the DOE's Yucca Mountain technical and scientific

investigations since the Board's inception

- An evaluation of the DOE's work on the natural and engineered components of the proposed repository system, using a list of technical questions identified by the Board
- A comprehensive Board review of draft and final documents supplied by the DOE through mid-November 2001
- Field observations by Board members at Yucca Mountain and related sites.

To focus its review, the Board considered the following 10 questions for components of the repository system and for the disruptive-event scenarios:

1. Do the models used to generate input to the total system performance assessment (TSPA) and the representations of processes and linkages or relationships among processes within TSPA have a sound basis?
2. Have uncertainties and conservatisms in the analyses been identified, quantified, and described accurately and meaningfully?
3. Have sufficient data and observations been gathered using appropriate methodologies?
4. Have assumptions and expert judgments, including bounding estimates, been documented and justified?
5. Have model predictions been verified or tested?
6. Have available data that could challenge prevailing interpretations been collected and evaluated?
7. Have alternative conceptual models and model abstractions been evaluated, and have the bases for accepting preferred models been documented?
8. Are the bases for extrapolating data over long times or distances scientifically valid?
9. Can the repository and waste package designs be implemented so that the engineered and natural barriers perform as expected?
10. To the extent practical, have other lines of evidence, derived independently of performance assessments, been used to evaluate confidence in model estimates?

In evaluating the DOE's work related to individual natural and engineered components of the proposed repository system, the Board found varying degrees of strength and weakness. For example, the Board considers the DOE's estimates of the probabilities of volcanic events and earthquakes at Yucca Mountain strengths, while the lack of data related to corrosion of materials proposed for the waste packages under conditions that would likely be present in the repository and the very short experience with these materials are considered weaknesses.

This kind of variability is not surprising, given that the Yucca Mountain project is a complex, and in many respects, a first-of-a-kind undertaking. An important conclusion in the Board's letter is that when the DOE's technical and scientific work is taken as a whole, the Board's view is that the technical basis for the DOE's

repository performance estimates is weak to moderate at this time. The Board made no judgment in its January 24 letter on the question of whether the Yucca Mountain site should be recommended or approved for repository development. Those judgments, which involve a number of public-policy considerations as well as an assessment of how much technical certainty is necessary at various decision points, go beyond the Board's congressionally established mandate.

Let me explain in a little more detail, Mr. Chairman, the bases for the Board's conclusion on performance estimates. The DOE uses a complex, integrated performance assessment model to project repository system performance. Performance assessment is a useful tool because it assesses how well the repository system as a whole, not just the site or the engineered components, might perform. However, gaps in data and basic understanding cause important uncertainties in the concepts and assumptions on which the DOE's performance estimates are now based. Therefore, while no individual technical or scientific factor has been identified that would automatically eliminate Yucca Mountain from consideration at this point, the Board has limited confidence in current performance estimates generated by the DOE's performance assessment model. As I will discuss in just a moment, the Board believes that confidence in the DOE's projections of repository performance can be increased.

But first let me clarify the comment I just made on the current state of knowledge of technical and scientific factors that could potentially eliminate Yucca Mountain from consideration. The Board considers the very precise statement in its letter that at this point, no individual technical or scientific factor has been identified that would automatically eliminate Yucca Mountain from consideration a necessary condition for a discussion of site suitability to take place. But this threshold condition, by itself, is not necessarily sufficient for a definitive determination of site suitability.

How can confidence in the DOE's performance estimates be increased? As noted in the Board's letter, the Board believes that a fundamental understanding of the potential behavior of a proposed repository system is very important. Therefore, if policy-makers decide to approve the Yucca Mountain site, the Board strongly recommends that, in addition to demonstrating regulatory compliance, the DOE continue a vigorous, well-integrated scientific investigation to increase its fundamental understanding of the potential behavior of the repository system. Increased understanding could show that components of the repository system perform better than or not as well as the DOE's performance assessment model now projects. In either case, making performance projections more realistic and characterizing the full range of uncertainty could increase confidence in the DOE's performance estimates.

The DOE's estimates of repository performance currently rely heavily on engineered components of the repository system, making corrosion of the waste package very important. As the Board has mentioned in many of its previous reports and letters over the last 11 years, we believe that high temperatures in the DOE's base-case repository design increase uncertainties and decrease confidence in the performance of waste package materials. It is possible that confidence in waste package and repository performance could increase if the DOE adopts a low-temperature repository design. However, the Board continues to believe that the DOE should complete a full and objective comparison of high- and low-temperature repository designs before it selects a final repository design concept.

Over the last several years, the Board has made several other recommendations that could increase confidence in the DOE's projections of repository performance. For example, the Board recommended that the DOE identify, quantify, and communicate clearly the extent of the uncertainty associated with its performance estimates. The Board also recommended that the DOE use other lines of evidence and argument to supplement the results of its performance assessment. Moreover, the DOE could strengthen its arguments about how multiple barriers in its proposed repository system provide "defense-in-depth" (or redundancy). Although the DOE has made progress in each of these areas, more work is needed.

Other actions that might be considered if policy-makers approve the Yucca Mountain site include systematically integrating new data and analyses produced by ongoing scientific and engineering investigations; monitoring repository performance before, during, and after waste emplacement; developing a strategy for modifying or stopping repository development if potentially significant unforeseen circumstances are encountered; and continuing external review of the DOE's technical and scientific activities.

Mr. Chairman, eliminating all uncertainty associated with estimates of repository performance would never be possible at any repository site. Policy-makers will decide how much scientific uncertainty is acceptable at the time various decisions are made on site recommendation or repository development. The Board hopes that the information provided in this testimony and in its letter report to Congress and the Secretary will be useful to policy-makers faced with making these important decisions. Not surprisingly, Mr. Chairman, people have drawn from the Board's January 24 letter the points that support their case. The Board is concerned, however, that lifting individual statements from the letter and using them without context can be confusing for policy-makers and the public. Therefore, we urge those charged with making decisions about Yucca Mountain to consider the full text of our 3-page letter.

Thank you very much, Mr. Chairman. I will be happy to respond to questions.

BACK

United States Senate

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Testimony of Ms. Gary Jones

on behalf of the General Accounting Office

May 23, 2002

Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to discuss the Department of Energy's (DOE) project to develop a nuclear waste repository. As required by law, DOE has been investigating a site at Yucca Mountain, Nevada, to determine its suitability for disposing of highly radioactive wastes in a mined geologic repository. On February 14, 2002, the secretary of energy recommended to the president approval of this site for the development of a nuclear waste repository. The next day, the president recommended approval of the site to the Congress. The president's recommendation began a statutory review process for the approval or disapproval of the site, including action by the state of Nevada, the Congress, DOE, and the Nuclear Regulatory Commission (NRC) within specified time frames. If the site is approved, DOE must apply to NRC for authorization (a license) to construct a repository. If the site is not approved for a license application, or if NRC denies a license to construct a repository, the administration and the Congress will have to consider other options for the long-term management of existing and future nuclear wastes. Our testimony, which is based on our recent report on the Yucca Mountain Repository Project, addresses (1) DOE's readiness to submit a license application within the statutory time frame, (2) the extent to which DOE can meet its goal of opening a repository at Yucca Mountain in 2010, and (3) the extent to which DOE is managing the project consistent with applicable departmental procedures.

Summary

DOE is not prepared to submit an acceptable license application to NRC within the statutory limits that would take effect if the site is approved. The president's recommendation of the Yucca Mountain site to the Congress triggered specific statutory time frames for the next steps in the repository project. Nevada, which had 60 days from February 15 to disapprove the site, did so on April 8. The Congress now has 90 days (of continuous session) from that date in which to enact legislation overriding the state's disapproval. On May 8, the House of Representatives passed a joint resolution approving the site for a repository. If the Senate also passes this resolution resulting in final approval of the site--the Nuclear Waste Policy Act requires DOE to then submit a license application to NRC within 90 days of the effective date of the legislation. Thus, the process gives DOE about 5 to 8 months from the date of the president's recommendation to submit the license application. However, a September 2001 detailed assessment of the repository program by DOE's managing contractor concluded that DOE would not be ready to submit a license application that would be acceptable to NRC until January 2006. DOE did not accept the contractor's proposed new schedule and directed the contractor to develop a proposal to shorten the time to a license application to December 2004, or about 19 months from now. The contractor has now developed such a proposal, which is under review within DOE. Moreover, while a site recommendation and a license application are separate processes, essentially the same data are needed

for both. Waiting until DOE was closer to having the additional information needed to support an acceptable license application would have put DOE in a better position to submit the application within the time frames set out in the law, and to respond to questions and challenges that may emanate from the statutory review process subsequent to the president's recommendation.

DOE is unlikely to achieve its goal of opening a repository at Yucca Mountain by 2010. On the basis of DOE's managing contractor's September 2001 reassessment, sufficient time would not be available for DOE to obtain a license from NRC and construct enough of the repository to open it in 2010. Even under the more recent proposal to submit a license application as early as December 2004, it is questionable whether DOE could open the repository in 2010. A key factor in the future licensing and construction of a repository is whether DOE will be able to obtain the increases in annual funding that would be required to open the repository by 2010. Because of the uncertainty of meeting the 2010 goal, DOE is exploring alternative approaches, such as developing surface facilities for storing waste at the site until sufficient underground disposal facilities can be constructed. Had DOE elected to defer a site recommendation until it was closer to having an acceptable license application, it could have ensured that the site recommendation was based on the approach to developing a repository that it intends to follow. This would have enabled DOE to develop an estimated schedule to design and build the preferred approach and to estimate its cost, including the annual funding requirements, as part of the information on which to make a site recommendation.

DOE currently does not have a reliable estimate of when, and at what cost, a license application can be submitted or a repository can be opened because DOE stopped using its cost and schedule baselines to manage the site investigation in 1997. DOE needs to reestablish a baseline for the repository program that accounts for the outstanding technical work needed to prepare an acceptable license application and the estimated schedule and cost to achieve this milestone. In conjunction, DOE needs to use the baseline as a tool for managing the program, in accordance with the department's policies and procedures for managing major projects. Therefore, our December 2001 report recommended that the secretary of energy reestablish the baseline through the submission of a license application and follow the department's management requirements, including a formal procedure for changing program milestones. According to DOE, it is currently in the process of establishing a new baseline for the nuclear waste program.

Background

Recognizing the critical need to address the issue of nuclear waste disposal, the Congress enacted the Nuclear Waste Policy Act of 1982 to establish a comprehensive policy and program for the safe, permanent disposal of commercial spent fuel and other highly radioactive wastes in one or more mined geologic repositories. The act created the Office of Civilian Radioactive Waste Management within DOE to manage its nuclear waste program. Amendments to the act in 1987 directed DOE to investigate only the Yucca Mountain site.

The Nuclear Waste Policy Act also set out important and complementary roles for other federal agencies:

- The Environmental Protection Agency (EPA) was required to establish health and safety standards for the disposal of wastes in repositories. EPA issued standards for the Yucca Mountain site in June 2001 that require a high probability of safety for at least 10,000 years.

- NRC is responsible for licensing and regulating repositories to ensure their compliance with EPA's standards. One prerequisite to the secretary's recommendation was obtaining NRC's preliminary comments on the sufficiency of DOE's site investigation for the purpose of a license application. NRC provided these comments on November 13, 2001. If the site is approved, then NRC, upon accepting a license application from DOE, has 3 to 4 years to review the application and decide whether to issue a license to construct, and

then to operate, a repository at the site.

- The Nuclear Waste Technical Review Board (the board) reviews the technical and scientific validity of DOE's activities associated with investigating the site and packaging and transporting wastes. The board must report its findings and recommendations to the Congress and the secretary of energy at least twice each year, but DOE is not required to implement these recommendations.

DOE has designated the nuclear waste program, including the site investigation, as a "major" program that is subject to senior management's attention and to its agencywide guidelines for managing such programs and projects. The guidelines require the development of a cost and schedule baseline, a system for managing changes to the baseline, and independent cost and schedule reviews. DOE is using a management contractor to carry out the work on the program. The contractor develops and maintains the baseline, but senior DOE managers must approve significant changes to cost or schedule estimates. In February 2001, DOE hired Bechtel SAIC Company, LLC (Bechtel), to manage the program and required the contractor to reassess the remaining technical work and the estimated schedule and cost to complete this work.

DOE will not be ready to submit a license application within the statutory time frame

DOE is not prepared to submit an acceptable license application to NRC within the statutory limits that would take effect if the site were approved. Specifically, DOE has entered into 293 agreements with NRC to gather and/or analyze additional technical information in preparation for a license application that NRC would accept. DOE is also continuing to address technical issues raised by the board. In September 2001, Bechtel concluded, after reassessing the remaining technical work, that DOE would not be ready to submit an acceptable license application to NRC until January 2006. DOE did not accept the 2006 date. Instead, it directed the contractor to prepare a new plan for submitting a license application to NRC by December 2004. DOE's current plan is that, by the end of September 2002, Bechtel will develop, and DOE will review and approve, a new technical, cost, and schedule baseline for submitting a license application to NRC in December 2004.

Moreover, while a site recommendation and a license application are separate processes, DOE will need to use essentially the same data for both. Also, the act states that the president's recommendation to the Congress is that he considers the site qualified for an application to NRC for a license. The president's recommendation also triggers an express statutory time frame that requires DOE to submit a license application to NRC within about 5 to 8 months.

DOE lacks information for a license application

The 293 agreements that DOE and NRC have negotiated address areas of study within the program where NRC's staff has determined that DOE needs to collect more scientific data and/or improve its technical assessment of the data. According to NRC, as of March 2002, DOE had satisfactorily completed work on 38 of these agreements and could resolve another 22 agreements by September 30 of this year. These 293 agreements generally relate to uncertainties about three aspects of the long-term performance of the proposed repository: (1) the expected lifetime of engineered barriers, particularly the waste containers; (2) the physical properties of the Yucca Mountain site; and (3) the supporting information for the mathematical models used to evaluate the performance of the planned repository at the site.

The uncertainties related to engineered barriers revolve around the longevity of the waste containers that would be used to isolate the wastes. DOE currently expects that these containers would isolate the wastes from the environment for more than 10,000 years. Minimizing uncertainties about the container materials and

the predicted performance of the waste containers over this long time period is especially critical because DOE's estimates of the repository system's performance depend heavily on the waste containers, in addition to the natural features of the site, to meet NRC's licensing regulations and EPA's health and safety standards The uncertainties related to the physical characteristics of the site center on how the combination of heat, water, and chemical processes caused by the presence of nuclear waste in the repository would affect the flow of water through the repository.

The NRC staff's concerns about DOE's mathematical models for assessing the performance of the repository primarily relate to validating the models; that is, presenting information to provide confidence that the models are valid for their intended use and verifying the information used in the models. Performance assessment is an analytical method that relies on computers to operate mathematical models to assess the performance of the repository against EPA's health and safety standards, NRC's licensing regulations, and DOE's guidelines for determining if the Yucca Mountain site is suitable for a repository. DOE uses the data collected during site characterization activities to model how a repository's natural and engineered features would perform at the site.

According to DOE, the additional technical work surrounding the 293 agreements with NRC's staff is an insignificant addition to the extensive amount of technical work already completed -- including some 600 papers cited in one of its recently published reports and a substantial body of published analytic literature. DOE does not expect the results of the additional work to change its current performance assessment of a repository at Yucca Mountain.

From NRC's perspective, however, the agreements provided the basis for it to give DOE its preliminary comments on the sufficiency of DOE's investigation of the Yucca Mountain site for inclusion in a future license application. In a November 13, 2001, letter to the under secretary of energy, the Chairman of the NRC commented that "although significant additional work is needed prior to the submission of a possible license application, we believe that agreements reached between DOE and NRC staff regarding the collection of additional information provide the basis for concluding that development of an acceptable license application is achievable."

The board has also consistently raised issues and concerns over DOE's understanding of the expected lifetime of the waste containers, the significance of the uncertainties involved in the modeling of the scientific data, and the need for an evaluation and comparison of a repository design having a higher temperature with a design having a lower temperature. The board continues to reiterate these concerns in its reports. For example, in its most recent report to the Congress and the secretary of energy, issued on January 24, 2002, the board concluded that, when DOE's technical and scientific work is taken as a whole, the technical basis for DOE's repository performance estimates is "weak to moderate" at this time. The board added that gaps in data and basic understanding cause important uncertainties in the concepts and assumptions on which DOE's performance estimates are now based; providing the board with limited confidence in current performance estimates generated by DOE performance assessment model.

As recently as May 2001, DOE projected that it could submit a license application to NRC in 2003. It now appears, however, that DOE may not complete all of the additional technical work that it has agreed to do to prepare an acceptable license application until January 2006. In September 2001, Bechtel completed, at DOE's direction, a detailed reassessment in an effort to reestablish a cost and schedule baseline. Bechtel estimated that DOE could complete the outstanding technical work agreed to with NRC and submit a license application in January 2006. This date, according to the contractor, was due to the cumulative effect of funding reductions in recent years that had produced a "growing bow wave of incomplete work that is being pushed into the future." Moreover, the contractor's report said, the proposed schedule did not include any cost and schedule

contingencies. The contractor's estimate was based on guidance from DOE that, in part, directed the contractor to assume annual funding for the nuclear waste program of $410 million in fiscal year 2002, $455 million in fiscal year 2003, and $465 million in fiscal year 2004 and thereafter. DOE did not accept this estimate because, according to program officials, the estimate would extend the date for submitting a license application too far into the future. Instead, DOE accepted only the fiscal year 2002 portion of Bechtel's detailed work plan and directed the contractor to prepare a new plan for submitting a license application to NRC by December 2004. Bechtel has prepared such a plan and the plan is under review by DOE. Although we have not reviewed the entire plan, we note that the plan (1) assumes that the program receives the $525 million in funds requested by the Administration for fiscal year 2003, which would be more than $100 million above the funds provided for fiscal year 2002, and (2) work on 10 of the department's 293 agreements with NRC would not be complete by the target license application date of December 2004.

Essentially the same information is needed for a site recommendation and a license application

Under the Nuclear Waste Policy Act, DOE's site characterization activities are to provide information necessary to evaluate the Yucca Mountain site's suitability for submitting a license application to NRC for placing a repository at the site. In implementing the act, DOE's guidelines provide that the site will be suitable as a waste repository if the site is likely to meet the radiation protection standards that NRC would use to reach a licensing decision on the proposed repository. Thus, as stated in the preamble (introduction) to DOE's guidelines, DOE expects to use essentially the same data for the site recommendation and the license application.

In addition, the act specifies that, having received a site recommendation from the secretary, the president shall submit a recommendation of the site to the Congress if the president considers the site qualified for a license application. Under the process laid out in the Nuclear Waste Policy Act, once the secretary makes a site recommendation, there is no time limit under which the president must act on the secretary's recommendation. However, when the president recommended, on February 15, that the Congress approve the site, specific statutory time frames were triggered for the next steps in the process. Figure 1 shows the approximate statutory time needed between a site recommendation and submission of a license application and the additional time needed for DOE to meet the conditions for an acceptable license application. The figure assumes that the Congress overrides the state's disapproval of April 8, 2002. As shown in the figure, Nevada had 60 days, until April 16, to disapprove the site. The Congress now has 90 days (of continuous session) from that date in which to enact legislation overriding the state's disapproval. If the Congress overrides the state's disapproval and the site designation takes effect, the next step is for the secretary to submit a license application to NRC within 90 days after the site designation is effective. In total, these statutory time frames provide about 150 to 240 days, or about 5 to 8 months, from the time the president makes a recommendation to DOE's submittal of a license application. On the basis of Bechtel's September 2001 and current program reassessments, however, DOE would not be ready to submit a license application to NRC until January 2006 or December 2004, respectively.

DOE is unlikely to open a repository in 2010 as planned

DOE states that it may be able to open a repository at Yucca Mountain in 2010. The department has based this expectation on submitting an acceptable license application to NRC in 2003, receiving NRC's authorization to construct a repository in 2006, and constructing essential surface and underground facilities by 2010. However, Bechtel, in its September 2001 proposal for reestablishing technical, schedule, and cost baselines for the program, concluded that January 2006 is a more realistic date for submitting a license application. Because DOE objected to this proposed schedule, the contractor has now proposed a plan for submitting the application in December 2004. Because of uncertainty over when DOE may be able to open the repository,

the department is exploring alternatives that might still permit it to begin accepting commercial spent fuel in 2010.

Extension of license application date will likely postpone 2010 repository goal

An extension of the license application date to December 2004 or January 2006 would likely preclude DOE from achieving its long-standing goal of opening a repository in 2010. According to DOE's May 2001 report on the program's estimated cost, after submitting a license application in 2003, DOE estimates that it could receive an authorization to construct the repository in 2006 and complete the construction of enough surface and underground facilities to open the repository in 2010, or 7 years after submitting the license application. This 7-year estimate from submittal of the license application to the initial construction and operation of the repository assumes that NRC would grant an authorization to construct the facility in 3 years, followed by 4 years of construction. Assuming these same estimates of time, submitting a license application in the December 2004 to January 2006 time frame would extend the opening date for the repository until 2012 or 2013. Furthermore, opening the repository in 2012 or 2013 may be questionable for several reasons. First, a repository at Yucca Mountain would be a first-of-a-kind facility, meaning that any schedule projections may be optimistic. DOE has deferred its original target date for opening a repository from 1998 to 2003 to 2010. Second, although the Nuclear Waste Policy Act states that NRC has 3 years to decide on a construction license, a fourth year may be added if NRC certifies that it is necessary. Third, the 4-year construction time period that DOE's current schedule allows may be too short. For example, a contractor hired by DOE to independently review the estimated costs and schedule for the nuclear waste program reported that the 4-year construction period was too optimistic and recommended that the construction phase be extended by a year-and-a-half. Bechtel anticipates a 5-year period of construction between the receipt of a construction authorization from NRC and the opening of the repository. A 4-year licensing period followed by 5 years of initial construction could extend the repository opening until about 2014 or 2015.

Finally, these simple projections do not account for any other factors that could adversely affect this 7- to 9-year schedule for licensing, constructing, and opening the repository. Annual appropriations for the program in recent years have been less than $400 million. In contrast, according to DOE, it needs between $750 million and $1.5 billion in annual appropriations during most of the 7- to 9-year licensing and construction period in order to open the repository on that schedule. In its August 2001 report on alternative means for financing and managing the program, DOE stated that unless the program's funding is increased, the budget might become the "determining factor" whether DOE will be able to accept wastes in 2010.

In part, DOE's desire to meet the 2010 goal is linked to the court decisions that DOE, under the Nuclear Waste Policy Act and as implemented by DOE's contracts with owners of commercial spent fuel, is obligated to begin accepting spent fuel from contract holders not later than January 31, 1998, or be held liable for damages. Courts are currently assessing the amount of damages that DOE must pay to holders of spent fuel disposal contracts. Estimates of potential damages for the estimated 12-year delay from 1998 to 2010 range widely from the department's estimate of about $2 billion to $3 billion to the nuclear industry's estimate of at least $50 billion. The damage estimates are based, in part, on the expectation that DOE would begin accepting spent fuel from contract holders in 2010. The actual damages could be higher or lower, depending on when DOE begins accepting spent fuel.

DOE is reviewing alternative ways to accept wastes in 2010

Because of the uncertainty of achieving the 2010 goal for opening the Yucca Mountain repository, DOE is examining alternative approaches that would permit it to meet the goal. For example, in a May 2001 report, DOE examined approaches that might permit it to begin accepting wastes at the repository site in 2010 while

spreading out the construction of repository facilities over a longer time period. The report recommended storing wastes on the surface until the capacity to move wastes into the repository has been increased. Relatively modest-sized initial surface facilities to handle wastes could be expanded later to handle larger volumes of waste. Such an approach, according to the report, would permit partial construction and limited waste emplacement in the repository, at lower than earlier estimated annual costs, in advance of the more costly construction of the facility as originally planned. Also, by implementing a modular approach, DOE would be capable of accepting wastes at the repository earlier than if it constructed the repository described in the documents that the secretary used to support a site recommendation.

DOE has also contracted with the National Research Council to provide recommendations on design and operating strategies for developing a geologic repository in stages, which is to include reviewing DOE's modular approach. The council is addressing such issues as the (1) technical, policy, and societal objectives and risks for developing a staged repository; (2) effects of developing a staged repository on the safety and security of the facility and the effects on the cost and public acceptance of such a facility; and (3) strategies for developing a staged system, including the design, construction, operation, and closing of such a facility. In March 2002, the council published an interim report on the study in which it addresses a conceptual framework for a generic repository program. The Council plans to issue a final report this fall, in which it intends to provide specific suggestions for incorporating additional elements of staged repository development into DOE's repository program.

DOE's current license application milestone date is not supported by the program's baseline

As of December 2001, DOE expected to submit the application to NRC in 2003. This date reflects a delay in the license application milestone date last approved by DOE in March 1997 that targeted March 2002 for submitting a license application. The 2003 date was not formally approved by DOE's senior managers or incorporated into the program's cost and schedule baseline, as required by the management procedures that were in effect for the program. At least three extensions for the license application date have been proposed and used by DOE in program documents, but none of these proposals have been approved as required. As a result, DOE does not have a baseline estimate of the program's schedule and cost -- including the late 2004 date in its fiscal year 2003 budget request -- that is based on all the work that it expects to complete through the submission of a license application.

DOE's guidance for managing major programs and projects requires, among other things, that senior managers establish a baseline for managing the program or project. The baseline describes the program's mission -- in this case, the safe disposal of highly radioactive waste in a geologic repository -- and the expected technical requirements, schedule, and cost to complete the program. Procedures for controlling changes to an approved baseline are designed to ensure that program managers consider the expected effects of adding, deleting, or modifying technical work, as well as the effects of unanticipated events, such as funding shortfalls, on the project's mission and baseline. In this way, alternative courses of action can be assessed on the basis of each action's potential effect on the baseline. DOE's procedures for managing the nuclear waste program require that program managers revise the baseline, as appropriate, to reflect any significant changes to the program.

After March 1997, according to DOE officials, they did not always follow these control procedures to account for proposed changes to the program's baseline, including the changes proposed to extend the date for license application. According to these same officials, they stopped following the control procedures because the secretary of energy did not approve proposed extensions to the license application milestone. As a result, the official baseline did not accurately reflect the program's cost and schedule to complete the remaining work necessary to submit a license application.

In November 1999, the Yucca Mountain site investigation office proposed extending the license application milestone date by 10 months, from March to December 2002, to compensate for a $57.8 million drop in funding for fiscal year 2000. A proposed extension in the license application milestone required the approval of both the director of the nuclear waste program and the secretary of energy. Neither of these officials approved this proposed change nor was the baseline revised to reflect this change even though the director subsequently began reporting the December 2002 date in quarterly performance reports to the deputy secretary of energy. The site investigation office subsequently proposed two other extensions of the license application milestone, neither of which was approved by the program's director or the secretary of energy or incorporated into the baseline for the program. Nevertheless, DOE began to use the proposed, but unapproved, milestone dates in both internal and external reports and communications, such as in congressional testimony delivered in May 2001.

Because senior managers did not approve these proposed changes for incorporation into the baseline for the program, program managers did not adjust the program's cost and schedule baseline. By not accounting for these and other changes to the program's technical work, milestone dates, and estimated costs in the program's baseline since March 1997, DOE has not had baseline estimates of all of the technical work that it expected to complete through submission of a license application and the estimated schedule and cost to complete this work. This condition includes the cost and schedule information contained in DOE's budget request for fiscal year 2003.

When DOE hired Bechtel to manage the nuclear waste program, one of the contractor's first assignments was to document the remaining technical work that had to be completed to support the submission of a license application to NRC and to estimate the time and cost to complete this work. The contractor's revised, unofficial baseline for the program shows that it will take until January 2006 to complete essential technical work and submit an acceptable license application. Also, DOE had estimated that completing the remaining technical work would add about $1.4 billion to the cumulative cost of the program, bringing the total cost of the Yucca Mountain project's portion of the nuclear waste program to $5.5 billion. As noted earlier, DOE accepted only the fiscal year 2002 portion of the proposed baseline and then directed the contractor to prepare a plan for submitting a license application to NRC by December 2004. The resulting plan is now under review within DOE.

Because of these management weaknesses, we recommended in our December 2001 report that the secretary of energy reestablish the baseline through the submission of a license application and follow the department's management requirements, including a formal procedure for changing program milestones. According to DOE, it is currently in the process of establishing a new baseline for the nuclear waste program. Mr. Chairman, this concludes our prepared statement. We would be happy to respond to any questions that you or members of the subcommittee may have.

BACK

United States House of Representatives

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Testimony of Laura Chappelle

on behalf of the Michigan Public Service Commission

April 18, 2002

Mr. Chairman and Members of the Subcommittee:

Good Morning. My name is Laura Chappelle. I am the Chairman of the Michigan Public Service Commission. I am here today on behalf of the National Association of Regulatory Utility Commissioners, commonly known as NARUC, and the Michigan Public Service Commission. I greatly appreciate the opportunity to appear before the Subcommittee on Energy and Air Quality and I respectfully request that NARUC's written statement be included in today's hearing record as if fully read.

NARUC is a quasi-governmental, nonprofit organization founded in 1889. Its membership includes the State public utility commissions for all States and territories. NARUC's mission is to serve the public interest by improving the quality and effectiveness of public utility regulation. NARUC's members regulate the retail rates and services of electric, gas, water and telephone utilities. Each State Commission and my Commission have the obligation under State law to ensure the establishment and maintenance of such energy utility services as may be required by the public convenience and necessity, and to ensure that such services are provided at rates and conditions that are just, reasonable and nondiscriminatory for all consumers.

NARUC has had a direct stakeholder interest in the civilian radioactive waste management program ever since the Nuclear Waste Policy Act of 1982 (NWPA) established that the federal government is responsible for safe, permanent disposal of high-level radioactive waste and spent nuclear fuel from commercial nuclear reactors, as well as making certain that the utilities pay their share of these disposal costs. The primary reason for NARUC's interest is that the fees paid by nuclear utilities to the Nuclear Waste Fund (NWF) are passed along to ratepayers through their electric bills. We would submit that passing the costs of the NWF on to the ratepayers has been the only aspect of the NWPA to begin on schedule.

We strongly support the President's decision to approve the site at Yucca Mountain for the geologic repository. It is a historic milestone for this troubled program and it is legally and scientifically sound.

I say "troubled" because, as the Subcommittee members know well, there have been a series of technical, political, legal and financial hurdles that have had the cumulative effect of delay to the point where, even under the most optimistic schedule, nuclear waste will not begin to be emplaced in the repository until 2010 – twelve years after the mandate set in the NWPA.

The Department of Energy (DOE) has spent over four billion dollars studying the site at Yucca Mountain for suitability for repository use, in what I have heard described as the most studied piece of real estate on earth. On behalf of NARUC and the State of Michigan, we praise the dedication and professionalism of the inter-disciplinary public and private sector team of scientists who have worked on this unprecedented venture and upon whose analytic investigations the President can rely upon with confidence.

The science is right. Analyses by the DOE team show that a repository at Yucca Mountain can be designed, built, operated, monitored and eventually sealed while meeting all statutory and regulatory requirements to protect public health and the environment. Principle among those requirements is the radiation standards established by the Environmental Protection Agency. While the scientific research about Yucca Mountain continues, more than enough is known at this point to support the site designation today.

The time is right. Yucca Mountain is the right place. While we can never have perfect information, it is hard to imagine a better site. We know there are questions that remain to be addressed to the fullest extent required to support a license approval by the Nuclear Regulatory Commission, but extensive findings support the President's decision to advance toward that next step. Secretary of Energy Abraham put it in the right context in his site recommendation when he observed that Yucca Mountain has been studied for a longer amount of time than it took to plan and complete the moon landing. Let us move on.

First and foremost, let us continue to focus on sound scientific facts surrounding the site designation, not the fear campaign being conducted in particular, on the subject of nuclear waste transportation. It ignores the excellent safety record of transportation of nuclear materials over the past 30 years. Each of those shipments, and all future shipments to Yucca Mountain, are and will be carefully planned and conducted under NRC, as well as other federal and State agency regulatory oversight. The public is largely unaware of that record, however, and is often predisposed to believe the worst about anything nuclear. The public may not realize, that despite claims of "100,000 shipments through 43 States and many large cities over 40 years," DOE has yet to choose either the mode (truck or rail) of shipments or any of the routes. In the Final Environmental Impact Statement for Yucca Mountain, DOE states a "preference for the mostly rail scenario," which would involve more like 11,000 shipments over 24 years. If the "mostly truck" alternative is more feasible, it would involve 53,300 shipments over the same period. We join others in urging that DOE consult with federal, State, tribal and local governments – as DOE has said it will – to coordinate these important decisions so that all will be prepared to ensure that the past safety record is sustained or exceeded. DOE is working today with the transuranic shipments to the Waste Isolation Pilot Plant (WIPP) in New Mexico and we believe that States and local governments, with the assistance to public safety officials provided for in Section 180 of the NWPA, can be prepared so that waste can be safely moved to Yucca Mountain.

In Michigan, we have been preparing for the eventual shipment of spent nuclear fuel from the plant sites for a number of years, and we believe that this material can be safely shipped, beginning tomorrow, if the opportunity arose.

The Secretary of Energy's Site Recommendation to the President is compelling. While NARUC did not join the flurry of press releases that were unleashed the day the report was out, because we chose to read the recommendation first, we did issue a release praising the recommendation and the President's acceptance of it the following Monday. The Secretary carefully examined the statutory and regulatory requirements and summarized the analyses, derived from a plethora of supporting technical documents. As a result of this exhaustive examination of the data, the Secretary presented the conclusion that the scientific basis exists to meet the requirements. Additionally, he developed and added the five "compelling national interests" that are found in the recommendation. It is often lost in the discussions of this subject, for example, that a geologic repository would still be needed for defense-related materials even if there never were nuclear power plants. Secretary Abraham is to be commended for the diligence with which he applied his own evaluation of the site qualifications and need, including addressing the arguments against recommending the site.

We support the President's decision to accept the recommendation. He is aware of the likely criticism and expected reactions from those who either oppose anything to do with nuclear energy or the actions taken by Congress in 1987 to designate a single site to examine for suitability. In our opinion, President Bush has the

sound science basis to support the decision he has made.

I would like to return to what I mentioned at the outset of my remarks. NARUC and its members have a direct interest in the disposal of spent fuel from commercial power plants for two reasons:

1. Unless the government finds a way to dispose of spent nuclear fuel, some nuclear plants may need to shut down if they are unable to meet their license requirements to store used fuel in pool or dry storage. That will have heavy financial, environmental or energy supply consequences – probably all three. And it likely rules out any utility being willing to invest in a new nuclear plant.

2. Most importantly, we represent ratepayers in 41 States who have, in good faith, paid over $19 billion into the Nuclear Waste Fund (including interest) and have little to show for it. The $19 billion consists of $17 billion that has been paid by the utilities into Federal Nuclear Waste Fund, and a little more than $2 billion in debt to the Fund that some utilities have elected to hold until a future date. Under any circumstances, the utility ratepayers that are represented by NARUC's members have paid the fees required to pay for this program. Worse, they have also had to pay utilities that had to bear additional on-site waste storage expenses when DOE missed the 1998 date to begin removing the fuel. In my State of Michigan, ratepayers have paid over $430 million into the Fund and I have to explain to them that it will be at least another eight years before they see any return on that investment. In fact, among the States, we often ask, "Why, after DOE failed to meet its contracted 1998 deadline, are we still paying that fee?"

Therefore, it is a matter of equity to those who are paying for this program that we move forward to the next step. Let the technical and legal experts of the Nuclear Regulatory Commission make the decision that really counts, whether to issue a construction license for the repository. That is the role the NWPA assigns to the independent Commission which bears the mission to protect the public health, safety, and the environment for all nuclear activities in this country, in a rigorous and adjudicative public process.

The equity is pretty simple. When you make an obligation, you honor it or you face the consequences. Since the Nuclear Waste Policy Act set the policy that the disposal of the Nation's high-level radioactive waste must be the Federal Government's responsibility, the utilities can hardly switch to another removal agent. Similarly, the electric utility ratepayers or consumers have upheld their part of the deal. The money has been paid to the utilities to pay the Federal Government to pay for the program. Given the sound scientific basis for the Secretary and President's decisions to recommend the site, it is now time for the U.S. Congress to do the right thing, honor its commitment and move this program to the next step of the license application process.

A final issue I would like to address is the so-called "PECO Alternative." In his notice of disapproval for the repository, Nevada Governor Kenny Guinn asserts that there is a "viable alternative to Yucca Mountain" by which he refers to the example of a settlement agreement reached between PECO Energy and the Department of Energy (DOE) over expenses already incurred by PECO at its Peach Bottom Nuclear Plant. Those expenses have already been incurred and were due solely to DOE's failure to meet the NWPA mandate to begin accepting commercial spent nuclear fuel in 1998 and as contractually bound with PECO. Governor Guinn has misinterpreted the stopgap measure to recover costs of waste acceptance delay as a substitute for geologic disposal. In short the "PECO Alternative" is not an alternative at all.

The Nuclear Waste Policy Act sets national policy for geologic disposal as the permanent solution for all high-level radioactive waste disposal. It does not allow for temporary on-site storage costs to be paid from the Nuclear Waste Fund, which is why several utilities are suing DOE over the Peach Bottom settlement. The settlement agreement basically allows the utility to forgo required payments to the Nuclear Waste Fund up until the amount agreed in the settlement. This has the effect of diverting NWF payments that are intended for permanent disposal to cover on-site storage costs that are due solely to the government's ongoing failure to

begin waste acceptance. If all utilities were to enter into similar settlements, there would be no revenue flowing to the NWF and the repository could never be built. Moreover, for those plants already shut down there are no payments to credit against the storage costs.

Leaving spent fuel at current commercial and government storage sites indefinitely is not the solution to the waste disposal problem that the NWPA contemplated, over twenty years ago, by geologic disposal at a suitable site. The PECO settlement does not provide for geologic disposal nor has the Peach Bottom site or any of the other 71 reactor locations been studied for suitability for indefinite storage. The Yucca Mountain Environmental Impact Statement did a comparison of leaving nuclear waste at 77 commercial and government sites for the same 10,000 year period of isolation from the human environment as the geologic repository and found that two variations of the "No Action" approach were either going to cost $5 trillion dollars or have intolerable human and environmental consequences, depending on what assumptions were made about regulatory compliance for the sites once the reactors reach the end of their productive operating lives. There is no need for Congress to "explore" the PECO approach: the Environmental Impact Statement has already done that and the financial or environmental consequences are simply unacceptable.

In conclusion, NARUC has been frustrated in the past with all the delays, but we are encouraged that the President has recommended that the program move forward and we urge the Congress to enable that.

Thank you for this opportunity to present our views. We would like to come back at a future point to lend our support to the goal that the Subcommittee tried to achieve through H.R. 4 last year, to reform the Nuclear Waste Fund so it is fully available for its intended purpose. Without such reform the repository may never be built, even if approved.

Summary:

- NARUC supports the President's decision to approve the site at Yucca Mountain for the geologic repository.
- Analyses show that a repository at Yucca Mountain can be designed, built, operated, monitored and eventually sealed while meeting all statutory and regulatory requirements to protect public health and the environment. While the scientific research about Yucca Mountain continues, enough is known at this point to support the site designation today.
- Transportation of nuclear material is not new and the public is largely unaware of that there has been an excellent safety record of transportation of nuclear materials over the past 30 years.
- Unless the government finds a way to dispose of spent nuclear fuel, some nuclear plants may need to shut down if they are unable to meet their license requirements to store used fuel in pool or dry storage. That will have heavy financial, environmental or energy supply consequences – probably all three. And it likely rules out any utility being willing to invest in a new nuclear plant.
- Most importantly, we represent ratepayers in 41 States who have, in good faith, paid over $17 billion into the Nuclear Waste Fund (including interest) and have little to show for it. Worse, they have also had to pay utilities that had to bear additional on-site waste storage expenses when DOE missed the 1998 date to begin removing the fuel. In my State of Michigan, ratepayers have paid over $430 million into the Fund and I have to explain to them that it will be at least another eight years before they see the return on that investment. In fact, among the States, we often ask, "Why, after DOE failed to meet its contracted 1998 deadline, are we still paying that fee?"

- The so-called “PECO Alternative” is NOT an alternative.
- Reform the Nuclear Waste Fund so it is fully available for its intended purpose.

BACK

United States House of Representatives

The Committee on Energy and Commerce
2125 Rayburn House Office Building, Washington, DC 20515
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Testimony of Joe F. Colvin

President and CEO, Nuclear Energy Institute

April 18, 2002

Chairman Barton, ranking member Boucher and distinguished members of the subcommittee, I am Joe Colvin, president and chief executive officer of the Nuclear Energy Institute. I am pleased to have this opportunity to testify regarding the President's recommendation of the Yucca Mountain, Nev., site as our nation's repository for used fuel rods from commercial nuclear power plants and high-level radioactive waste from our country's defense programs.

NEI coordinates public policy on issues affecting the nuclear energy industry, including the management of used nuclear fuel from 103 commercial nuclear power plants that produce electricity for one of every five homes and businesses in the United States. The Institute represents nearly 275 companies, including every U.S. company licensed to operate a commercial nuclear reactor, industry suppliers, fuel fabrication facilities, architectural and engineering firms, organized labor, law firms, radiopharmaceutical companies, research laboratories, universities and international nuclear organizations.

The nuclear energy industry strongly supports the decision by President George Bush that Yucca Mountain be further developed as a disposal facility to manage used nuclear fuel and other high-level radioactive waste.

The industry appreciates this opportunity to provide its perspective on this important program. Building a specially designed repository at Yucca Mountain will begin the process of moving used nuclear fuel and high-level radioactive waste now stored at 131 sites¾including Department of Energy facilities, university reactors, defense sites and commercial nuclear plants¾to one safe and secure facility under a remote Nevada desert ridge.

Used fuel is safely stored at nuclear power plant sites, either in steel-lined, concrete vaults filled with water or in steel or steel-reinforced concrete casks or bunkers with steel inner canisters. Although the Nuclear Regulatory Commission (NRC) determined that used fuel could be stored safely at plant sites for 100 years, scientific consensus supports disposal in a specially designed underground repository. The Nuclear Waste Policy Act of 1982 codified this longstanding federal policy, and the 1987 amendments to the law required the Energy Department to study Yucca Mountain solely as a specially designed underground repository.

Nonetheless, more than four years ago, the federal government defaulted on its obligation—under the law and in contracts between utilities and DOE—to begin moving used fuel from the nation's nuclear power plants. Because of the government's default, electricity consumers still are paying for additional on-site storage over and above the $18 billion already committed to the federal repository program. DOE's delay in managing the federal nuclear fuel program has forced nuclear power companies to store more used fuel than expected for longer than originally intended. By the end of 2006, about 60 reactors will run out of their original storage space, and by the end of 2010, 78 reactors will have exhausted their original storage capacity. Companies that have not added on-site storage capacity by those dates would have to do so at that point.

As a result of the Energy Department's default on its January 31, 1998, obligation to begin moving used nuclear fuel from nuclear power plants, electricity consumers will have to pay an additional $5 billion to $7 billion for used fuel management, assuming the repository is available in 2010¾and much more if repository operation does not begin by 2010. Nuclear power plant owners are suing the federal government in the U.S. Federal Claims Court due to DOE's failure to meet the 1998 obligation. The court has reaffirmed the federal government's obligation and the lead cases are in the damages phase. The Department of Energy must move forward with the Yucca Mountain project, under the current schedule, to meet its legal commitment to consumers to begin receiving used nuclear fuel at a federal disposal facility and to limit the federal liability for missing the 1998 deadline to a minimum.

Nevada's April 8 notice of disapproval of the President's Yucca Mountain recommendation brings the federal government to the next step in the deliberative process established in the Nuclear Waste Policy Act. It is now up to the Congress to approve Yucca Mountain and advance the program from the study phase to the license application phase. The nuclear energy industry calls on Congress to fulfill its responsibility to advance the national interest and approve the site.

Approval of a repository at Yucca Mountain is key for U.S. energy security, our national security, future growth of our economy and nuclear energy, and absolutely essential for environmental protection.

Scientific Basis Supports Yucca Mountain Recommendation

Deep geologic disposal, like the proposed repository at Yucca Mountain, has been identified by the world's leading scientists as the best way to isolate radioactive byproducts while protecting public safety and the environment for thousands of years. Twenty years of world-class study by hundreds of expert scientists and engineers -- 36 million hours in all -- have produced an indisputable body of evidence supporting the designation of Yucca Mountain as a repository site.

The scientific evaluation of Yucca Mountain is unmatched by any other comparable endeavor in the United States. Teams of the world's best scientists examined every aspect of the natural environment at Yucca Mountain—including collecting and examining more than 75,000 feet of core rock and 18,000 geologic and water samples, mapping and modeling various features of the mountain, and conducting an array of scientific experiments in six and one-half miles of tunnels in an underground laboratory. One of those experiments is the largest known test in history to simulate heat effects of a repository on the rock at Yucca Mountain.

Scientists have used this vast collection of data to develop computer simulations of the natural features, events and processes that exist at Yucca Mountain. They also have used these models to forecast how the facility will perform hundreds and thousands of years from today. In addition to the natural systems that would protect the public and the environment, a series of man-made safety features—including corrosion-resistant alloy containers that will hold the reactor fuel rods—will be incorporated in the repository design to further protect public safety and the environment. Numerous oversight groups have thoroughly reviewed the results of DOE's scientific studies, including the NRC, the Nuclear Waste Technical Review Board, the University of Nevada system, as well as international groups. These scientific studies also have been subject to extensive scientific peer review.

In Secretary Abraham's recommendation to the President, he said: "The first consideration in my decision was whether the Yucca Mountain site will safeguard the health and safety of the people, in Nevada and across the country, and will be effective in containing at minimum risk the material it is designed to hold. Substantial evidence shows that it will."

A broad spectrum of experts, including the International Atomic Energy Agency and Lawrence Berkeley National Laboratory, agree that there is scientific information to support the President's recommendation of Yucca Mountain as a safe repository site.

The Nuclear Waste Technical Review Board, a scientific advisory panel to the U.S. Congress, reported to Congress in a January 24 letter that research at Yucca Mountain indicates that "no individual technical or scientific factor has been identified that would automatically eliminate Yucca Mountain from consideration as the site of a permanent repository." Although pointing out issues where further DOE attention should be focused, the NWTRB said that there is no reason that the Yucca Mountain program should not move forward. The outstanding issues identified by the NWTRB will be resolved during the DOE licensing process with the Nuclear Regulatory Commission. In fact, several of these issues already have been resolved to NRC's satisfaction.

We urge Congress to join the scientific community and a far-reaching group of bipartisan governors, state legislators and local officials across the nation who have endorsed the Yucca Mountain repository program.

Despite the comprehensive record of science, some opponents of this project continue to call for additional study. Their claims are thinly veiled attempts to delay this important national facility. The President's recommendation is consistent with the National Academy of Sciences' conclusion in 1990 that a deep geologic repository is "the best option for disposal of high-level radioactive waste." There is no need for additional study on the mode of disposal, or the Yucca Mountain site in particular, in advance of the site selection.

Scientific Analysis Continues During NRC Licensing Phase

I want to clarify an important point regarding Yucca Mountain. The site approval process is a first, but necessary, step that starts the formal design and safety evaluation process for a repository at Yucca Mountain. Scientific evidence supports the approval of the Yucca Mountain site for an underground repository, where used nuclear fuel can be securely managed. After congressional approval of the President's decision, DOE will continue a multi-year scientific process through an extensive licensing review process and, if the license is approved, operation of the facility. The NRC, through its exacting licensing process, must ensure that the repository meets stringent regulatory requirements to protect public safety and the environment. This independent licensing review process will require the resolution of outstanding scientific issues identified in the siting process.

No repository construction can proceed at Yucca Mountain without first being licensed by the NRC. If new scientific issues arise in the process of the licensing review or operation of the repository, they must be resolved or DOE cannot continue. The nuclear energy industry, as a stakeholder in the Yucca Mountain project, will participate in this program with safety as our foremost consideration—just as it is with operation of the nation's nuclear power plants.

Although some 600 scientific and technical reports have been completed on Yucca Mountain over the course of the Reagan, Bush, Clinton and current administrations, scientific research will continue. This ensures that the best scientific insight will continue to be provided in combination with cutting edge engineering and the natural features of Yucca Mountain to protect public safety and the environment.

The U.S. General Accounting Office issued a report last December reviewing the Yucca Mountain project. Instead of investigating the site using scientific reports assembled in the course of 20 years of study, the GAO relied extensively on conversations with DOE's contractor about the project schedule and budget. Remarks by this contractor regarding the licensing schedule for the repository have since been retracted.

The GAO report stated that there are 293 technical items that DOE should resolve with the NRC before a site recommendation could be made. This reflects a fundamental lack of understanding by the GAO about the repository siting process. Neither the law nor the NRC licensing process requires that these items be resolved before a site recommendation can be made. Rather, regulations require that any scientific issues related to assuring protection of public health and safety be resolved during the NRC licensing process and DOE has plans to do so. This requirement has been satisfied.

The NRC stated that it "believes that sufficient …analysis and waste form proposal information, although not available now, will be available at the time of a potential license application such that development of an acceptable license application is achievable."

Electricity Consumers Deserve Return on $18 Billion Investment

Mr. Chairman, the time to move forward with licensing and building a repository has never been more appropriate. The Department of Energy has spent more than $7 billion on scientific and engineering studies that demonstrate that the site is suitable for disposal of used nuclear fuel and that the site is ready to proceed to the license phase. It is important to note that the Yucca Mountain project is funded largely by a tax on the millions of consumers who benefit from the use of nuclear energy. Last year, nuclear power plants generated a record 767 billion kilowatt-hours of electricity. The tax for the Yucca Mountain program collected by the U.S. Treasury totaled more than $728 million. Since 1983, more than $18 billion, including interest, has been committed by consumers solely for DOE's used nuclear fuel management program.

The federal Nuclear Waste Fund has a balance of more than $10 billion because consumer payments into the fund have far exceeded appropriations by Congress for this important environmental program for decades. For example, consumers committed well over $500 million more for the Yucca Mountain program in 2001 than was spent on the project. The industry greatly appreciates the Energy and Commerce Committee's and this subcommittee's commitment to consumer fairness embodied in your efforts to take the Nuclear Waste Fund "off budget" in last year's energy policy legislation.

Yet, delays in the repository program can no longer be tolerated. Although the federal government was to start accepting used nuclear fuel on January 31, 1998, no fuel has been moved to a federal fuel management facility, and DOE projects that no fuel will start moving until 2010 at the earliest.

The Energy Department's delays have resulted in dual payments by electricity consumers for used nuclear fuel management -- one to fund the Yucca Mountain project and a second to pay for additional temporary storage at nuclear plants because of DOE's default. Operation of a federal repository at Yucca Mountain would begin the process of removing used fuel rods from commercial nuclear power plants and the radioactive byproducts from the nation's defense facilities in 39 states—where it was never intended to be stored for the long term. Electricity consumers deserve a solution to this issue that is based on sound science and that protects public safety and the environment.

Conclusion

The federal government must continue on schedule with its program to site, license, and build a used nuclear fuel repository to provide the nation with continued energy security, environmental protection, economic growth and national security. Used nuclear fuel and radioactive defense waste is safely stored at nuclear power plants in 39 states, but the federal government has a legal obligation to consolidate this material at a central location where it can be efficiently managed for the long term.

A repository 1,000 feet below the surface of Yucca Mountain is the safest and most secure place for the

permanent disposal of used nuclear fuel from commercial reactors and high-level radioactive byproducts from our U.S. defense programs. The vast scientific record supports the site designation, and domestic energy security, environmental protection and national security considerations should compel Congress to support the President's recommendation and provide the funding needed to proceed with licensing and construction of a specially designed repository at Yucca Mountain.

There is broad support for congressional approval of the Yucca Mountain repository from a myriad of groups, including:

- African-American Environmentalist Association
- American Public Power Association
- Council for Citizens Against Government Waste
- Covering Your Assets Coalition
- Edison Electric Institute
- Frontiers of Freedom
- Hispanic Business Roundtable
- International Brotherhood of Electrical Workers
- The Latino Coalition
- National Association of Manufacturers
- National Association of Neighborhoods
- National Black Chamber of Commerce
- Nuclear Energy Institute
- 60 Plus Association, Inc.
- The Seniors Coalition
- United Seniors Association, Inc.
- U.S. Chamber of Commerce
- U.S. Hispanic Chamber of Commerce
- Utility Workers Union of America

In the press, editorial pages by a margin of 7 to 1 support the Yucca Mountain project, including:

- *Albuquerque Journal*

- *Chicago Sun-Times*
- *Chicago Tribune*
- *Cleveland Plain Dealer*
- *The (Allentown, Pa.) Morning Call*
- *The New York Times*
- *Tennessean*
- *The Wall Street Journal*
- *The Washington Times*
- *Wilmington (N.C.) Morning Star*

In his letter forwarding the Yucca Mountain site recommendation to the President, Energy Secretary Abraham said, "First, and most important, I have considered whether sound science supports the determination that the Yucca Mountain site is scientifically and technically suitable for the development of a repository. I am convinced that it does."

Mr. Chairman and distinguished members of this subcommittee, scientists and policymakers alike are convinced that the Yucca Mountain site is scientifically and technically suitable to be the nation's repository for used nuclear fuel from nuclear power plants and high-level radioactive waste from Defense Department programs. It is imperative that Congress support continued timely progress toward development of a national repository at Yucca Mountain.

A repository is imperative for our energy security, given that nuclear energy provides 20 percent of all U.S. electricity and is the largest emission-free source of electricity.

A repository is imperative for our national security because about 40 percent of our Navy's most essential vessels, such as aircraft carriers and submarines, are nuclear-powered ships.

A repository is imperative for future growth of our economy and nuclear energy, which is the only large source of electricity that is readily expandable and does not produce greenhouse gasses or other harmful emissions.

A repository is imperative for environmental protection, particularly at facilities in Colorado, Idaho, New Mexico, New York, South Carolina and Tennessee where defense waste is stored, and in Maine, Connecticut, Oregon, Illinois, California and other states where sites with decommissioned reactors cannot be returned to greenfield status without a repository to accept used fuel rods stored at those plants.

And, a repository is imperative to promote U.S. non-proliferation objectives by providing a disposal facility for surplus weapons grade plutonium.

Mr. Chairman, an editorial in the March 9 *New York Times* summarizes, I believe, the prevailing notion held by many regarding Yucca Mountain. The *Times* said, "It is time to determine, once and for all, whether Yucca Mountain is a suitable disposal site, or whether the nation will need to look elsewhere…The Nuclear

Regulatory Commission, the chief guardian of the public's health, has ruled that enough information will be available to support a licensing application. The reason to proceed now is that it will force all parties to come up with final answers to a problem that has been allowed to fester too long."

After 20 years of scientific and engineering study and billions of dollars from consumers used to fund this research, a large, indisputable body of research results supports the President's decision.

Thank you.

BACK

United States House of Representatives

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Testimony of Jim Dushaw

on behalf of the International Brotherhood of Electrical Workers

April 18, 2002

My name is Jim Dushaw and I am the Utility Department Director for the International Brotherhood of Electrical Workers, the IBEW.

Mr. Chairman, on behalf of IBEW President Ed Hill, and IBEW members, especially worker members who are associated with the commercial nuclear power industry, thank you for the opportunity to present our views on the Yucca Mountain nuclear waste repository issue.

The IBEW is a labor union with approximately 780,000 members, including many workers at nuclear facilities. Of the 70,000 union jobs within the nuclear industry, the IBEW represents 15,000 full-time workers at 74 nuclear stations. Thousands more IBEW members rotate through the plants with the contractor work force as needed for maintenance and refueling outages. With a history of work in the commercial nuclear industry dating back to the 1950s, and the test reactor at Shippingport, Pennsylvania, IBEW nuclear workers can say without reservation that this is an industry with a proven record of exceptional safety. It is among the safest industrial work environments in the United States.

The commercial nuclear industry is a source of high quality, safe, well-paying jobs for tens of thousands of IBEW members and many others as well. Does it follow then that our union is biased in favor of sustaining nuclear power? Yes, but that is not the exclusive reason for the IBEW's support for moving forward with development at Yucca Mountain.

I am not an engineer, physicist, geologist, nor do I profess to have any special technical knowledge relevant to the Yucca Mountain issue. However, IBEW members want common sense to be heard on this issue. We applaud the President's decision to move forward with development of a spent fuel repository at Yucca Mountain, and urge Congress to approve the President's decision over the state of Nevada's objection.

We support the President's decision on several counts; most importantly, the IBEW has, at least since the late 1970s, adopted formal resolutions during several consecutive IBEW International Conventions, the union's highest governing body, that deal particularly with the need for "expediting" the establishment of a federal repository for nuclear waste. A similar resolution was passed without exception by delegates to the 36th IBEW International Convention September 12, 2001.

Mr. Chairman, the IBEW is by name and fact an organization associated with the energy industry. We are also consumers, environmentalists and working folks. We engage in energy policy issues often, and we do so from many perspectives. The development of public policy with respect to energy, environmental protections, and the well-being of the nation now and for the future, is of great concern for IBEW members.

The IBEW view is that there is a compelling need for the nation to develop in a thoughtful, but accelerated

and safe fashion, all domestic energy resources, including nuclear, in order to fuel economic growth, provide jobs for a growing population, protect our environment, assure energy and, therefore, economic security. For all of these reasons, the nation can ill afford indecisive outcomes on vital energy issues in such threatening times as have come upon us.

We are satisfied to leave the technical discussion, of which the Yucca Mountain debate is overflowing, to the qualified experts. The IBEW has confidence that the President of the United States has made a fully informed decision on the scientific merits in approving the Energy Secretary's recommendation of Yucca Mountain as a permanent nuclear waste storage site. We believe that in the range of alternative solutions, none compare well with the Yucca Mountain plan, which intends to place spent fuel and nuclear waste where the potential for any harm and any access is tightly controlled and monitored.

If plants start closing down due to a lack of spent fuel storage space, jobs will disappear, and consumers, for no compelling reason, lose a real contender for low-cost electricity in the newly competitive electric supply industry. If even one plant is forced to shut down because of a lack of spent fuel storage space, hundreds, possibly thousands, of jobs will be irretrievably lost. Forcing higher than necessary costs on plant operation with on-site storage makes no sense, as consumers suffer the consequences.

It is clear the nation needs to have a place to put the used nuclear fuel to ensure continued operation of our nuclear power plants. Scientists have been studying Yucca Mountain for more than a decade. This mountain is the most extensively defined piece of property in the world. DOE's viability assessment shows that based upon the scientific studies of Yucca Mountain, there are no "showstoppers" to continuing development of this urgently needed facility. We are now twelve years behind the goal Congress set forth in the Nuclear Waste Policy Act.

It clearly makes sense that used nuclear fuel should be stored at one centralized storage facility. Fuel is currently stored at more than 130 long-term storage facilities in 39 states. According to the DOE Environmental Impact Statement of 1999, there is significantly more protection for the American public and the environment if we have one central federal repository. We should not pass this problem onto our children and grandchildren, especially since science has proven that we can safely transport and store the fuel at Yucca Mountain.

It is a fact that the spent nuclear fuel can be transported safely. Our existing laws and regulations provide for the safe loading, packaging, transportation and unloading of all kinds of nuclear materials today. There is no reason to believe that the continued transportation of radioactive materials will be any less safe. Union workers are justifiably proud of their safety record in transporting radioactive cargo – both by rail and by truck.

The federal government has a legal obligation to manage and dispose of the used fuel created by the nation's electric utilities. For twenty years, consumers of electricity, including union workers, have paid more than $17 billion into a federal trust fund to pay for the disposal of used nuclear fuel. Only about six billion of these dollars have been spent on the Yucca Mountain project. Congress should move expeditiously to see that the federal government lives up to its lawful responsibility and begins managing the used nuclear fuel as promised.

Science shows that Yucca Mountain is a suitable repository for the used nuclear fuel. In addition, we have proven that we can transport radioactive cargos without harming American citizens or the environment. It just makes sense that we continue forward with Yucca Mountain as the repository for our nation's used nuclear fuel. There's much more than jobs at stake here. The IBEW submits that this issue is a challenge to the nation's will and determination to preserve and further develop all safe energy options.

Thank you.

Summary Statement

- The IBEW is a labor union with approximately 780,000 members and represents 15,000 full-time workers at 74 nuclear stations. Thousands more IBEW members rotate through the plants with the contractor work force.
- IBEW nuclear workers can say without reservation that this is an industry with a proven record of exceptional safety.
- IBEW members want common sense to be heard on this issue and applauds the President's decision to move forward with Yucca Mountain.
- IBEW members are concerned with development of public policy with respect to energy and environment.
- The nation can ill afford indecisive outcomes on vital energy issues.
- IBEW is confident that the President of the United States has made a fully informed decision on the scientific merits of Yucca Mountain.
- Of alternative solutions, none compare well with Yucca Mountain, where the potential for harm is best controlled and monitored.
- If operating nuclear plants start closing, jobs will disappear, consumers lose low-cost electricity.
- Forcing higher than necessary costs with on-site storage makes no sense.
- DOE's viability assessment shows no "showstoppers".
- We are twelve years behind the goal set forth in the Nuclear Waste Policy Act.
- It makes sense that used nuclear fuel should be stored at one centralized storage facility as opposed to more than 130 long-term storage facilities in 41 states.
- Existing laws and regulations provide for the safe loading, packaging, transportation and unloading of all kinds of nuclear materials. No reason to believe that radioactive materials will be any less safe.
- Federal government has a legal obligation to manage and dispose of the used fuel.
- Consumers have paid more than $17 billion into federal trust fund to pay for the disposal of used nuclear fuel.
- The federal government should live up to its lawful responsibility.
- This issue is a challenge to the nation's will and determination to preserve and further develop all safe, affordable, reliable energy options capable of sustaining reasonably projected needs.

BACK

United States House of Representatives

The Committee on Energy and Commerce
2125 Rayburn House Office Building, Washington, DC 20515
(202) 225-2927

Testimony of Joan Claybrook

President, Public Citizen

April 18, 2002

Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to testify on the president's February 14th recommendation that a nuclear waste repository be developed at Yucca Mountain, Nevada. I am President of Public Citizen, a national non-profit public interest organization with 150,000 members nationwide. Public Citizen works to protect citizens and the environment from the dangers posed by nuclear power and advocates for safe, affordable, and sustainable energy policies.

In the coming months, Congress will face an unprecedented decision about whether to support or override the Governor of Nevada's Notice of Disapproval to prevent establishing a Yucca Mountain repository for 70,000 metric tons of high-level radioactive waste from commercial nuclear power plants and Department of Energy (DOE) weapons activities.

Public Citizen urges the Committee to decisively reject Energy Secretary Spencer Abraham's unscientific site recommendation, support the Notice of Disapproval and stop the Yucca Mountain Project, in order to protect public health and safety. The DOE has a long record of investing in wasteful ventures and white elephants at a cost of tens of billions of dollars to the U.S. taxpayer. No private business could survive operating with such a string of misjudgments and failures. It is time for the Congress to insert a dose of reality and pull the plug on the hazardous Yucca Mountain venture. Just look at the DOE's mishandling of military nuclear waste projects, some of which were highlighted by 60 Minutes on Sunday, March 17, 2002 (transcript attached). Yucca Mountain is poised to become another contaminated DOE site if the repository proposal moves forward.

The site is unsuitable

After fifteen years of site characterization studies at a cost exceeding $5 billion, DOE scientists have been unable to demonstrate that a repository at Yucca Mountain could effectively isolate high-level nuclear waste throughout the quarter million years it remains dangerously radioactive. Having originally instructed the DOE to assess the suitability of the site for a geologic repository, Congress should now consider this question answered in the negative, and terminate repository activities at Yucca Mountain.

The geology of the site is ill-suited to the task of containment. Yucca Mountain is a ridge of porous volcanic tuff, highly fractured as a result of seismic activity. Thirty-three earthquake faults are known to exist within and adjacent to the Yucca Mountain site, with additional fault lines expected to develop over time. The proposed repository would lie about 1,000 feet above a freshwater aquifer, which currently provides the only source of drinking water for area residents in Amargosa Valley, Nevada, and parts of Inyo County, California. If radioactivity from the proposed repository reaches the aquifer below, it not only will contaminate this

important source of drinking water, which is in short supply, but also will provide a pathway for potentially dangerous levels of radioactivity to reach the accessible environment.

Although the climate at Yucca Mountain is generally dry, evidence points to relatively rapid movement of water through the rock. Elevated levels of the tracer isotope Chlorine-36 found in the DOE's test tunnel at Yucca Mountain indicate that water traveled from surface- to repository-level (about 1,000 feet) in 50 years or faster. The original siting guidelines (10 CFR 960) would have disqualified the Yucca Mountain site on the basis of water flow time alone.

To prevent the site from being disqualified, the government changed the rules. The DOE inappropriately rewrote the repository siting guidelines in November 2001 to accommodate the deficiencies in the Yucca Mountain site. The revised guidelines (10 CFR 963) are a dangerous departure from the concept of geologic containment and offer an inadequate basis for site recommendation. The new performance-based siting guidelines permit a reliance on "engineered barriers" in an attempt to mask the many problems that should disqualify the Yucca Mountain site. DOE's repository design proposals rely more than 99% on engineered barriers for containment. The geology of Yucca Mountain contributes less than 1%.[1]

Given the difficulties in accurately predicting, on the basis of very limited experience, the performance of engineered barriers over tens of thousands of years, coupled with the inadequacies of the "natural barriers" at Yucca Mountain, it is only a question of when – not if – the proposed repository's isolation systems would fail.

High-level nuclear waste is intensely radioactive and very long-lived. It is one of the most hazardous substances ever created. The waste's dangerous radioactivity will outlast any engineered barriers employed at Yucca Mountain. The Environmental Protection Agency's (EPA) site-specific radiation protection standards for Yucca Mountain (40 CFR 197) arbitrarily established a 10,000-year limit on containment requirements at the repository, which has been subsequently adopted by the DOE in its siting guidelines and the Nuclear Regulatory Commission (NRC) in its Yucca Mountain licensing rule.

Yet high-level nuclear waste will remain dangerously radioactive for much longer. For example, Plutonium-239, which accounts for approximately 1-4% of high-level nuclear waste by weight, has a half-life of 24,400 years and remains dangerously radioactive for close to a quarter-million years. If DOE's optimistic predictions are correct and the underground nuclear waste storage containers at Yucca Mountain do not begin failing from corrosion for 40,000 years, peak radiation dose rates from the proposed repository are expected 100,000-200,000 years into the future – outside EPA's inadequate regulatory timeframe.

The EPA's radiation standards (40 CFR 197) also establish a lower level of environmental protection for Yucca Mountain than the generic rule applicable elsewhere, by expanding the unregulated zone to 18 kilometers from the repository boundary. This site-specific rule allows the DOE to rely on dilution and dispersion in groundwater, rather than containment of radioactivity, and as such sets an inadequate benchmark for performance assessment evaluations. Public Citizen, together with the Natural Resources Defense Council and other environmental and public interest organizations, filed a lawsuit last June challenging these aspects of the EPA rule.

But even projections of the proposed repository's compliance with this inadequate standard are inconclusive. The Nuclear Waste Technical Review Board[2] advised Congress on January 24, 2002, that "the technical basis for the DOE's repository performance estimates is weak to moderate." Also, a December 2001 report by the General Accounting Office highlighted 293 unresolved technical issues, identified by the Nuclear Regulatory Commission, that require further study and analysis.[3] As the GAO report suggests, Secretary Abraham's site recommendation is premature at best.

The risks of nuclear waste transportation cannot be justified

Intrinsic to any assessment of Yucca Mountain's suitability as a national nuclear waste repository is the feasibility of transporting waste to the site. Yet the DOE has consistently downplayed the transportation impacts of the Yucca Mountain proposal. Secretary Abraham's site recommendation does not detail a specific plan for transporting waste from the 77 nuclear power plants and DOE weapons sites across the country where it's currently stored to Nevada. Basic decisions about the mode of transportation (truck, train, or barge) and routes have not yet been made.

The maps of potential Yucca Mountain transport routes, included in the project's final Environmental Impact Statement, indicate that tens of thousands of high-level radioactive waste shipments would likely pass through 44 states and the District of Columbia en route to Yucca Mountain. Recognizing the explosive nature of route designations, the DOE refuses to announce a specific proposal for transporting nuclear waste until after Yucca Mountain is licensed. But based on the Environmental Impact Statement, I have attached a list of members of this committee through whose districts high-level nuclear waste likely will be transported in route to Yucca Mountain We urge the full committee not to vote on the Yucca Mountain Project until DOE reveals precisely which routes would be used for nuclear waste transportation.

Transporting nuclear waste is inherently dangerous because it increases the likelihood of radioactive release and introduces this risk to densely populated areas where the emergency response/public health infrastructure may lack the capacity to respond effectively to a nuclear emergency. The Department of Transportation (DOT) recorded 453,000 crashes involving large trucks in 1999, the most recent year for which statistics are available, including 8,857 hazardous materials shipments.[4] Over the same period, the Federal Railroad Administration reported 2,768 train crashes.[5] According to RailWatch analysis of accident reports, a train carrying hazardous materials in the U.S. runs off the tracks, spills some of its load, and forces an evacuation about once every two weeks.[6]

Since the dawn of the Nuclear Age, approximately 3,000 shipments of high-level nuclear waste have traveled on U.S. roads and rails. This number would be exceeded within the first two years of shipments to the proposed Yucca Mountain repository. While the nuclear industry frequently refers to an accident-free shipping history, a 1996 analysis of DOE accident reports[7] documents 72 "incidents" since 1949 involving nuclear waste shipments, including four involving "accidental radioactive material contamination beyond the vehicle," four with radiation contamination confined to the vehicle, 49 of accidental container surface contamination, 13 traffic accidents with no release or contamination, and 2 incidents with no description. Extrapolating on the basis of this past history and considering, statistically, general traffic crash rates along probable nuclear waste transportation routes, crashes involving Yucca Mountain shipments are certain to occur if the repository program moves forward.

Given the statistical certainty of crashes involving Yucca Mountain nuclear waste shipments, the DOE and nuclear industry safety assurances rest upon the robustness of shipping containers, or "casks," and their ability to contain radioactivity even in the event of a crash. However, we are concerned that in the event of a severe crash, casks may not perform as expected. DOE accident analyses fail to consider the statistical likelihood of manufacturing and human error and its impact on cask performance. Also, NRC license requirements for high-level radioactive waste transport casks rely on computer modeling. Amazingly, currently licensed casks have never had full-scale, dynamic tests. Limited dynamic tests in the 1970s were performed on now-obsolete casks and have not been repeated. In those tests, cask valves and shielding failed during extended fire tests.

Furthermore, the NRC's performance requirements for nuclear waste casks (10 CFR 71.73), established in the 1970s, are outdated and dangerously underestimate the conditions of today's worst-case accident scenario:

- The drop test requires casks to withstand a fall from 30 feet onto an unyielding surface, which simulates a crash at 30 miles per hour. Yet no regulations are in place to limit to 30 mph the speed at which nuclear waste shipments can travel. This test condition could easily be exceeded, if, for instance, a cask traveling at regular highway speeds (now 65-75 miles per hour) crashed into oncoming traffic or a virtually unyielding structure such as a bridge abutment.

- The burn test requires casks to withstand an engulfing fire at 1475 degrees Fahrenheit for 30 minutes. Other materials routinely transported on our roads and rails could spark a hotter fire (diesel burns at 1850 degrees) and could potentially burn for longer than half an hour. Last summer's fire in Baltimore's Howard Street train tunnel – which the DOE has identified as a potential Yucca Mountain shipment route - burned for more than 3 days and likely reached temperatures of at least 1500 degrees. If a nuclear waste cask had been on the train involved in that accident, its containment would have been breached, exposing 345,493 people in the area to radiation and costing at least $13.7 billion dollars to clean up.[8]

- The puncture test requires casks to withstand a free-fall from 40 inches onto an 8 inch-long spike. A train derailment or a truck crash on a bridge could result in a fall from much higher than 40 inches and potentially result in puncture damage to the cask's shielding.

- The same cask is required to withstand submersion in 3 feet of water, and a separate test requires an undamaged cask to withstand submersion in 200 meters of water (656 feet) for 1 hour. If a crash involving a nuclear waste shipment occurred on a bridge or barge, a damaged cask could be submerged in depths greater than 3 feet. Furthermore, given the weight of nuclear waste transport casks, it is not reasonable to assume that a submerged cask could be rescued within one hour. Licensed truck casks weigh 24-27 tons, loaded, and train casks can weigh up to 125 tons, loaded. In the case of a barge transport accident, if a crane capable of lifting such a massive load out of the ocean were not immediately available, water pressure over longer periods could result in cask failure and radiation release.

The prospect of transporting high-level nuclear waste across the country through major population centers also poses a security risk, particularly in the current context of heightened national security concerns. Immediately following the September 11th terrorist attacks, at least 10 people were arrested on charges of possessing fraudulent permits for transporting radioactive and hazardous materials.

Regulatory requirements are also inadequate to protect against the risk of terrorist attacks. Although the Nuclear Regulatory Commission does not require transportation casks to be tested against this vulnerability, tests and studies have demonstrated that an anti-tank weapon could easily penetrate a nuclear waste transportation cask and result in a potentially catastrophic release of radiation. In a 1998 demonstration at Aberdeen Proving Ground, a TOW anti-tank missile shot at a Castor V-21 storage cask blew a hole through the wall of the cask. Analysis by the state of Nevada indicates that a successful terrorist attack on a GA-4 truck cask using a common military demolition device could cause 300 to 1,800 latent cancer fatalities, assuming 90% penetration by a single blast. Full perforation of the cask, likely to occur in an attack involving a state-of-the art anti-tank weapon such as the TOW missile, could cause 3,000 to 18,000 latent cancer fatalities. Cleanup and recovery costs would exceed $17 billion.[9]

Yet just last month, on March 11, 2002, CIA national intelligence officer Robert Walpole told the Senate Government Affairs Committee that while the chance that a missile with a nuclear, chemical, or biological

warhead will be used against U.S. forces or interests is greater today than during most of the Cold War, the agency's analysts believe there is an even greater threat that such a weapon will be delivered by truck, ship or airplane "because non-missile delivery means are less costly, easier to acquire, more reliable and accurate".[10]

On September 11, 2001, and again in October when U.S. forces entered Afghanistan, Secretary Abraham suspended all nuclear shipments because of the security risks they pose. Yet his Yucca Mountain site recommendation, issued only 5 months later, failed to acknowledge or address this security concern in relation to the tens of thousands of nuclear shipments that would be launched by the Yucca Mountain Project.

The unintentional and non-accident risk of nuclear waste transportation is also a concern. NRC regulations allow nuclear waste shipping casks to emit 10 millirem of radiation – the equivalent of a chest X-ray – per hour from a distance of 6.5 feet. The cumulative impact of routine radiation exposure from Yucca Mountain nuclear waste shipments on other motorists (maximized in gridlock traffic scenarios) and people who live or work along transport routes has not been adequately examined.

The multiple risks associated with transporting large volumes of nuclear waste over long distances to an unsuitably sited repository in Nevada simply cannot be justified. Since a repository at Yucca Mountain necessarily involves an unprecedented program of nuclear transportation, we urge the Committee to fully consider the impact of the many transportation dangers in its evaluation of the Yucca Mountain Site Recommendation.

The integrity of the process has been undermined

The dramatically flawed process railroading the Yucca Mountain Project toward approval undermines the credibility of Secretary Abraham's site recommendation. The downgrading of environmental regulations (EPA's more lenient site-specific radiation protection standards and DOE's revised siting guidelines that prevent Yucca Mountain from being disqualified) has set a dangerous precedent of sacrificing public health and environmental safety to nuclear industry interests. And yet even these underhanded decisions cannot mask the fact that this site is not suitable, as the GAO, IG, and Nuclear Waste Technical Review Board have made clear.

A Public Citizen report released April 1, 2002, indicates that nuclear industry interests may have directly biased Secretary Abraham's site recommendation. The report is attached. According to our research, the nuclear industry contributed $82,728 to Secretary Abraham's failed bid for re-election during the 2000 election cycle, and in 2000 alone, top nuclear contributors to his campaign spent more than $25 million – nearly half a million dollars each week – on lobbying efforts that included support for the repository proposal. Public Citizen, in January 2002, requested that Secretary Abraham recuse himself from Yucca Mountain site recommendation activities, based on the precedent of Attorney General John Ashcroft recusing himself from the Justice Department's Enron investigations because the failed energy trading company had contributed $75,000 to his election campaign. Our letter to Secretary Abraham is attached. We have received a legalistic response that doesn't deal with the issue of the appearance of impropriety.

As another indication of pro-industry bias in the Yucca Mountain Project, a November 2001 report by the DOE Inspector General disclosed that the law firm Winston & Strawn was simultaneously employed as counsel to the DOE, working on the Yucca Mountain Project, and registered as a member of and lobbyist for the Nuclear Energy Institute between 1992 and 2001. The executive summary of this report is attached. The DOE, as a federal agency, is supposed to be objective and unbiased in its evaluations of the repository proposal and to uphold the same standards of integrity for its contractors. Yet it hired a member of the Nuclear Energy Institute, the lobbying arm of the nuclear industry that specifically advocates in favor of the proposed nuclear waste repository at Yucca Mountain, which would serve the narrow financial interests of its nuclear

industry members. The involvement of Winston & Strawn lawyers in both shaping the DOE's Yucca Mountain activities and advising and lobbying on behalf of the Nuclear Energy Institute on nuclear waste legislation undermines the integrity of the recent site recommendation. After this conflict was publicly disclosed, Winston & Strawn resigned from the Yucca Mountain Project. But even in the wake of this scandal, but the firm's work was not withdrawn.

The same Inspector General report notes that TRW, Inc., hired by the DOE as the managing and operations contractor for the Yucca Mountain Project until February 2001, was simultaneously engaged in lobbying activities on nuclear waste storage issues. TRW was additionally implicated in December 2000 as the author of a memo attached to a leaked overview of the DOE Yucca Mountain Site Recommendation Considerations Report (later released as the Preliminary Site Suitability Evaluation and the Science and Engineering Report). The memo indicated that the overview was intended to help supporters of the Yucca Mountain Project express their support for a favorable site recommendation and that "the technical suitability of the site is less of a concern to Congress than the broader issue of whether the nuclear waste problem can be solved at an affordable price in both financial and political terms."

Clearly, the DOE has failed to exercise necessary and proper oversight of its contractors, resulting in an obvious pro-industry bias in the agency's site characterization and site recommendation activities. In January, Public Citizen joined 232 public interest and environmental groups calling on Congress to suspend consideration of the Yucca Mountain Project pending a thorough review of the causes and consequences of contractor conflict of interest in the DOE's site characterization and site recommendation activities. This letter is attached. The public cannot – and lawmakers ought not – have confidence in Secretary Abraham's site recommendation, which has arisen out of such a conflicted and compromised process.

Conclusion

The 1957 National Research Council report, commissioned by the Atomic Energy Commission and which marked the beginning of this government's continuing process to identify "disposal" options for high-level nuclear waste, stated in its summary, "Unlike the disposal of any other type of waste, the hazard related to radioactive waste is so great that no element of doubt should be allowed to exist regarding safety."[11] Numerous unresolved technical, environmental, and policy issues plague the Yucca Mountain Project. To approve the repository proposal would directly threaten the health and safety of current and future residents of Nevada and more than 50 million people who live along likely nuclear waste transportation routes. Furthermore, the failed Yucca Mountain Project serves as a distraction from the serious policy examination and scientific study that is needed to more appropriately address the increasingly urgent issue of high-level nuclear waste management.

We recommend that:

- the Committee uphold Nevada's anticipated Notice of Disapproval of the Yucca Mountain Project and reject any siting approval resolution;
- the Committee hold additional hearings in all major cities along nuclear waste transportation routes identified in the final Environmental Impact Statement for the Yucca Mountain Project to give the public a voice in this decision;
- Congress and its Committees maintain vigorous legislative oversight of the nuclear waste transportation program that accompanies any repository proposal; and

- Congress initiate a complete review of the civilian nuclear waste management program.

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[1] Nevada Nuclear Waste Project Office analysis of DOE presentation to Nuclear Waste Technical Review Board, 1/25/99.

[2] The presidential-appointed Nuclear Waste Technical Review Board is an independent agency of the U.S. Government. The Board provides independent scientific and technical oversight of the civilian high-level radioactive waste management program.

[3] Nuclear Waste: Technical, Cost and Schedule Uncertainties of the Yucca Mountain Project (December 2001).

[4] Large Truck Crash Facts, 1999, Analysis Division, Federal Motor Carrier Safety Administration, U.S. Department of Transportation (April 2001).

[5] Federal Railroad Administration Office of Safety, http://safetydata.fra.dot.gov/officeofsafety/, viewed 3/16/02.

[6] Why Is There a Train Accident Every 90 Minutes? RailWatch (revised March 1999).

[7] Reported Incidents Involving Spent Nuclear Fuel Shipments, 1949 to Present, Nevada Nuclear Waste Project Office (1996).

[8] Radiological Consequences Of Severe Rail Accident Involving Spent Nuclear Fuel Shipments To Yucca Mountain: Hypothetical Baltimore Rail Tunnel Fire Involving SNF, Radioactive Waste Management Associates (September 2001).

[9] "Potential Consequences of a Successful Sabotage Attack on a Spent Fuel Shipping Container: An Analysis of the Yucca Mountain EIS Treatment of Sabotage," Radioactive Waste Managemet Associates, April 2002.

[10] The Boston Globe March 12, 2002 and The Milwaukee Journal Sentinel March 12, 2002 quoting the Associated Press.

[11]. The Disposal of Radioactive Waste on Land, National Research Council (1957).

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
(202) 225-9446

Opening Statement of Shelley Berkley

U.S. Representative, Nevada

April 25, 2002

As the Representative from southern Nevada, I must express the outrage felt throughout Nevada about the Yucca Mountain project. Over 83 % of the people I represent vehemently oppose Yucca Mountain. Why are Nevadans so outraged? Because the state of Nevada produces not one kilowatt of energy through the use of nuclear power. And we create not one ounce of nuclear waste. Yet the federal government is asking the state of Nevada to store 77,000 tons of high level nuclear waste within an hour's drive of the homes of 1.4 million men, women, and children. We don't want the dump, and our country does not need this dump. Yucca mountain is not the solution to the problem of disposal of nuclear waste.

There is a myth that the approval of Yucca Mountain as a high-level nuclear waste repository will solve the problem of on-site storage. Nothing could be further from the truth. The Department of Energy admits that as long as we produce nuclear energy, nuclear waste will always be stored on-site. When proponents of Yucca Mountain speak of consolidating the 131 storage site into one repository located at Yucca Mountain, it's a deception. We won't be eliminating storage sites, we will be adding another.

The administration's energy plan calls for an escalating reliance on nuclear energy, which means the continued creation of nuclear waste. We will never solve the nation's nuclear waste problem as long as we are pushing an energy policy that continually produces more deadly waste, without offering any solutions. As long as we continue to rely on nuclear power, we will have on-site storage.

Today there are 46,000 tons of nuclear waste stored on-site. If we continue to rely on nuclear power, we will create an additional 2,000 tons of waste a year. At that rate, in the year 2036 when Yucca Mountain is filled to capacity with 77,000 tons of nuclear waste, there will still be 44,000 tons of nuclear waste still stored at reactor sites. That means after 38 years of shipping high level waste through our cities and towns we will have reduced onsite storage of nuclear waste by a mere 4%. I would also emphasize that these figures pre-date proposals to increase nuclear power, so this is a conservative estimate of how much nuclear waste will be on site at mid-Century. Why would we want to ship nuclear waste across 45 states for 38 years if it makes no difference in the amount of waste stored on-site throughout the country?

Why should we worry about transportation? Because more than 123 million people currently live in the 703 counties traversed by the DOE's proposed highway routes, and 106 million people live in counties along DOE's rail routes. DOE predicts that within the next 30 to 40 years between 10 and 16 million people will live within just one half mile of a transportation route. At the peak of the DOE's shipping schedule somewhere in our country a nuclear waste shipment will leave a reactor every four hours. Given the frequency of these shipments and the sheer volume of the nuclear waste, even routine radiation from the nuclear waste casks, given off while passing on the highway, or stuck at a red light, would be a health concern for people living and working in the vicinity of the transportation routes.

And what if there is an accident? The DOE's own environmental impact statement documents that with 108,000 shipments we can expect between 50 and 300 accidents. In just the last two weeks we have unfortunately witnessed two separate devastating train accidents. On Tuesday, a commuter train in California ran head-on into a freight train. On April 18, an passenger train derailed in Florida. Last July, a train carrying hazardous materials derailed in a Baltimore tunnel, closing down the city. That tunnel is on a train route identified by the DOE as a potential route to move waste from the Calvert Cliffs nuclear power plant. Can you imagine if this accident involved nuclear waste?.... The chaos the evacuation would cause? ... The potential number of casualties, the health risks? Can you imagine the cost of the cleanup?

An even greater concern should be the threat of a terrorist attack. With over 108,000 shipments traveling across the country for 38 years, after 9/11 this is a real threat. With the DOE planning as many as 3,000 barge shipments, in major ports like Boston, New Haven, Newark, Jersey City, Baltimore, Norfolk, Miami, Milwaukee, Muskeegon and Omaha, how hard is it to imagine a nuclear U.S.S. Cole incident? We cannot be naive and think there aren't people out there who are willing to give up their lives to end ours.

Two separate tests, one done at Sandia National Laboratory, and the other at the Aberdeen Proving Grounds demonstrates that a TOW missile can breach a nuclear waste canister, and release deadly radiation. This type of terrorist attack, essentially causing a 'dirty bomb' effect, would be disastrous to the environment and human health.

You may think that we have tested these casks for exactly that type of scenario. But casks currently in use around the country are licensed through a combination of scale-model testing and computer simulations. Do we really think it is a good policy to ship 108,000 shipments in casks that have never been actually tested?

The projected costs of the Yucca Mountain project already range from $56 billion to $309 billion. How do we plan to pay for this? The Nuclear Waste Trust Fund only has $11 billion. Where is the rest of the money going to come from? Are we going to raise taxes? Are we going to raid social security? Are we going to increase the surcharge to the nuclear power ratepayers?

And what if that accident or terrorist attack happens? Who is going to pay the cleanup costs, the local governments? How can any of us say that we are fiscally responsible when we are preparing to hand a blank check to the DOE and use the local municipalities and the American taxpayer as the guarantor?

The DOE does not like to talk about cost and transportation, because they know the more we know how much waste is going to be transported through our districts, the more likely we are to oppose this project. Make no mistake about it, this is our last chance to vote on the Yucca Mountain issue. If you are concerned with nuclear waste going through your districts, and you want to have your voices heard, if you want to protect your constituents, you had better speak now. Once you approve this project, you are approving 108,000 shipments of nuclear waste through your districts for 38 years.

An honest evaluation of the Yucca Mountain Project demonstrates that the benefits simply don't match the risks. Yucca does nothing to alleviate on-site storage problems. It creates additional national security concerns with every truck, rail and barge shipment.

This hearing is the last chance we have to question why we are putting our constituents at risk by transporting "mobile Chernobyl's" through their backyards. Transportation is the heart of the DOE's Yucca Mountain plan. If we can't move the waste safely, than we shouldn't move it at all. The Nuclear Regulatory Commission has determined that nuclear waste can be safely stored where it is right now for at least 100 years. We have two choices. We can reject this proposal now, and safely secure the waste where it is currently located while our

nation's best scientists find a workable long term solution; Or, we can deal with the problem later, when we are cleaning up a nuclear catastrophe and trying to explain to our constituents how we let this happen.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
(202) 225-9446

Testimony of Dennis J. Kucinich

U.S. Representative, Ohio

April 25, 2002

Mr. Chairman, I am deeply concerned about massive campaign to move highly radioactive waste across the U.S. to Yucca Mountain, Nevada. My constituents in Cleveland, Ohio will be subjected to repeated shipments with minimal safeguards.

The transportation of high-level radioactive waste to a Yucca Mountain repository would require a massive transportation undertaking. More highly radioactive waste would be shipped in the first full year of repository operations than has been transported in the entire five-decade history of spent fuel shipments in the United States.

The transportation of this waste would require over 96,000 truck shipments over four decades. Almost every major east-west interstate highway and mainline railroad in the country would experience high-level waste shipments as waste is moved from reactors and other sites in 39 states.

The Department of Energy proposes to directly impact 44 states and many of the major metropolitan areas in the nation, at least 109 cities with populations exceeding 100,000. Highway shipments alone will impact at least 703 counties with a combined population of 123 million people. Nationally, 11 million people reside within one- half mile of a truck or rail route.

This never-before-attempted radioactive materials transportation effort would bring with it a constellation of hazards and risks, including potentially serious economic damage and property value losses in cities and communities along shipping routes. Also of concern are the increased security risks from shipments that represent numerous mobile targets within some of the country's most populous and vulnerable metropolitan areas. This committee must understand that high-level nuclear waste will remain deadly for a million years.

If sending nuclear waste down our roads and rails with limited safeguards doesn't bother you, then maybe placing this deadly waste on barges in our rivers, lakes, and oceans will. Because of a lack of rail facilities to several reactors, The Department of Energy will use barge shipments to move this waste to a port cable of transferring the 120 ton cask to a train.

Some of these shipments will occur on the Great Lakes. The Great Lakes is the world's largest source of fresh water. Over 35 million people living in the Great Lakes basin use it for drinking water, and I will venture to guess they will not be appreciative of nuclear waste shipments across their drinking water. I cannot support any plan that even contemplates shipping highly radioactive waste in the Great Lakes.

Before any nuclear waste shipments occur, the federal government must ensure the safety and security of these shipments. Therefore, today, I am introducing the Nuclear Waste Transportation Protection Amendments Act of 2002. This legislation would establish a comprehensive nuclear waste transportation

safety program that establishes greater safety and security enhancements.

Specifically, the legislation would establish:

1. Comprehensive Nuclear Waste Transportation Safety Program - Requires the Secretary of Energy to develop a comprehensive safety program that includes driver selection, independent inspections, bad weather protocols, road condition reporting, safe parking areas, advance notice, real time tracking and monitoring, emergency response, medical preparedness, equipment standards, training and exercises, mutual aid agreements, emergency alternative routing, program evaluation, and public information.

2. Protecting Populated Communities - Prohibits the shipment of waste through areas with a population greater than 50,000 unless the waste originates in that community.

3. Oldest Fuel First - All shipments must begin with the oldest spent nuclear fuel first which will lessen the radiation exposure because older fuel is less radioactive.

4. Full-scale Cask Testing - Requires that transportation casks are tested at full-scale to demonstrate compliance with NRC performance standards. It also ensures a stakeholder role in development of cask testing program, including selection of test facilities, personnel, and peer review.

5. State and Local Route Consultation - Routes must be selected with maximum consultation with affected state, local and tribal governments.

6. Private Carrier Prohibition - Prohibits private carriers from transporting high level nuclear waste. The environmental and security risks are too large to be left to the private sector.

7. Advanced Notification - A minimum of 14 days is required for advanced notification including the advanced notice for local communities, not just states.

8. Security Precautions - Mandate all rail shipments be made in dedicated trains. Mandate three armed escorts per nuclear waste convoy, a trailer vehicle and lead vehicle. Shipments shall be scheduled to avoid regular patterns. Such shipments shall be planned in order to minimize storage times and to assure that deliveries occur at a time when the receiver at the final delivery point is present to accept the shipment.

This legislation offers significant, but reasonable protections, for my district and approximately 320 other districts in this nation who will see high-level nuclear waste transported through their district.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
(202) 225-9446

Testimony of Jim Ensign

U.S. Representative, Nevada

April 25, 2002

Mr. Chairman, I would like to make a simple assertion - taking 70,000 metric tons of dangerous radioactive nuclear waste, removing it from reactor sites around the country, and putting it on trucks and trains and barges moving through cities and towns and waterways across America is a disastrous scheme.

According to the Department of Energy, 50,000 to 100,000 truck shipments, or 10,000 to 20,000 rail shipments and nearly 1,600 barge shipments would be required to transport high-level nuclear waste to Yucca Mountain. Anyone who believes the argument that this waste can be transported without incident only need look at what happened last July in the Baltimore tunnel, when a CSX freight train carrying hazardous waste derailed and set off fires that burned for five days. Imagine a similar incident, only the waste is radioactive.

But even if we put aside the possibility of a catastrophic accident - what about a terrorist attack? In the midst of a global war on terrorism that could last for years, and perhaps decades, trucks and trains carrying radioactive fuel would be prime targets for terrorists. Consider: some 3,000 people died when terrorists hijacked planes and crashed them into the Pentagon and World Trade Towers September 11th. Hijacking or blowing up a truck of nuclear waste would be an easy way for terrorists to devastate one of our major metropolitan areas.

Indeed, the most senior al Qaeda leader in US custody, Abu Zubaydah, told interrogators that al Qaeda is seeking to explode a "dirty bomb" in the United States. Al Qaeda doesn't need to buy nuclear material and smuggle the device into our country. They just have to use a TOW missile to hit a truck carrying nuclear waste. Let's not fool ourselves. Every truckload of nuclear waste going to Yucca Mountain on our highways is a potential "dirty bomb."

NUCLEAR WASTE SECURITY

Mr. Chairman, nuclear power plant sites are among the most secure commercial facilities in the country. Following the events of September 11th, they are being made even more secure, and there are even proposals for military protection at these sites. Modest infrastructure improvements can further increase the level of protection against any conceivable terrorist threat.

After building up all that security, what is the logic of removing spent fuel from this safe and secure storage, putting it on the nation's roads and railways, within easy reach of terrorists?

Secretary Abraham asserts these shipments will be "a secret". They will not - they will be extremely high profile and, because of the long duration of the campaign and large numbers of repetitive shipments, they will be easily predictable.

And even if they were "secret," let's all reflect for a moment about what it means to the people of the towns and communities that will play temporary host to this radioactive refuse. The federal government intends to take highly dangerous nuclear waste, and bring it through your towns and cities, without your even knowing about it. No warnings to local governments. No opportunities for local communities to prepare safety precautions. No chance for parents to protest the shipment routes. An accident or terrorist incident in their backyard would be the first time they learned that their children were in proximity to radioactive waste.

In other words, the federal government is treating every community in America with the same contempt as they are the people of Nevada. In fact, they are treating them with even greater contempt. At least they have had the decency to tell us that we Nevadans will be exposed to radioactive material-the rest of the country will just have to wait for disaster before they find out.

CASKS

And Mr. Chairman, disasters will happen. The NRC hasn't even conducted physical tests on actual casks, only scale models. I wouldn't put my children in a car that hadn't been crash tested; but I'm supposed to put them on a highway next to a truck with casks of nuclear waste that haven't been physically tested.

These casks are going to be traveling by homes, schools, and churches. And at this time we can't be sure they will survive real world conditions. For example, the casks have not been tested in real fires - only with computer simulations - and not to the extent they need to be. The computer simulation is for 30 minutes at 1475 degrees Fahrenheit. The temperature in the Baltimore tunnel fire reached 1500 degrees Fahrenheit and the fire burned for five days.

Last week, in order to better understand the risks of transportation, Senator Reid and I asked the NRC for complete information on every shipment of spent nuclear fuel and high-level radioactive waste shipped in the US by truck, rail, or barge. We have a responsibility to investigate all of the potential risks to public health, safety and the economy posed by these large numbers of shipments.

Yesterday, in the Washington Times, the NRC stated that it is doing a top-to bottom review of security requirements, including a review of transportation cask vulnerabilities to terrorism. Let's make sure these casks are properly tested before the Congress votes on Yucca Mountain.

NOT WORTH THE RISK

Mr. Chairman, it's just not worth the risk to transport 70,000 metric tons of nuclear waste across our nation. Even with Yucca Mountain, there will continue to be nuclear waste stored at all operating reactor sites.

You see, even if it were possible to immediately and magically remove all of the existing spent fuel from commercial nuclear power plant locations, there would still continue to be spent fuel stored at each and every operating reactor in the country. That's because nuclear waste is highly radioactive and thermally hot and must be kept at the reactor sites in water-filled cooling pools for at least five years. The only way spent fuel storage can be eliminated from a reactor location is to shut down the reactor. I don't think that option figures in the nuclear industry's long range plans.

Mr. Chairman, we will have 65,000 metric tons of commercial nuclear waste by the time Yucca Mountain is scheduled to open. We produce 2,000 metric tons of nuclear waste a year. The DOE plans to transport 3,000 metric tons a year. Just do the math. We won't get rid of the nuclear waste backlog for nearly a century - and Yucca Mountain will be filled long before then.

All that moving waste to Yucca will do is create one additional large storage facility. But to do that, the cost

will be tens of thousands of shipments of deadly radioactive waste on the nation's highways and railroads, day after day, month after month, that will travel constantly through cities and communities in 45 states.

So if transporting nuclear waste across our country to Yucca Mountain isn't the answer, what is?

Mr. Chairman, we should keep that waste right where it is, safely stored for the time being. The federal government should offer to take title and liability to the waste stored on site, just as it did in Pennsylvania under the PECO settlement. The NRC has stated fuel can be stored safely on site for at least 100 years in dry cask storage. That leaves plenty of time to continue to develop new technologies at our National Labs to reprocess the waste without producing weapons-grade plutonium as a byproduct.

CONCLUSION

Mr. Chairman, transporting tens of thousands of tons of nuclear waste across the country wasn't a good idea before September 11, and it's certainly not a good idea now. We had never thought of a fully fueled passenger plane as a weapon. Let's not make the same mistake with the trucks, trains, and barges that will be transporting nuclear waste.

You are being asked to risk the health and safety of your constituents for a scheme that will leave this country looking for another nuclear waste storage site 24 years after Yucca Mountain opens. It's just not worth it.

As a legislator, like all of you, I need to be fully informed about the effects of legislation on my constituents before I vote. At least I know that transporting waste to Yucca Mountain will be bad for the people of Nevada. You don't know how transporting nuclear waste to Yucca Mountain will impact the people in your states. The Department of Energy transportation routes published in the final EIS are suggestions; they are not set in stone. It may be better for your folks - it may be worse - but you don't know. And until you do, you shouldn't support Yucca Mountain.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
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Testimony of Kenny Guinn

Governor, State of Nevada

April 25, 2002

Honorable Mr. Chairman and members of the Committee, my name is Kenny C. Guinn and I am Governor of the State of Nevada. These written comments are submitted for the record and supplement my oral testimony. The state of Nevada compliments Chairman Young and Subcommittee Chairmen Quinn and Petri for holding this important hearing on a set of transportation issues that few people in the Congress seem to want to address in a substantive manner.

As is well known by this time, Nevada considers the Yucca Mountain project to be the product of extremely bad science, extremely bad law, and extremely bad public policy. Moreover, implementing this ill-conceived project will expose tens of millions of Americans to unnecessary nuclear transport risks. For these reasons we in Nevada believe, and ask, that Congress should take no further action with respect to the Yucca Mountain project.

Attached to this statement are the Notice of Disapproval and an accompanying Statement of Reasons I recently filed with the U.S. Congress pursuant to Section 116 of the Nuclear Waste Policy Act. Please consider the Statement of Reasons as part of my written testimony to the Committee. In addition, I would like to supplement this testimony with the following:

Recent Revelations on the Unsound Science of Yucca Mountain

I would like to briefly call the Committee's attention to a new document, a key document, which has now appeared from within the scientific community that excoriates the scientific work of the Department of Energy (DOE) in connection with Yucca Mountain. Numerous independent scientific reviewers have now evaluated the project during the past year, and all have reached the same conclusion: There is nowhere near enough information to certify the suitability of the Yucca Mountain site for high-level nuclear waste disposal, and the information that is available suggests the site is woefully unsuitable geologically.

This latest report, however, reaches shocking new conclusions. It is a peer review report commissioned by DOE from the International Atomic Energy Agency and the Nuclear Energy Agency (IAEA) of the Organization for Economic Cooperation and Development (OECD). These agencies assembled some of the world's leading scientists to evaluate, over several months, the total system performance of Yucca Mountain as represented by DOE and its computer models. Among other things, these leading scientists concluded that DOE lacks sufficient information even to build a model to predict the suitability and hydrogeologic performance of the proposed repository. According to the peer review group, the water flow system at Yucca Mountain is "not sufficiently understood to propose a conceptual model for a realistic transport scenario."

Moreover, according to the peer review group, DOE's level of understanding of the hydrogeology of the site is "low, unclear, and insufficient to support an assessment of realistic performance." DOE's sensitivity studies

in its computer models "do not give any clues to the important pathways for the water in the system." Perhaps most troubling of all, in DOE's performance model of Yucca Mountain, "increased ignorance leads to lower expected doses, which does not appear to be a sensible basis for decision-making."

It is truly amazing to me, as an elected executive official, that DOE commissioned this peer review report many months ago, and then made a final "site suitability" determination to the President and the Congress in spite of its stunning conclusions. It shows once again, in my view, that politics has long prevailed over science when it comes to Yucca Mountain. This is another reason for Nevada to redouble its efforts to stop this project - government bureaucrats seem unable to pull the plug, even in the face of shocking independent evidence that the science is bad or nonexistent. A copy of the IAEA/NEA peer review report is attached, together with a brief summary of its findings.

The PECO Solution and the Myth of One Central Storage Site

It is almost certain that, even if Yucca Mountain proceeds, every nuclear utility in the United States will nonetheless have to build an interim dry storage facility for their inventories of spent nuclear fuel, if they have not already done so. This is because Yucca Mountain will not be ready to receive high-level radioactive waste until long after spent fuel pools at reactor sites have been filled to capacity. Moreover, as I have explained in my Statement of Reasons, Yucca Mountain will not reduce the number of storage sites across America for 60 to 100 years, even if no new plants are built, and Yucca Mountain will never reduce the number of storage sites as long as nuclear reactors continue to be built and operated.

Attached to this statement is a copy of the agreement DOE signed with PECO Energy in June 2000. As explained in my Statement of Reasons, the PECO deal is the safe, practical, economic alternative to a severely flawed Yucca Mountain project. It represents what utilities are planning to do, and will have to do anyway, in the real world. I urge the Committee to explore the PECO deal carefully, and to question DOE and the nuclear industry as to why it has recently been ignored, or even hidden from public view.

So the cat is out of the bag - opening Yucca Mountain will not reduce from 131 to one (1) the number of sites where high-level waste and spent nuclear fuel is stored in America. As long as nuclear reactors continue to operate, which is the main purpose of developing a waste "solution," there will continue to be waste stored above-ground at reactor sites across the nation. In fact, at current rates of spent fuel production, if Yucca Mountain were to open and be filled to capacity by around 2036, there would still be just about as much spent fuel stored at reactors sites as there is today. And that amount would continue to pile up for years to come, even if no new reactors are built, because nuclear plants generate about 2,000 tons of spent fuel each year, and will continue to do so regardless of what happens with Yucca Mountain.

To borrow a popular phrase, "Do the Math." Today, approximately 46,000 tons of spent fuel is stored at the nation's reactor sites. By the time shipments start in 2011, DOE's earliest predicted date, there will be at least 64,000 tons. Yucca Mountain is being designed and licensed to hold only 77,000 tons, and is probably physically incapable of holding more. The law precludes it from holding more. DOE hopes to be able to ship 3,000 tons of waste per year to Yucca Mountain. But nuclear plants will continue operating on renewed licenses for decades beyond 2011, so spent fuel inventories will continue to grow at the rate of 2,000 tons per year. Thus, the net depletion rate will be only 1,000 tons per year.

If DOE meets its shipping targets, it will take approximately 25 years to fill Yucca Mountain with 77,000 tons of waste and spent fuel. But by then, operating reactors will have produced an extra 50,000 tons, leaving approximately 37,000 tons of spent fuel still sitting at reactor sites across America – a mere 9,000 tons less than we have today.

In short, on the day Yucca Mountain is filled to the brim, we would largely be right back where we started. Indeed, the 131 sites identified by DOE will not be reduced to one, but will in fact have risen by one. And in the interim, at least 50,000 shipments of highly radioactive waste will have been made through 43 states, almost every major city, and thousands of towns in between.

Transportation Issues

The main thing I want to bring to your attention are the issues and concerns associated with the proposed massive campaign to transport 77,000 tons of nuclear waste across the nation for up to 38 years. Some have accused Nevada of fear mongering simply for honestly and sincerely raising the many questions that these shipments to Yucca Mountain pose for our nation's citizens. But these are extremely legitimate questions, and they deserve legitimate answers.

In its Environmental Impact Statement for Yucca Mountain, DOE's own numbers point to as many as 108,000 high-level waste and spent nuclear fuel shipments to Yucca Mountain. Almost every state, and most major metropolitan areas, will be affected by these shipments. More than 123 million citizens reside within one-half-mile of the proposed transport routes. The modes and methodologies for shipment have not yet been determined, much less analyzed. For example, we recently learned from DOE that as many as 3,000 barge shipments may be involved, traversing numerous port cities and harbor areas. According to DOE's own analyses, a single accident scenario could produce thousands of latent cancer fatalities and lead to many billions of dollars in cleanup costs.

Secretary Abraham testified last week that DOE now believes most spent fuel shipments would take place by rail, but that suggestion raises its own set of questions about practicality and physical possibility. For example, many reactor sites do not have rail access, and there are no known plans to create such access, so some form of truck or barge transport and transfer will still be necessary for many shipments. Additionally, in Nevada alone, DOE is proposing to construct more that 400 miles of new rail lines – that is more new rail capacity than we have built in the entire United States in the last century. My point, which I think is well illustrated by the Secretary's testimony announcing yet another change in approach, is that the transportation issue is a major concern – it is one that will affect literally millions of Americans, but it has not been well thought out. We are being asked to accept DOE platitudes and industry assurances in response to our questions and concerns, but that is not good enough, and it will not be good enough when the first problems arise, and we know they will.

Another very troubling aspect of this issue is that DOE has never done an analysis of the terrorism risks associated with mass transport to Yucca Mountain. In a recent brief filed in NRC license proceedings by nuclear utilities for the proposed Private Fuel Storage facility in Utah, the nuclear industry took the position that it is essentially no one's jurisdiction, other than the U.S. military, to evaluate terrorism risks in spent fuel transport. According to the utilities, this is not a proper subject for analysis by DOE, the NRC, the Department of Transportation, or the industry itself. In short, if you believe the industry, this is an area that only Congress can now evaluate, or direct others to evaluate. Put another way, if Congress does not order such an analysis to be done, none will be done. In the wake of September 11th, failure to perform such an analysis would appear unwise.

And there is something else our experts now tell us: DOE has never done an evaluation of the nuclear criticality risk of a spent fuel cask getting struck by a state-of-the-art armor-piercing weapon. In recent nuclear industry advertisements and press statements, it was suggested that if a warhead penetrated a cask, authorities would simply dispatch an emergency crew to "plug it up." This assumes the dose rate in the vicinity of the cask is not a lethal one. It assumes that the warhead does not essentially liquefy the contents of the cask, if it is not already liquid. It assumes that any inner explosion in the cask would not so alter the geometry of the

contents that the contents would go critical, obliterating the cask. It assumes that the cask is not over a river or on a barge and will not subsequently fill with water, a neutron moderator. It assumes that the cask is not filled with U.S. or foreign research reactor spent fuel, which is usually comprised of highly-enriched, or weapons-grade, uranium.

Finally, there are questions regarding the casks that will be used for shipping high-level waste and spent nuclear fuel to any repository. First of all, very few casks exist today, so the ones that would be used for a 38-year shipping campaign to Yucca Mountain are still in various stages of development. That might be acceptable if we knew they were going to be subjected to rigorous physical testing prior to use, but that is not intended. Instead, computer- and some limited scale-model testing is the planned method of assessing cask integrity. Those ancient tapes we have all seen of discarded shipping casks being dropped from helicopters, run into cement walls and hit by trains – none of that is planned for the new generation of casks. NRC Commissioner Greta Dicus last week testified that NRC does now plan to physically test one cask, but that is the first time such an announcement has been made, and we therefore remain, respectfully, skeptical about what will actually be done.

So for now, we are being asked to believe recent industry claims that the new, not-yet-built casks can withstand "all but the most advanced armor-piercing weapons" and a "direct hit by a fully fueled Boeing 747." These wild claims are not based on actual testing, and we know from tests conducted at Sandia National Laboratories in the 1980s and by the U.S. Army at Aberdeen Proving Grounds as recently as 1998 that even very robust casks are vulnerable to attacks from small missiles. Shouldn't the new generation of casks be subjected to full-scale physical testing under a range of conceivable scenarios, including an attack by terrorists willing to give their own lives?

The Role Of the Nuclear Regulatory Commission

The final issue I will raise is the notion being promoted here in Washington, and adopted by some mainstream media organizations, that Congress can responsibly move DOE's Yucca Mountain site selection forward because all remaining issues related to the site's suitability would be reexamined and resolved in licensing proceedings before the NRC. That is not the case.

In fact, under current rules for licensing Yucca Mountain, which Nevada is challenging in court, NRC will not be examining or determining the geologic suitability of the Yucca Mountain site at all. Under the Nuclear Waste Policy Act, this critically important task was supposed to have been performed by DOE. But DOE recently revised the rules, and in doing so virtually abdicated this function. NRC will essentially be determining only whether DOE's man-made waste packages can keep radiation emissions to within standards set by the Environmental Protection Agency. In simple terms, NRC will be determining the suitability of the waste containers that DOE will put inside the mountain, but it will not be examining the suitability of the mountain itself at all. That's like making sure every deck chair on the Titanic can hold the heaviest passenger, without ever bothering to make sure the ship can float.

Under this approach, DOE is both the promoter and arbiter of the suitability of the Yucca Mountain site. There is no independent government oversight. That's how we used to regulate things nuclear until we learned the hard way that it was necessary, indeed vital to the protection of public health and safety, to separate the promotional and regulatory aspects of the government's involvement in nuclear energy. (For example, witness the $250 billion cleanup bill taxpayers now face for the nation's mismanaged nuclear weapons complex.) But that's exactly happening with Yucca Mountain, and the result is a site recommendation that was made prematurely and against the strong concerns of virtually the entire scientific community and the U.S. General Accounting Office.

Conclusion

Today, the President's recommendation to move forward with Yucca Mountain is heading down the path to finality, and only the Congress can stop it by choosing not to override my recent, Congressionally-authorized, site veto. If the matter of site suitability really were up to the NRC, Nevada and the scores of independent scientists alarmed by DOE's premature and falsely based site recommendation would be considerably reassured. But such is not the case.

If Congress overrides my veto and simply punts to the NRC, the suitability of the Yucca Mountain site will never be independently reviewed by any government authority, barring a court order. We will seek that court order, but we believe Congress should accept its responsibility, recognize that the Yucca Mountain project is fatally flawed on numerous fronts, and not act to override my veto.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
(202) 225-9446

Testimony of Jon C. Porter

Nevada State Senator

April 25, 2002

Good morning, Chairman Young and members of the Joint Subcommittee. On behalf of the citizens of Nevada, I thank you for this opportunity to express our long-standing, continuing, and absolute opposition to the storage of high level nuclear waste at Yucca Mountain.

For many years, we in Nevada have adamantly opposed the establishment of a nuclear dump in our state. As a result, we've been accused of being unpatriotic. We have been charged with nimbyism - not in my backyard.

And now we stand accused of scare tactics and "desperate efforts."

This fight has nothing to do with patriotism. You have only to look at Nevada's history to know that we have always been willing to do our part, and more, for the safety and security of this nation.

And you have only to look at the Nevada Test Site to know that in doing our part, we have sacrificed in ways that the citizens of no other state have been asked to do.

Throughout this long fight, we've argued endlessly about whether putting nuclear waste in Nevada was a victory for politics or a vindication for science.

The battle has been fought hard on both fronts. Most believe that it's been won on the political front - that Nevada will lose, not because you dismiss our opposition as nothing more than nimbyism, but because 49 other states don't want the waste in their backyards.

That's what this debate is really all about.

So now to the latest charge - that our national campaign to educate the public about the dangers of transporting nuclear waste constitutes scare tactics.

Well, let's talk about that.

Should millions of Americans in nearly every state be scared? Unquestionably. And that includes Americans in states that currently store nuclear waste. Perhaps particularly in states that currently store nuclear waste.

An editorial in the *New York Times* this weekend offered two arguments against Nevada's campaign to publicize the dangers of transporting nuclear waste: first, that "spent fuel rods have been shipped in small quantities for decades now with no obvious harm to the public," and second, "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."

Small quantities? We're not talking now about small quantities. We're talking about seventy-seven thousand tons being shipped through or near cities and communities across the country for nearly four decades. Common sense alone tells you that the greater the number of shipments the greater the potential for accident.

And "no obvious harm?" that, perhaps, is the most frightening of comments. For many years, Nevadans were subjected to radiation from nuclear testing. We thought then that there was no obvious harm - now we know differently. The effects of radiation may go undiscovered for years. And those effects, when discovered, are lethal.

What is more, it is irresponsible at best and disingenuous at worst to draw the universe of examples so small - to say that there have been no accidents of a particular size or severity within a set number of years - and then to conclude, from that small sample and those narrowly defined parameters, that accidents will not occur.

We know that is not the case. Nuclear accidents have happened. Nuclear accidents will happen.

There has been a lot of talk about "acceptable risk" over the past few weeks. But that term has always been applied to Nevada and to Yucca Mountain.

Let me ask all of you now: what is an acceptable risk to you, and your families, and the communities in which you live?

Let's assume for the moment that an accident involving the transport of nuclear waste is rare. Will its rarity be of any consolation to you if the accident occurs in your state?

But it's not only transportation accidents we must consider. Now, we also have to prepare for the threat of a terrorist attack. We already know, from tests sponsored by the industry itself, that a tow missile can blow a hole through any cask used to store nuclear waste.

There are half a million tow missiles in the world today, many of them in countries not friendly to the U.S. since nuclear waste will always be stored at nuclear facilities - always, a fact that the industry does not like to acknowledge -transporting waste across the nation, every day, thousands of miles, thousands of tons, merely increases the number and attractiveness of terrorist targets.

And I do not need to tell you the devastation that would follow with spent nuclear fuel rods in the hands of terrorists.

Scare tactics? Yes. Because you should be scared.

The next argument advanced by the *New York Times* and by many nuclear industry proponents is that "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."

Let Nevada tell you about answering questions "on the road."

There are nearly 300 questions remaining regarding the safety of Yucca Mountain. Even the GAO called the decision to recommend the site premature. Yet we are told the project should nevertheless proceed -- that the questions will all be answered by the time the site is open.

As we in Nevada have learned, when the answer doesn't suit the DOE or the Nuclear Industry, they simply change the question.

Over the past 20 years, we have seen everything - the studies, the procedures, the politics, and the science - revised as necessary or even ignored to support a decision that had already been made.

Can you trust the DOE and the nuclear energy to be more honest with you than they have been with us?

The Industry is fond of pointing out how much money has been spent studying Yucca Mountain, as if the amount already spent somehow justifies spending more. But has anyone told you how much the site will cost from this point on?

It is estimated the program will cost, over and above industry fees, $35 billion or more. You in this body know that it is not sunk costs that matter in making a decision; it is future costs. And the Nuclear Industry is demanding that you and your constituents, the American taxpayers, foot the bill for an unnecessary and unsafe project.

And it is not just the cost of the repository itself - we must now ensure that every shipment is heavily guarded from its point of departure to its arrival.

Or perhaps the DOE and the Nuclear Industry don't want you to know that they have no intention of ensuring the safety of shipments?

As members of Congress, you consistently seek evidence before, rather than after, making a decision. Can you do less now, when the stakes are so much higher? Yet that is exactly what the Nuclear Industry, in its arrogance, expects you to do.

No one has told you how many truckloads, how many rail shipments, how many barges, how many casks and containers are involved. No one has told you where and how often those shipments will be made.

Perhaps they do not wish you to know that deadly shipments will pass near population centers in your state every day for nearly 40 years.

Mr. Chairman and Members of the Committee, these are answers to which you are entitled.

A little over a year ago, during Nevada's legislative session, I introduced a resolution on this very issue. Senate Joint Resolution no. 11 urged Congress to require an environmental impact statement on the risks of transporting nuclear waste to Yucca Mountain.

I said to my legislative colleagues then, and I say to you now: "transportation is key to our stopping yucca mountain from being used as a dump site. I believe in having the public involved, and once they realize the health hazards, they too can be involved in the process of stopping Yucca Mountain."

Our public education campaign is not, as the *New York Times* says, simply a desperate attempt. The simple fact is: we don't know. You don't know. And no level of risk can ever be deemed acceptable until we do.

I urge you to require, to demand that a study be done of the dangers of transporting nuclear waste. I urge you to demand to know now, before you make your decision, if that waste will pass through your backyard on the way to Nevada's.

Finally, I ask you to remember this: establishing a nuclear repository at Yucca Mountain will never remove the risk at nuclear facilities.

The truth is that a significant amount of waste will always be stored onsite at nuclear facilities, since spent

rods cannot be moved for years until they have cooled. By transporting the waste, you merely increase the potential for accident or, terrifyingly, terrorist attack.

Chairman Young, let me conclude by offering my personal gratitude as well as that of all Nevadans for agreeing to conduct this hearing. I have been fighting the establishment of a national dump since 1985, when as a Boulder City councilman I introduced one of the first resolutions in the state in opposition to the proposal.

To the Nuclear Industry and the states in which nuclear energy plants currently exist, Nevada has likely appeared to be an irritant, a nagging obstacle to what must seem, to anyone who does not call Nevada home, the perfect solution.

But that is precisely the point: Nevada is our home. It is not a desert, it is not an uninhabited expanse of federal land that can or should be used without any consideration given to the health and safety of those who live there.

Now the DOE and the Nuclear Industry are asking you to do the same: to risk the health and safety of your own communities and your own families.

But there is no reason to rush through this decision - none, because nuclear waste will always be stored onsite -- other than that the Nuclear Industry is worried that if you take the time to consider the dangers of a national dump and to evaluate the risk to your own states, they will lose.

They do not want you to ask the very questions I've posed to you today.

Mr. Chairman, Members of the Subcommittee, you must ask those questions. And it is not enough to have the dubious reassurance of the DOE and the Industry that the answers will come all in good time. Do not wait to get your answers "on the road."

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
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Testimony of Dario Herrera

Chairman, Clark County Commission, Nevada

April 25, 2002

Thank you, Mr. Chairman, for the opportunity to testify before this Joint Subcommittee Hearing and thank you distinguished members of the Committee for hearing from the Clark County Commission on this matter.

As Chairman of the Clark County Commission in Southern Nevada, I profoundly disagree with the Department of Energy's plan to transport the nation's high-level nuclear waste across the country to be stored at Yucca Mountain, 90 miles from the fastest growing metropolitan area in the nation. The transport and disposal of high-level nuclear waste at Yucca Mountain is a threat to the health and safety of millions of American families across the country.

Nevadans are sincerely committed to finding a long-term solution to nuclear waste. We also understand the grave concerns about having high-level radioactive waste stored near their homes. But the answer is not for Congress to override Governor Guinn's veto. This project will transport highly radioactive waste across the country, passing the homes of millions of Americans. The most appropriate answer is to immediately increase security at existing nuclear power plants to protect the current waste storage facilities, at which there will always be some amount of waste, while aggressively studying new processing technologies, such as transmutation.

Congressional approval of the Yucca Mountain Project and the transportation of high-level nuclear waste across the country will cause severe economic strain on stressed city, county, and state budgets, and put the health and safety of Americans at risk. Apart from misguided political maneuverings, there are no legitimate reasons to move with the Yucca Mountain project. There are four very crucial reasons why the Yucca Mountain Project should not move forward based on transportation issues alone:

1. The transportation of high-level nuclear waste does not simplify national security concerns nor prevent the threat of a terrorist attack on nuclear reactors or on-site waste storage facilities. Transporting this waste across the country magnifies the threat of a terrorist attack and complicates homeland security defense. More than 100,000 truck and trainloads of highly radioactive waste will travel through 43 states for 40 years just to dump the 77,000 metric tons of existing high-level nuclear waste. That means approximately 7 shipments will begin every morning for 40 years and each will travel an average of 2000 miles along interstate highways. These estimates do not include any future waste from active nuclear reactors.

At any given time, there will be hundreds of mobile terrorist targets throughout the country. Active nuclear reactors will continue to remain targets and will continue to produce an estimated 2,000 metric tons of waste each year. These uncovered casks used to transport waste have proved severely vulnerable to terrorist attack. Whereas on-site storage of spent fuel rods consists of concrete encasements behind the gates, walls and surveillance of nuclear power plant compound. Instead of increasing the security of the just over 100 active nuclear reactors, the Department of Energy proposes increasing the possibility of a terrorist threat and

potentially exposing millions more Americans that live hundreds of miles away from the nearest nuclear reactor to that threat.

2. The Department of Energy is eager to point out their track record for shipping waste over the past 40 years. Yet to use the DOE's shipping record as the standard for the quantity of transports to be sent to Yucca Mountain is like comparing an ant to an elephant. Far more waste will be transported per year over the next 40 years than has been transported in total since the advent of nuclear energy.

In their own technical analysis and documents, the Department of Energy admits that accidents and incidents of radiation release will certainly occur during their proposed shipping campaign. They have estimated at least two "incidents" will happen each year. The trouble is, no one knows when, where, or how. Furthermore, the Department of Energy plans to track each shipment of high-level nuclear waste using a system that the National Academy of Science called outdated and incapable.

3. Most government officials along the proposed transportation corridors are unaware of the immense costs of preparing for, and responding to, an incident involving high-level radioactive waste. Our studies show that the cost to Clark County public safety agencies just to prepare for the first shipment of high-level nuclear waste is expected to reach $360 million. Although the Nuclear Waste Policy Act (section 180 C) indicates that the Department of Energy will reimburse states for additional public safety training and equipment costs incurred as the result of nuclear waste shipments, the State of New Mexico's experience with low-level radioactive waste indicates that sufficient resources will not be made available.

Shipping high-level nuclear waste will result in unfunded federal government mandates. Our studies demonstrate that the costs to Clark County government entities alone for additional personnel, planning, training, and public outreach to prepare for incoming shipments that proceed without incident is expected to reach almost $2.7 billion over the project's proposed 40 years of shipments. It is doubtful that the federal government is prepared to reimburse communities in 43 states for costs associated with preparing for an unthinkable radioactive accident. This will be yet another unfunded federal mandate burdening already financially squeezed local and state governments, with the taxpayers on the transportation route left holding the bag.

4. Another area of impact that has only been recently acknowledged by the Department of Energy is that of potential property value decrease, the effect on homeowners, and accompanying revenue losses to state and local governments. A study of Clark County bankers and appraisers indicates that even without an attack or accident a property value loss of more than $500 million can be expected in one of the most active housing markets in the nation. If a severe accident occurred this could grow to between $6.6 billion and $8.7 billion, devastating Clark County. In South Carolina, the Department of Energy's shipment of nuclear waste has already resulted in property value losses similar to what has been estimated for Clark County.

Home and property owners along the transportation corridor should also expect similar property value losses. Since property taxes are a significant source of local revenue, local education and emergency services will be adversely affected.

The four major transportation concerns outlined above are only a portion of the hundreds of unanswered questions about a project that was supposed to only progress based on "sound science" but will nonetheless come down to an override vote in Congress despite the Nuclear Waste Technical Review Board's finding that the science at Yucca Mountain is "weak to moderate" and the non-partisan General Accounting Office detailing 293 unanswered technical questions.

I have spoken with other county officials across the nation about the several economic impact that the

transportation of nuclear waste will have on their communities. The reaction has been consistent outrage. After explaining this to the National Association of County Officials meeting earlier this year, NACO voted to strengthen their position on the transportation of nuclear waste. County officials along the transportation route are preparing to pass official resolutions opposing the project and will be lobbying members of their federal delegation to oppose the project.

There are alternatives to putting the safety and security of millions of Americans at risk while causing undue economic hardship to taxpayers. There are technologies, such as transmutation, that have shown promise in the search for an alternative to long-term storage. Unfortunately, the Department of Energy's budget proposal for FY2003 cuts transmutation funding by 76 percent, effectively foregoing the search for an alternative.

Despite our frustration over how poorly Nevada has been treated by the Federal government over the years, Nevadans view this not only as a threat to our own security but as a tremendous risk to the entire nation. This is not just "not in my backyard politics," this is about common sense.

I have spoken to thousands of people on this issue and not one has been able to convince me that this project will benefit anyone other than the nuclear power industry.

The nuclear power industry likes to talk about the amount of Americans that live within 75 miles of nuclear waste storage sites, but they fail to mention that as long as nuclear reactors are active, there will always be waste stored on site and the reactors themselves could still be terrorist targets. They also fail to mention how many millions of Americans live along the transportation route. 50 million Americans live within just one-half mile.

We believe Congress should act to protect the nation's public and economic health and vote against moving forward with the Yucca Mountain project. Instead of putting high-level nuclear waste out on America's roads, Congress should increase security at existing nuclear power plants and continue research into alternatives to long-term storage. Instead of purely protecting the nuclear power industry, Congress should protect the millions of families and the hundreds of local communities that could be devastated by this project.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
(202) 225-9446

Testimony of Ellen G. Engleman

on behalf of the Research and Special Programs Administration, U.S. Department of Transportation

April 25, 2002

Good morning, Chairman Petri, Chairman Quinn, and members of the committee. I am Ellen Engleman, Administrator of the Research and Special Programs Administration (RSPA), U.S. Department of Transportation (DOT). Thank you for inviting me to discuss DOT's role in ensuring the safe transportation of hazardous materials, including spent nuclear fuel.

Spent nuclear fuel has been transported safely in the United States for many years. It is noteworthy that there have been many hundreds of domestic shipments of spent nuclear fuel with no deaths, no injuries, and no releases of the hazardous material. Right now, approximately 15 shipments of spent nuclear fuel are being made annually by utilities, academic institutions, and other facilities that are regulated by the Nuclear Regulatory Commission (NRC). There also are shipments by the military and other shippers not regulated by NRC. All future shipments of spent fuel, just as the ones being made today, will be subject to mandatory transportation requirements and operational procedures to minimize the risks involved in that transportation.

AGENCY ROLES

Under the Nuclear Waste Policy Act (NWPA), the Department of Energy (DOE) has primary responsibility to plan for and arrange the transportation of spent nuclear fuel to a geological repository. NRC licenses storage facilities and also approves the packages and requires transportation in accordance with a physical protection plan. Within DOT, RSPA issues hazardous materials regulations, the Federal Railroad Administration (FRA) issues rail safety regulations, the Federal Motor Carrier Safety Administration (FMCSA) issues motor carrier safety regulations, and the United States Coast Guard issues marine transportation safety regulations - all of which apply to the transportation of spent nuclear fuel and other radioactive materials. RSPA, DOE, and the Federal Emergency Management Agency (FEMA) have provided grants, courses, and course materials for emergency responder training related to this transportation.

REGULATORY REQUIREMENTS

I want to provide a brief overview of the regulatory requirements that would apply to spent fuel shipments to Yucca Mountain. Because of NRC's jurisdiction over these and other facets of nuclear waste and other radioactive materials transportation, and DOT's jurisdiction over hazardous materials transportation, the two agencies have entered into a Memorandum of Understanding (MOU) for the regulation of the transport of all radioactive materials. Under the MOU, NRC has the lead responsibility for the review and certification of the packages that are and will be used for spent nuclear fuel transportation. The MOU has been an effective vehicle for a sound regulatory program drawing upon the expertise of both agencies.

Nuclear fuel must be packaged for transportation in cask containers approved by NRC. These specialized casks both reduce the effects of radiation during routine transportation and in a transport accident. NRC's certification process requires demonstration through tests and analyses that casks can survive hypothetical accident scenarios. The on-going radiation exposure protection provided by the casks is equally important for transportation workers who load and unload a shipment of spent nuclear fuel from its conveyance or remain near it during its movement in transportation. Because the time that it takes to move a shipment from origin to destination directly affects radiation exposure, DOT requires that shipments of spent nuclear fuel be planned to avoid intermediate stops to the extent practicable.

Within DOT, several agencies are involved in regulating the transportation of spent nuclear fuel. RSPA's regulations, issued under the Federal hazardous material transportation law, impose packaging, hazard communication, training, operational, and other requirements; they specifically prohibit unnecessary delay in the transportation of hazardous materials. FRA's regulations, issued under the Federal Railroad Safety Act, impose requirements to ensure the safe rail transportation of hazardous materials. FMCSA's regulations, issued under the Motor Carrier Safety Improvement Act, impose requirements to ensure the safe highway transportation of hazardous materials; they require the use of routes that minimize time in transit when spent nuclear fuel is transported by motor vehicle. FMCSA's routing regulations permit States, following Federal regulatory guidelines, to designate certain routes for transporting hazardous material. Preferred routes are Interstate highways and alternate routes designated by a State routing agency. An Interstate bypass or beltway around a city, when available, must be used rather than an Interstate route through a city. Many States have designated highway routes for radioactive and other hazardous materials (or restricted the use of other routes), in accordance with FMCSA's regulations. Under these DOT regulations, a State or locality may not designate (or restrict the use of) routes that "export" transportation risks to a neighboring jurisdiction or unnecessarily delay the transportation of hazardous materials. To protect barges engaged in spent fuel transportation, the Coast Guard can impose moving security zones around barges under the Magnuson Act and 33 C.F.R. Part 6, and can impose moving safety zones around barges under the Ports and Waterways Safety Act (PWSA); under the PWSA, Coast Guard captains of the port can take other protective actions.

Rail shipments of spent nuclear fuel adhere to recommendations of the Association of American Railroads for the use of special or dedicated trains over key routes. These special trains carry no other cargo and have priority use of the mainline. Key routes are higher volume lines that have safety detection devices (such as wheel bearing detectors) and receive the most frequent inspections and best maintenance.

The NRC's requirements for physical protection of a shipment of spent nuclear fuel, including armed escorts who must be in close contact with a communications center about the status of the shipment, protect against intentional or unintentional disruption of the transportation and reduce the risks of an accident or incident. The same is true of other operational requirements, including State and local provisions that address traffic control and local safety hazards, as well as regulations of RSPA and its sister agencies within DOT - FRA for rail carriers, FMCSA for motor carriers, and the Coast Guard for water carriers. All transportation workers must have training in the requirements that apply to the functions they perform and how to avoid accidents and protect themselves from the hazards of materials being transported. Escorts for shipments of spent nuclear fuel must be trained in security measures, communications, responding to contingencies and threats, the hazards of radiation, and the Federal, State and local requirements that apply to the transportation of radioactive materials.

Many Federal and State agencies enforce these regulatory requirements through inspections. For example, FMCSA has worked with DOE and the Commercial Vehicle Safety Alliance (CVSA) to develop the CVSA Level VI Enhanced Radioactive Inspection Protocols. Under these protocols, every vehicle transporting spent nuclear fuel is required (by DOE contract) to be inspected at its point of origin. This inspection includes radiation scans, as well as driver and vehicle compliance checks. Any defect discovered during the inspection,

regardless of how minor, must be corrected before transportation begins.

EMERGENCY RESPONSE

In addition to imposing regulatory requirements intended to prevent incidents and releases, DOT and its partners are concerned about emergency response in the event an incident should occur. Effective response to a transportation accident or incident involving spent nuclear fuel is enhanced through Federal requirements and resources, including financial assistance to States and localities for emergency response planning and training. DOE maintains regional emergency management field offices that can dispatch qualified response teams to an incident involving nuclear material, although the first responders on the scene of an accident usually are local fire departments and law enforcement agencies. RSPA's hazard communication requirements (placarding, shipping papers, and package marking and labeling) inform these responders of the hazards involved. For shipments of spent nuclear fuel, coordination with local responders is also enhanced by the NRC's physical protection requirements that provide for advance notification to the State governor of each shipment to or through the State and advance arrangements with local law enforcement agencies for response to an emergency or a call by escorts for assistance. Local emergency response capabilities are strengthened by RSPA's planning and training grants to States, who in turn pass at least 75% of the grants through to local communities. Significantly, both DOE and FEMA have actively conducted and promoted emergency responder training that enhances the ability of State and local fire, police and other emergency personnel to respond to and mitigate hazardous materials spills and other incidents.

SUMMARY

DOT provides a regulatory structure for the safe transportation of spent nuclear fuel, other radioactive materials, and all other hazardous materials. Our enforcement of those regulatory requirements would be greatly assisted by passage of legislation to reauthorize the hazardous materials transportation safety program; the Administration's proposal was introduced last year as H.R. 3276 and S. 1669. In partnership with other Federal agencies, States, local and tribal governments, and carriers and shippers of hazardous materials, we will continue to ensure the safe transportation of all hazardous materials into, through, and within the United States.

If the committee has questions, I will be happy to respond.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
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Testimony of Alan Rutter

on behalf of the Federal Railroad Administration, Department of Transportation

April 25, 2002

Mr. Chairman and members of the Subcommittees, I am very pleased to be here today to testify on the important subject of the transportation of nuclear wastes. The Federal Railroad Administration (FRA), on behalf of the Secretary of Transportation, administers the Federal railroad safety laws, including those concerning the transportation of hazardous materials by rail. Ranking at the top of FRA's priorities is the safety of rail shipments involving Spent Nuclear Fuel (SNF)1 and High-Level Radioactive Waste (HLRW)2. These materials have been transported safely by rail in the United States for more than 45 years. Since 1957, approximately 1,100 shipments of SNF and HLRW have traversed our Nation's railroad system.

To ensure the safe transportation of nuclear materials by rail, FRA works as part of a multi-agency team that includes, among others: the Department of Energy (DOE), the Nuclear Regulatory Commission (NRC), the Federal Emergency Management Agency, the Research and Special Programs Administration (RSPA) and the Federal Motor Carrier Safety Administration (FMCSA). We also work closely with various state governmental organizations, including the Council of State Governments, the Western Governors Association, and the Southern States Energy Board.

DOE, of course, has broad responsibilities in the area of nuclear power that include planning and arranging for the transportation of spent nuclear fuel and high-level radioactive wastes. NRC, in addition to licensing nuclear facilities, has developed the overall design criteria for the casks in which these materials are transported and reviews and approves physical security plans for spent fuel shipments. RSPA, another agency of the Department of Transportation, sets the standards for the transportation of all hazardous materials, including spent fuel and high-level wastes. RSPA's relevant standards cover hazard communication, shipment documentation, packaging safety and training. FMCSA oversees the safety and routing of shipments by highway.

In general, FRA establishes safety standards concerning the design, maintenance and inspection of many elements of our Nation's railroad system, including track, motive power and equipment, signal and train control, operating practices, and hazardous materials transportation. Railroads are required to conduct their own inspections to ensure that these safety standards are being met. FRA leads a cadre of approximately 400 Federal and State safety inspectors whose role is not to conduct safety inspections for the railroad industry, but to monitor the railroad industry's own inspection forces to ascertain whether the railroads are in compliance with applicable Federal safety standards. FRA inspectors accomplish this task by conducting routine, random and programmed inspections of railroad properties and comparing their findings to a railroad's own inspection records. Thus, while primary responsibility for inspecting the railroads rests with the railroads themselves, FRA's inspection strategy is to ensure the integrity and effectiveness of the railroads' own inspection programs.

With regard to rail transportation of SNF and HLRW in particular, FRA conducts inspections to verify that the shipment is properly prepared and in compliance with all applicable hazardous materials regulations. We also help to ensure that the track, signal systems, grade crossings, bridges, and rail vehicles used for these shipments are in safe condition and that responsible railroad employees are properly trained and briefed. In these activities, of course, we work very closely with the railroads, their employees, and the affected communities. We believe the regulatory structure, planning, monitoring, coordination, and experience have produced a very safe system for the transportation of nuclear wastes by rail, but we understand the need to continue to improve that system to meet the new challenges posed by the expected increase in those shipments and the post-September 11th security environment.

Rail Transportation of Radioactive Materials

Railroad transportation is well suited to moving high-level radioactive materials safely and efficiently. Complementary Federal regulations issued by RSPA and NRC require SNF and HLRW, even when shipped in small amounts, to be transported in specially shielded containers or casks that conform to NRC's regulations for Type B containers. Typically, in accordance with NRC's standards, these casks are constructed of multiple layers of stainless steel with shielding sandwiched in between the layers of steel to protect against radioactive emissions. Railroads are ideally suited to moving these large, heavy casks.

Most rail shipments of SNF or HLRW move in casks that weigh up to 125 tons when loaded and are capable of carrying large quantities of high-level radioactive material. Many truckloads would be required to move an equivalent amount of nuclear material by highway. To get a sense of the great efficiencies that can be achieved by moving high-level nuclear materials by rail, consider the data projections presented in the environmental impact statement (EIS) for the Yucca Mountain site. Over the 24-year period covered by the EIS, there will be approximately 10,700 shipments of SNF, which means there will be about 150 train movements carrying up to 450 shipments (three shipments per train) annually. To carry this same quantity of SNF by truck would require approximately 53,000 shipments over 24 years, which would mean 2,200 highway movements (one shipment per truck) annually. The inherent efficiency of rail transportation in moving SNF and HLRW has a direct bearing on safety, as fewer shipments of nuclear materials means less public exposure and less opportunity for a transportation incident.

Rail movements of SNF and HLRW have a long and very positive history, and the volume of these shipments is growing. The Navy has been shipping SNF to disposal sites since 1957. In 1989, Carolina Power and Light began sending SNF from its commercial nuclear reactors to temporary storage facilities. Several years ago, FRA realized that the relatively modest number of rail shipments of SNF and HLRW, which had numbered between 15 and 25 annually during the early 1990s, was likely to increase dramatically. In 1995, DOE began shipment of SNF and HLRW as part of its Foreign Research Reactor Fuel Program, which is intended to safeguard SNF shipped from research reactors around the world and is an important element in the Nation's nuclear non-proliferation efforts. As a result of these programs, rail shipments of SNF and HLRW increased from 38 shipments in 1997 to an average of more than 64 shipments per year in the succeeding years. Furthermore, two separate consortiums of commercial nuclear power producers each anticipate initiating as many as 100 rail shipments per year of SNF and HLRW to temporary storage facilities, possibly as early as next year. Therefore, even without the Yucca Mountain shipments, rail shipments of SNF and HLRW are destined to increase sharply.

FRA's Safety Compliance Oversight Plan (SCOP)

Ultimately, the safe movement of SNF and HLRW depends on the application of sound safety regulations, policies and procedures. This requires extensive planning and coordination among Federal agencies, state and

local governments, and commercial transportation companies.

In the mid-1980s, partly as a result of the rail shipments from the Three Mile Island Nuclear Power Plant, FRA implemented its High-Level Nuclear Waste Rail Transportation Inspection Policy for all known rail shipments of SNF and HLRW. Under FRA's Inspection Policy, there has never been a rail accident or incident involving the transportation of SNF or HLRW that has resulted in a release of the material from the packaging. Furthermore, there has never been a single death or injury resulting from a rail shipment of radioactive material.

Taking a proactive approach to railroad safety, FRA recognized the need to enhance its high-level radioactive materials rail transportation inspection policy to ensure that the railroad industry's outstanding safety record for nuclear material shipments could continue unabated despite the sharp increase in nuclear materials shipments. Therefore, in 1998, FRA developed the Safety Compliance Oversight Plan For Transportation of High-Level Radioactive Waste and Spent Nuclear Fuel (SCOP), which set forth an enhanced FRA policy to address the safety of rail shipments of SNF and HLRW. While the SCOP was originally developed in support of the DOE's Foreign Research Reactor Fuel program, FRA believes this enhanced policy is necessary to ensure the safety of future rail shipments of SNF and HLRW, which are destined to increase significantly with or without the opening of Yucca Mountain.

Development of the SCOP involved a coordinated effort between FRA, DOE, the Association of American Railroads (AAR), railroad labor organizations, and representatives of affected States. Also, through participation in DOE's Transportation External Coordination Working Group, FRA has consulted with Native American groups on the relevant issues. FRA wishes to acknowledge the invaluable contribution of its safety partners, whose insight and wisdom were instrumental in formulating the policies and procedures that are incorporated into the SCOP.

Key elements of the SCOP include: planning the most appropriate routes, training of railroad employees and emergency responders, and enhancing FRA safety inspection practices and overall safety oversight policies.

Under the SCOP, FRA works with DOE, the offeror or its agent, and the rail carriers in planning and selecting the routes, emphasizing the selection of the highest classes of track. (FRA regulations define various classes of track; each class of track has a maximum allowable operating speed and specific design, maintenance and inspection requirements. The higher the class of track, the higher the permissible operating speed and the more stringent the safety standards.) FRA also prepares an accident prediction model for the highway-rail grade crossings along the intended route and uses this model to assist DOE in coordinating with appropriate State, local, and tribal agencies in route planning activities. We also coordinate with Operation Lifesaver, a private safety organization, to increase grade crossing safety awareness and education in communities along designated routes. We also work with DOT's Office of Intelligence and Security in coordinating security precautions, such as the identification of "safe havens," with the offeror, law enforcement officers, and intelligence communities. As the new Transportation Security Administration begins its work in the Department, we will be coordinating closely with them to ensure the security of these shipments. Finally, FRA reviews the emergency response plans of the offeror, rail carrier, and DOE to ensure that they adequately address the actions to be taken in the unlikely event of an accident or incident involving the train.

Training is another important element of the SCOP. It is FRA's policy to assist DOE, and the offeror or its agent, in the development of emergency response training and safety briefings and to monitor the industry to verify that requisite training and briefings have been performed. FRA also conducts reviews to ensure that train crews who operate the trains in which nuclear materials are transported are properly certified, trained, and experienced in running over the designated routes. FRA also checks to see that these crews have received specific training concerning the nature of the shipments. As explained above, FRA's safety inspection program

is primarily designed to monitor the safety performance of railroads, which are responsible for performing their own inspections and ensuring the safety of their operations. However, under the SCOP, FRA plays a more direct role by conducting more focused and intensive safety inspections to ensure the highest level of safety for rail shipments of SNR and HLRW. For example, instead of inspecting a limited sample of locomotives and freight cars as we do for routine rail operations, FRA equipment inspectors conduct a thorough inspection of each and every locomotive and freight car for every train that transports SNF and HLRW. These inspections ensure that locomotives, freight cars, and the train's braking systems meet all applicable Federal safety standards. Furthermore, along a designated route, it is FRA's policy to observe the operation of all automated warning devices at highway-rail grade crossings, to ascertain that they are operational before the shipment. FRA signal inspectors also conduct inspections of selected grade crossing warning devices to gauge the reliability and integrity of the grade crossing warning system. Furthermore, FRA places operating practices experts in the rail carriers' dispatching centers during SNF and HLRW shipments on designated routes to observe firsthand the progress of the shipments and any operational problems that might arise. It is also FRA's policy to inspect all the tracks along the entire route of a nuclear shipment; this includes both visual inspections and automated inspections by FRA's track geometry vehicle (the T-2000), which is capable of measuring the alignment, gage and cross-level of every foot of railroad track. In addition, FRA reviews the rail carrier's rail flaw detection vehicle data to ensure that rail flaw inspections have been performed on the designated route, and necessary rail repairs have been made prior to the shipments.

It must be emphasized that the SCOP is a living document that has evolved from 45 years of accumulated experience regarding the safe movement of nuclear materials by rail. FRA will continue to work in partnership with the rail community to periodically review, evaluate and update the SCOP to keep pace with the latest developments and technologies involving the safe transportation of nuclear materials. From this brief description of FRA safety inspection policies under the SCOP, one can understand why FRA inspection resources are stretched to their limits, even with the relatively modest number of nuclear rail shipments that are currently taking place. We are working within the budget process to anticipate the resources needed to maintain the highest level of safety for SNF and HLRW rail shipments. For example, one of the budgetary challenges FRA will need to overcome involves our automated track geometry vehicle, which is capable of inspecting 30,000 miles of track per year. When the interim nuclear storage facilities or Yucca Mountain begin accepting shipments of SNF and HLRW, the number of track miles over which SNF and HLRW travel will most assuredly exceed 30,000, and we must be prepared to respond to the challenge. Safety and Security Protocols

Federal regulations for shipment of nuclear material by rail are augmented by a series of safety and security protocols and special operating restrictions that have been agreed upon by DOE and the railroads. These protocols and operating restrictions have evolved over the years and are often tailored to the particular needs of the individual shipments. Under these protocols, a train carrying SNF or HLRW would typically include the cask cars, two buffer cars (one on each end of the shipment to cushion against impacts in the event of a collision), and an occupied escort car staffed by security personnel. Special operating restrictions have included limitations on the maximum speed of trains carrying nuclear materials, requirements to stop opposing trains on adjacent tracks when they meet a train carrying nuclear materials, and requirements that nuclear material cars be switched only with an attached locomotive rather than allowing them to roll to a stop on their own during switching.

Another convention involving the shipment of SNF and HLRW by rails concerns the use of dedicated trains. Until the mid-1970s most rail shipments of these radioactive materials were handled in regular service trains that carried a wide variety of freight in addition to the radioactive materials cars. In 1974, the railroad industry began insisting that radioactive materials shipments move in dedicated trains that solely transport the radioactive material cars. There has been much debate about this topic over the years; while many nuclear

materials shipments do move in dedicated trains today, this is not the case for all such shipments. (In 1977, the Interstate Commerce Commission issued a decision that prevented railroads from mandating the use of dedicated trains.) FRA has engaged the services of the John A. Volpe National Transportation Systems Center to conduct a thorough study of the safety and security implications surrounding the transportation of high-level radioactive materials in dedicated trains versus regular service trains. We hope to have the study completed by the end of this year or early next year.

The security of rail shipments of radioactive materials has long been a priority even before the tragic events of September 11th. Some of the protocols described above contain stringent security measures to protect against terrorist threats, including the accompaniment of these shipments by armed security forces and requirements to protect the cars when sitting in rail yards or sidings.

More recently, Global Positioning Satellite (GPS) technology is being used to track the location of trains carrying radioactive materials. FRA is leading a departmental effort to build a Nationwide Differential Global Position Satellite (NDGPS) system that can greatly improve the accuracy of conventional GPS to several centimeters. This level of precision permits the system's user to determine exactly which track (where there are adjacent tracks) a train is occupying. Our goal is to have dual NDGPS coverage for the entire United States. Presently, 80 percent of the continental U.S. has NDGPS coverage while 40 percent has dual coverage.

Although security concerns have long played a prominent role in the safety of rail shipments of radioactive materials, the events of September 11th have reinforced the fact that we must constantly reassess our assumptions and beliefs. A few weeks after the attacks on the World Trade Center and the Pentagon, the Association of American Railroads secured the services of an experienced security firm to conduct a comprehensive review and assessment of the security of our Nation's freight railroad system. The security of hazardous materials, including radioactive materials, and defense-related shipments are two areas that have received special emphasis in the security review. FRA has obtained the services of its own security experts to review the AAR security assessment. We will provide input into the security review, which may include proposed enhancements for the security of rail shipments of nuclear materials.

Nothing that we do in transportation after last September 11th can ignore the threats to security posed by terrorist organizations. The Federal agencies responsible for direction or oversight of these movements have worked successfully over the years through the Governors' offices of the respective States to ensure that emergency planning and emergency response agencies have the information and training they need to do their jobs. This sharing of information and cooperation must continue. However, it will be particularly important that specific information regarding routes and timing of individual shipments is kept secure by those with a need to know. The Transportation Security Administration and other participating agencies, including FRA, will need to evaluate how best to address this security concern.

Conclusion

FRA believes that it is critical that rail shipments of high level radioactive materials continue to be conducted with a maximum degree of safety and security. This can only be accomplished through a sound and meaningful safety partnership involving all relevant elements of the nuclear industry, the railroad community and appropriate Federal, State and local governmental bodies. Our current safety requirements and practices have evolved over a period of 45 years. We must build upon the knowledge and experience we have gained over that period to meet the challenges that are likely to arise with the projected increase in rail shipments of SNF and high-level radioactive materials in today's railroad environment. As noted above, new challenges will arise regardless of whether or when the Yucca Mountain storage facility becomes operational, and when they do, FRA and its many partners are determined to be prepared to successfully meet these challenges.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
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Testimony of Lake Barrett

on behalf of the Office of Civilian Radioactive Waste Management

April 25, 2002

Chairmen and Members of the Subcommittees, I am pleased to appear before you today. I am currently the Deputy Director of the Office of Civilian Radioactive Waste Management and have served as Acting Director or Deputy Director for the past nine years. This Office is responsible within the Department for implementing the Nuclear Waste Policy Act and developing a geologic repository and the associated transportation system to safely manage and dispose of the Nation's inventory of spent nuclear fuel and high-level radioactive waste. This Administration is committed to make progress towards solving this National problem while remaining true to the principles of sound science and responsible public policy.

On February 14, Secretary Abraham forwarded his recommendation to the President, based on approximately 24 years of research, that Yucca Mountain, Nevada, is suitable for development as the nation's geologic repository for spent nuclear fuel and high-level radioactive wastes. The President affirmed this recommendation by forwarding it to Congress on February 15. The State of Nevada has exercised a disapproval of the President's recommendation as provided for in the Act. As a result, this issue is again before the Congress for disposition, this time for expedited consideration under the framework Congress established in the NWPA. Specifically, Congress must act to pass a joint resolution to accept the President's recommendation or further consideration of a repository at Yucca Mountain will come to a halt.

Fifteen years ago, Congress legislated that a single underground repository located at Yucca Mountain holds the greatest promise for the long-term safety and security for the Nation. Since then, the great body of scientific work done has confirmed the fundamental soundness of the Yucca Mountain site. That alone is reason enough to support the joint resolution. The Secretary also concluded that proceeding with a repository is critical to a number of important national interests: national security, energy security, homeland security, and protection of the environment.

Moreover, the effect of supporting the resolution is not to decide that a repository will be built at Yucca Mountain. It is simply to authorize the Department of Energy to apply for a license from the independent, expert Nuclear Regulatory Commission, and to demonstrate to the NRC that a repository can be safely built there. DOE must also demonstrate that any transportation routes and modes the Department ultimately proposes are safe. The Secretary is convinced that we will be able to make that case, and so am I.

On the other hand, anyone advocating opposing the joint resolution, and thereby bringing the program to an immediate halt, has a heavy burden of proof. That person must show that there is no reasonable possibility that the Department will be able to demonstrate the repository's safety to the NRC, that the Department therefore should not even be given the chance to try to do so, and that the basic decisions Congress made 15 years ago on this question were fundamentally flawed. The critics of the program have not come close to making that showing.

The critics of Yucca Mountain, in fact, are unable to refute the sound science that underlies the President's recommendation or dismiss the compelling national interests that support development of a repository at Yucca Mountain. Instead of addressing the merits of the recommendation, these critics have sought to create fear about transportation of spent fuel as a substitute for any real argument against permitting NRC to consider a license application for a repository at Yucca Mountain. I welcome this opportunity to set the record straight and dispel fears with facts.

At the outset, I would like to emphasize that no decisions concerning routes, modes, and timing of any shipments to Yucca Mountain have been made by the Department. The issue of transportation is one that will be addressed and resolved in consultation with States, local governments, and tribes - as well as with federal regulators - should Congress decide to approve Yucca Mountain as the site for a permanent underground repository.

Now, I would like to describe our experience in transporting spent fuel and other radioactive materials.

The Department and utilities have a long and successful record of shipping spent nuclear fuel and radioactive materials. The transportation experience internationally is also impressive. Critics hope that unwarranted fears associated with transporting nuclear waste are sufficient grounds to derail this critical national program. It is our firm belief, however, that the facts associated with transporting spent fuel clearly demonstrate that the critics' claims are unfounded, and that such shipments can be conducted safely.

Spent nuclear fuel transportation is neither new nor dangerous. Since the 1960s, over 1.6 million miles have been traveled by more than 2,700 spent nuclear fuel shipments without any harmful release of radioactive material. If Yucca Mountain is built, transportation of spent nuclear fuel and high-level radioactive waste from 131 temporary storage sites located in 39 States will begin in 2010. That is the scheduled opening date for Yucca Mountain. In any event, no spent fuel can be moved to Yucca Mountain until the Nuclear Regulatory Commission (NRC) licenses a repository at the site.

Our safety record is comparable to that in Europe, where spent nuclear fuel has been transported extensively since 1966. Over the last 25 years, more than 70,000 metric tons of uranium in spent nuclear fuel (an amount roughly equal to what is expected to be shipped over the entire active life of the Yucca Mountain Project) has been shipped. France and Britain average 650 shipments per year, considerably more than the average of approximately 175 annual shipments currently contemplated for the Yucca Mountain Project, even though the population density in each of those countries greatly exceeds that of the United States.

The Department has expressed a preference to ship to Yucca Mountain by rail. Under the current 24-year waste emplacement schedule, that's an average of about 175 shipments of spent nuclear fuel per year. Even if DOE were to figure out a way to cut its waste acceptance timetable in half, and thus double the rate at which this material is shipped, it would still be only 350 shipments per year, or less than one per day. For the sake of comparison, let me note that there are 300 million annual shipments of other hazardous material: explosives, chemicals, flammable liquids, corrosive materials, and other types of radioactive materials that are currently transported around the country.

Moreover, DOE's practice is to follow strict Department of Transportation (DOT) and NRC transportation rules. These include the use of only NRC certified transportation cask designs, advance notification approvals, and shipment escorts. We also track DOE spent fuel shipments 24-hours a day by satellite. In addition, for highway shipments, each State has the ability to provide the DOT its preferred routes. Based on that information, the Department plans to work with States and Tribes to ensure that routes not only meet the regulations, but respond to community interests. Already, DOE has trained emergency response teams in 34

States, under a variety of programs in cooperation with other government agencies. Using funds provided by DOE, State safety officials, local firefighters and police will continue to be trained in advance to respond appropriately to any accident involving the shipments.

The safe transportation of nuclear waste starts with the use of robust shipping containers. All designs for casks that contain the spent nuclear fuel must be certified by the NRC and must be designed to withstand tests that simulate the conditions of severe accidents while safely containing their radioactive contents. These tests are:

- A 30-foot free fall onto an unyielding surface, which would be equivalent to a high-speed crash into a concrete bridge abutment;
- A puncture test allowing the container to fall 40 inches onto a steel rod 6 inches in diameter;
- 30-minute exposure to fire at 1,475 degrees Fahrenheit that engulfs the entire container; and
- Submergence of the same container under three feet of water.

To achieve certification, a cask must prevent harmful release of radioactive material even when subjected to each of these tests.

While critics have questioned the adequacy of these criteria, the safety of transportation casks has been studied for many years. For example, Sandia National Lab in New Mexico subjected truck transportation casks to real life accidents to see what would happen. They included:

- A flatbed truck loaded with a cask was smashed into a 700-ton concrete wall at 80 miles per hour;
- A cask was broad-sided by a rocket assisted 120 ton train locomotive traveling 80 miles per hour; and
- A transportation container, traveling 235 miles per hour, was dropped 2000 feet into soil as hard as concrete at impact.

In all these cases, the containers survived intact.

In 1984, the Central Electricity Generating Board (CEGB) of Great Britain conducted a spectacular demonstration of spent fuel cask integrity. CEGB ran an unmanned locomotive at 100 mph into a MAGNOX spent fuel cask. The test was conducted in front of 2,000 spectators and aired on British television. The cask survived the test with minimal damage. Although the cask was of British design, essentially the same international design standards are used in the United Kingdom and the United States.

In addition to robust containers, detailed planning will help ensure safety. The transportation of spent fuel is a collaborative effort between the Federal government and local jurisdictions. Federal laws have provided considerable discretion to the States and Tribes specifically to allow them to determine how best to address their citizens' concerns. We expect to work closely with local jurisdictions and to coordinate our planning with theirs. For example, the Department of Transportation has established a process that DOE and the States and Tribes must use for evaluating potential highway transportation routes. In addition, Federal regulations require that the NRC approve all road and rail routes and security plans for NRC licensed shipments of spent fuel. Accordingly, the Department will work with States and Tribes, the DOT, and the NRC to identify preferred shipping routes. States and Tribes can designate alternate highway routes.

Collaboration with local jurisdictions extends beyond the planning of routes and includes the coordination of operations. While DOE protects schedule and itinerary information, those with a need-to-know (i.e.,

State/Tribal representatives, law enforcement/emergency response officials, inspectors) are informed of spent fuel shipments as they are being transported and can track them on a satellite-based tracking system. The Governor of each State is notified of shipments in advance, and shipments are tracked around the clock. All shipments are coordinated with State and federal law enforcement agencies. In addition to continuous tracking by satellite, these shipments are required to have an escort physically report in every two hours to ensure there are no problems.

At a minimum, all shipments are accompanied by escorts 24-hours a day. Armed escorts are required through heavily populated metropolitan areas and, at the discretion of the Governor, may be required through the entire State.

Effective emergency response supports the safe transportation of spent fuel should there ever be an incident or accident. States and Tribes will receive funding by DOE specifically for the Yucca Mountain shipments. Grants will be provided to train local officials along transportation routes in emergency response and inspection procedures and for the purchase of equipment. Funding is planned to begin in 2005. We have worked with the States and Tribes to develop a process to distribute the funds and we plan to finalize the process next year if Congress decides to designate the site.

This repository program specific funding is in addition to the emergency preparedness assistance that is already in place. Emergency responders (police, fire, and emergency management services) presently receive assistance/training from DOE, the DOT, the Federal Emergency Management Agency, and others. They are prepared to respond to incidents and accidents, and the Department will provide additional resources to respond to any accidents involving shipments to a repository.

Our plans for safely transporting spent fuel are not abstract. They have been refined as result of the experience we obtained in shipping campaigns associated with the Waste Isolation Pilot Plant (WIPP) in southeastern New Mexico. WIPP is certified to safely and permanently dispose of transuranic radioactive waste from the production of nuclear weapons. In the last three years, WIPP has received nearly 700 shipments and logged 1.5 million safe transportation miles. Since 1988, DOE has funded approximately $30 million in training along routes to prepare for shipments of waste to WIPP.

Prior to the commencement of shipments to WIPP our training effort has been substantial and addressed many of the same issues and concerns that accompany the shipment of spent fuel. In all, WIPP has trained 21,486 State and Tribal first responders and 2,340 emergency medical personnel over the past 10 years. The DOE Transportation Emergency Preparedness Program (TEPP) provides technical assistance and training to emergency responders. In the past 2 years alone, the TEPP provided train-the-trainer and direct classroom training to responders in 34 States. This training has supported shipping campaigns for spent nuclear fuel, rail shipments of transuranic waste, and low- and mixed low-level waste. We directly trained over 1,200 responders. In addition, the trainers that we trained delivered training to many more (i.e., State, Tribal and local responder organizations). Training materials have been distributed nation-wide and are being integrated into standard training for first responders. In addition, DOT's Hazardous Materials Emergency Preparedness Grants Program has, to date, awarded $73 million in grants to all 50 States, 5 territories, 42 Indian Tribes, and the District of Columbia.

It is important to keep in mind that a vote against permitting the initiation of a NRC licensing proceeding on a repository at Yucca Mountain does not mean there will be no transportation of spent fuel. Even without a repository at Yucca Mountain, the need to find a place to put the spent fuel that is continuing to accumulate will lead to the transportation of these materials, and likely quite soon. On-site storage space is running out, and not all utilities can find new adjacent land where they can put this material. Therefore, they will devise ad hoc, off-site, consolidated storage alternatives. Already a consortium of utilities, working with a Native

American Tribe, has presented to the NRC a facility proposed to be built on Tribal land. Whether or not this effort ultimately succeeds, it is likely that some similar effort will. The transportation of nuclear materials is not a function of a repository at Yucca Mountain, but rather is a necessary consequence of the material that continues to accumulate at the 131 sites in 39 States that are running out of room for it.

Let me close by reiterating the Secretary's observations before the Commerce Committee last week. He noted that the critics of this program would have Congress overturn the fundamental decisions it legislated 15 years ago - that a single underground repository located at Yucca Mountain holds the greatest promise for the long-term safety and security for the Nation. The great body of scientific work done since then has confirmed the fundamental soundness of the Yucca Mountain site. In addition, substantial real world experience demonstrates that the waste can be transported safely from its current 131 temporary storage locations to a permanent facility.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
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Testimony of Dr. Carl J. Paperiello

on behalf of the U.S. Nuclear Regulatory Commission

April 25, 2002

Messrs. Chairmen, members of the Subcommittees, I am pleased to join you to testify on behalf of the Nuclear Regulatory Commission (NRC) concerning the NRC's regulatory oversight role in the U.S. program for transportation of spent nuclear fuel to a proposed permanent geological repository at Yucca Mountain, Nevada.

The Commission believes that a permanent geologic repository can provide the appropriate means for the United States to manage spent nuclear fuel and other high-level radioactive waste in a safe manner. We also believe that public health and safety, the environment, and the common defense and security can be protected by deep underground disposal of these wastes. Similarly, we believe that spent nuclear fuel can be safely and securely transported from its current locations to a permanent geologic repository. However, the Commission takes no position on whether such a repository should be located at Yucca Mountain, Nevada. The Commission's views on that question must be shaped by the results of the Congressionally mandated licensing process.

Spent fuel has been safely and securely shipped within the U.S. and around the world for more than 25 years. Spent fuel is required to be shipped in extremely robust transportation packages that are designed and fabricated to withstand severe accident conditions. These packages are known as "Type B" transportation packages. The hypothetical accident conditions and consequent design standards for Type B packages have been established under the auspices of the International Atomic Energy Agency (IAEA) by international experts, including the U.S. representatives. The standards for Type B transportation packages have been in existence for more than 25 years and their adequacy has been repeatedly demonstrated during worldwide shipment of Type B packages.

In the U.S., shipments of spent fuel have been safely and securely made by both NRC licensees and the U.S. Department of Energy (DOE). These shipments included shipments by NRC licensees between power reactor facilities and other facilities. Over 1300 spent fuel shipments have been safely made in NRC-approved packages over the last 20 years under the NRC's and Department of Transportation's (DOT) regulatory authority - a remarkable safety record. No failures of the spent fuel transportation packages have occurred during these shipments, which means there have been no radiological releases or injuries to workers or the public who live and work along the shipment routes. Additionally, the NRC has also been involved in DOE's efforts to return foreign research-reactor spent fuel to the U.S. For example, NRC has approved packages used by DOE.

Regulatory Framework

As you know, Congress provided in the Hazardous Materials Transportation Uniform Safety Act of 1990 that the DOT would regulate the safe transportation of hazardous materials in intrastate, interstate, and foreign

commerce. Radioactive material is one of the nine classes of hazardous materials whose transportation is regulated by DOT. Separately, Congress provided in the Atomic Energy Act of 1954 (AEA) and the Energy Reorganization Act of 1974 that the NRC would regulate the transfer, delivery, or acquiring of special nuclear material and byproduct materials. Additionally, Congress provided in the Nuclear Waste Policy Act of 1982 (NWPA), as amended, that DOE would use NRC-approved package designs to transport spent nuclear fuel to a permanent geologic repository. Congress also provided that DOE would abide by the NRC's regulations on advance notifications to state and local governments associated with transporting spent fuel. NRC has reviewed and certified a number of Type B package designs which could be used for transport of spent fuel to a repository, and has additional designs under review. I am pleased to state that the NRC has consistently met the obligations established by these Acts.

In recognition of their joint regulatory responsibilities for the safe transport of radioactive materials, the NRC and DOT cooperate under a Memorandum of Understanding (MOU). Under the MOU, the NRC's regulatory responsibilities include establishing requirements for the design and manufacture of Type B packages, establishing requirements for quality assurance programs, and establishing requirements for physical protection of spent nuclear fuel shipments. The NRC also requires advance notification to Governors of such shipments. DOT regulates the transport of all hazardous materials, including spent fuel, and has established regulations for shippers and carriers regarding radiological controls, hazard communication, training, response, and other aspects, including the use of preferred hazardous material shipment routes. Separately, the NRC also benefits from advice from its independent Advisory Committee on Nuclear Waste on issues such as the transportation of spent fuel.

NRC's regulations contained in 10 CFR Part 71 describe the requirements for spent fuel transportation package design approvals, quality assurance requirements, and inspections. The NRC also has regulatory requirements in 10 CFR Part 73 for the physical protection of spent fuel shipments. These safeguards regulations require licensees to develop and implement a security plan to meet performance objectives, including minimizing the possibilities for radiological sabotage.

Safety and Security of Spent Fuel Transportation

To ensure transportation package designs meet NRC regulations, the NRC staff has a very thorough certification process. This process requires the NRC staff to conduct comprehensive reviews of the package's design against certain "hypothetical" accident conditions. Applicants are required to demonstrate that packages would meet stringent requirements through testing of subscale models and rigorous analyses of these packages under an NRC-approved quality assurance program. Certificate holders who fabricate packages and licensees who use the packages are also required to conduct their activities under an NRC-approved quality assurance program. NRC staff also reviews and approves quality assurance (QA) programs of applicants for transportation package certificates of compliance and registered users of packages. The review assures that the QA program adequately addresses all applicable regulatory requirements and that the program includes design, purchase, fabrication, shipping, storage, cleaning, assembly, inspection, testing, operation, maintenance, repairs, and modification activities.

The NRC believes the safety protection provided by the current transportation regulatory system is well established. Nonetheless, we continually examine the transportation safety program. In FY 2000, NRC published a reexamination of its generic assessment of spent fuel transportation risks to account for the fuel, cask and shipment characteristics likely to be encountered in future repository shipping campaigns. Over 2 years ago, NRC began an additional review of cask performance under severe impact and fire accident conditions. The NRC staff has actively and will continue to solicit public comment on the plan for this review. Through partial funding, the NRC is also supporting a study by the National Academy of Science's Board on Radioactive Waste Management that will examine radioactive material transportation, with a primary focus on

spent fuel transport safety. As a part of its evaluation, the NRC staff is analyzing appropriate national transportation accidents, such as the 2001 train accident in Baltimore, Maryland, to determine if lessons learned from that event would require changes in our transportation requirements or analyses. Additionally, NRC is sponsoring a study to update its evaluation of cask response to acts of sabotage and terrorism. NRC plans to utilize the results of these studies as input into its comprehensive review of security in light of the events of September 11. We will decide within the next year whether changes are needed in our physical security requirements for spent fuel shipments. Finally, the NRC and DOT are currently conducting joint rulemakings as part of our periodic updates of our respective transportation regulations, to be consistent with the latest version of the IAEA's standards on the transportation of radioactive material.

NRC also reviews and approves physical security plans for spent fuel shipments. These plans provide information on how licensees comply with NRC spent fuel shipment physical protection requirements, including advance notification of each shipment to Governors, the establishment of redundant communication capability with the shipment vehicle, the arrangement of law enforcement contacts along the route, and provision of shipment escorts, including armed guards in certain circumstances.

Conclusion

The NRC believes the current regulatory framework ensures safe and secure transport of spent fuel today. The NRC also believes that shipment of spent nuclear fuel to a permanent geologic repository can be safely accomplished in the future. We are continually assessing our regulatory framework to ensure that it adequately protects public health and safety and the environment. This includes establishing design standards for packages intended to transport spent nuclear fuel, reviewing and approving applications for the design of Type B transportation packages, inspecting the fabrication and use of such packages, implementing quality assurance requirements, and implementing physical protection measures. As I believe this statement makes clear, we take these obligations very seriously.

I will be pleased to answer any questions you may have.

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Testimony of Ed Hamberger

on behalf of the Association of American Railroads

April 25, 2002

Mr. Chairman, the Association of American Railroads (AAR) is pleased at this opportunity to testify on the transportation of nuclear waste. AAR's member railroads account for 97 percent of the nation's railroads' ton-miles and have transported a significant percentage of the spent nuclear fuel that has been transported in the U.S. AAR's members would likely be called upon to transport a substantial amount of the spent nuclear fuel (SNF) and high-level radioactive waste that would be moved to the Yucca Mountain repository [1], since the Department of Energy (DOE) has indicated it prefers rail transportation for the movement of SNF and high-level radioactive waste.[2]

Over twenty years ago, the Interstate Commerce Commission, the predecessor of today's Surface Transportation Board, held that, based upon the record at that time, the railroads' common carrier obligation requires them to transport shipments of SNF. Even though the railroads may currently prefer not to be common carriers of SNF, the railroads recognize that they may be called upon to transport SNF safely and efficiently to the repository.

The railroads' safety record speaks for itself. There has never been a release in connection with the transportation of SNF by rail. Furthermore, the railroads' overall safety record shows that the public has every reason to expect this record will continue. Today, the railroads transport 99.9956% of hazardous materials carloads without a release due to an accident. And the record keeps improving. The rate of train accidents with a hazardous materials release has decreased 86 percent since 1980 and 25 percent since 1990. Specifically, in 1980 there were 0.143 train accidents resulting in a hazardous materials release per thousand carloads of hazardous materials transported; in 1990, the number was reduced to 0.027; and in 2000, the number was further reduced to an estimated 0.021, or one accident in which hazardous materials were released for every 48,000 carloads of hazardous materials shipped. Putting these rates in perspective, DOE projects there would be at most approximately 400 carloads of SNF transported annually to the Yucca Mountain repository over twenty-four years, until the repository reaches its statutory capacity. Notwithstanding this safety record, the railroads recognize that public concern over radioactive materials requires that all parties involved in the transport of SNF take special measures to ensure that SNF is moved without incident. In particular, the Department of Energy (DOE), as the shipper of SNF to the repository, the Department of Transportation (DOT), as the regulator of the safety aspects of the transportation of hazardous materials, and the railroads must work together to design the safest possible transportation system for SNF.

The railroads believe that the safest possible method of transporting SNF by rail is through the use of dedicated trains. Dedicated trains offer several important safety advantages that reduce the very small possibility of an accident occurring. One advantage offered by dedicated trains is that SNF cars in dedicated trains do not have to be "switched" in and out of trains at rail yards since all cars in a dedicated train travel from the same origin to the same destination. Switching would be required were SNF cars to be transported in

general freight service. Switching increases the handling of cars and the more a car has to be handled, the greater the risk of an accident.

Mixing heavy SNF cars in general freight service instead of dedicated trains also increases the potential for an accident.[3] The heavy SNF cars could generate high forces in a general service train, causing significant in-train forces, such as slack action, that could lead to a derailment. Slack action is the force exerted throughout the train as trains accelerate, decelerate, and operate over undulating and curved terrain. A significant part of an engineer's safety responsibilities is to control in-train forces such as slack action. Slack action would be much easier to control in a short dedicated train than in a long general service train. Furthermore, premium suspensions can be incorporated in all rail cars in dedicated trains. Premium suspensions reduce lateral wheel forces and vertical dynamic impact forces, which can result in derailments.[4] If SNF were transported in general freight service, there would be no way of assuring that the cars transporting other freight would have premium suspensions.

Dedicated trains are also essential if the newest technology designed to lower the possibility of a derailment is to be used for SNF shipments. For example, electronically-controlled pneumatic (ECP) brakes, a recent innovation, can be utilized only when all cars in a train are equipped with them. In addition to providing superior braking performance, ECP brakes utilize a communication system throughout a train that can be used to transmit train "health" information to the locomotive crew and security personnel. The train health information could include monitoring for known derailment causes such as truck hunting,[5] rocking,[6] wheel flats,[7] defective bearings, vertical and longitudinal acceleration, and, of course, braking performance.

Dedicated trains are also advantageous from the perspective of time spent in transportation. The amount of time SNF shipments spend in the transportation system should be minimized, for both security and efficiency reasons.[8] It would take longer to transport SNF from origin to destination if SNF were transported in mixed-freight trains instead of dedicated trains. One reason is that the switching of rail cars in and out of trains takes time. A second reason is that railroads can schedule dedicated trains to move quickly and smoothly through sensitive areas, thus lessening safety concerns by limiting the time of transit for SNF shipments.

Finally, dedicated SNF trains can be transported with greater security. Escorts, required by DOT and the Nuclear Regulatory Commission (NRC) for all SNF movements, would have an easier time monitoring SNF in dedicated trains than in general freight service, which by necessity involves the switching of SNF cars and the movement of the cars in different trains as the SNF moves from origin to destination. With the advantages that dedicated trains offer, it is unfortunate that in its environmental impact statement for the Yucca Mountain repository, DOE maintains that the evidence does not show that dedicated trains are advantageous.[9] Thus, DOE states, "it has not determined the commercial arrangements it would request from railroads for shipment of spent nuclear fuel and high-level radioactive waste." [10]

DOE's reluctance to commit to dedicated trains dates back at least to the 1970's, when it argued before the Interstate Commerce Commission that railroads could not require shippers to use and pay for dedicated train service for SNF. DOE's position, as a potential shipper, is driven, no doubt, by economic considerations. I submit that the events of September 11, 2001, have altered that calculation forever.

It is noteworthy that the Private Fuel Storage consortium, which is seeking to build a temporary storage facility for SNF in Utah, intends to use and pay for dedicated trains incorporating ECP brakes and a train health monitoring system. Dedicated trains with these safety enhancements will be used by the private utilities belonging to the consortium and the rail transporters of SNF because of the safety benefits. The commitment of industry to dedicated trains should be convincing evidence that safety would be enhanced by the use of dedicated trains. AAR calls on DOE to meet the commitment to safety exemplified by the railroads' private

utility customers. AAR also urges DOT and NRC, the agencies charged with ensuring the safe transport of SNF, to join us in insisting on DOE's use of dedicated trains.

Mr. Chairman, thank you for the opportunity to testify. AAR would be pleased to answer any questions the Committee has concerning the transportation of SNF by rail.

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1. AAR takes no position on whether Yucca Mountain is the appropriate site for a repository.

2. In its environmental impact statement for the Yucca Mountain repository, DOE stated it would prefer that most shipments to the repository be made using rail transportation, although highway transport is an option. U.S. Department of Energy, Office of Civilian Radioactive Waste Management, A Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada,@ p. J-1 (Feb. 2002). The remainder of this testimony will use ASNF@ as a shorthand for spent nuclear fuel and high-level radioactive waste.

3. SNF cars weigh over 400,000 pounds, while loaded general freight service case generally weigh a maximum of 286,000 pounds and empty rail cars weigh as little as 30,000 pounds.

4. Premium suspensions are higher quality freight car wheel assemblies.

5. Truck hunting is an instability at high speed of a wheel set (truck) causing the truck to weave down the track, usually with the flange of the wheel striking the rail.

6. Excessive lateral rocking of cars and locomotives can occur, usually at low speeds. The speed range at which this cyclic phenomenon occurs is determined by such factors as the wheel base, height of the center of gravity of each individual car or locomotive, and the spring dampening associated with each vehicle's suspension system.

7. A wheel flat is a flat spot or loss of roundness of the tread of a railroad wheel.

8. See U.S. Department of Transportation, "Identification of Factors for Selecting Modes and Routes for Shipping High-Level Radioactive Waste and Spent Nuclear Fuel," p. vi (April 1998).

9. Final Environmental Impact Statement, p. J-76.

10. Id.

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United States House of Representatives

Committee on Transportation & Infrastructure
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Testimony of Robert M. Halstead

Transportation Advisor, State of Nevada's Agency for Nuclear Projects

April 25, 2002

I am Robert J. Halstead, Transportation Advisor, Agency for Nuclear Projects, State of Nevada. I have worked on nuclear waste transportation issues for the past 24 years. I have been Transportation Advisor to the Nevada Agency for Nuclear Projects since 1988. My primary responsibility is assessment of the impacts and risks of transporting spent nuclear fuel and highlevel radioactive wastes to the proposed Yucca Mountain repository site. In addition to reviewing the U.S. Department of Energy's Draft and Final Environmental Impact Statements for Yucca Mountain, my recent work for Nevada includes managing contractor studies on the vulnerability of shipments to sabotage and terrorist attack, on the radiological consequences of severe highway and rail accidents, and on radiation exposures from incident-free shipments.

From 1983 to 1988, I was senior policy analyst for the State of Wisconsin Radioactive Waste Review Board, an agency created by the Wisconsin Legislature to represent the State in dealings with the U.S. Department of Energy, the U.S. Nuclear Regulatory Commission, other federal agencies, and nuclear electric utilities. I advised the Board and Wisconsin's congressional delegation on federal legislation that resulted in the Nuclear Waste Policy Act of 1982, and the Nuclear Waste Policy Amendments Act of 1987. I monitored on-going spent nuclear fuel shipments; evaluated transportation impacts of repository candidate sites in Wisconsin, Minnesota, and Michigan; and represented the Board on all matters pertaining to transportation.

From 1978 to 1983, I worked for the State of Wisconsin Energy Office. I evaluated utility plans for nuclear and coal- fired power plants, and represented the State in proceedings before the Public Service Commission of Wisconsin. I prepared policy recommendations on transportation of coal, petroleum, spent nuclear fuel, and low- level radioactive wastes.

I have also worked as a consultant on nuclear waste transportation and storage for the States of Minnesota, Tennessee, and Texas, and for the Law and Water Fund of the Rockies.

The U.S. Department of Energy's Final Environmental Impact Statement for Yucca Mountain

The Department of Energy (DOE) released the Final Environmental Impact Statement (FEIS) for the proposed Yucca Mountain Repository on February 14, 2002. The FEIS was available from DOE's website (www.ymp.gov) shortly thereafter. DOE apparently published no paper copies of the FEIS for distribution to the public. DOE's transportation impact analyses are spread over more than 750 pages in the FEIS Summary, eight chapters, and four appendices. In order to obtain print-optimized files for the Summary, it is necessary to go to DOE's website and download 48,425 KB. To obtain the eight chapters and four appendices dealing with transportation and related issues, it is necessary to download more than 113,300 KB. In the FEIS Summary, DOE has estimated the total projected inventory of commercial spent nuclear fuel (SNF), high-level radioactive wastes (HLW), and other wastes intended for repository disposal through 2046. This inventory,

referred to by DOE as Module 2, includes 105, 000 metric tons of heavy metal (MTHM) of commercial SNF, 2,500 MTHM of DOE SNF, 22,280 canisters of DOE HLW (equivalent to about 11,500 MTHM), 2,000 cubic meters of Greater-than-Class-C (GTCC) waste, and 4,000 cubic meters of Special-Performance- Assessment-Required (SPAR) waste. [FEIS, p. S-78]

Under DOE's Proposed Action, the following wastes would be shipped to Yucca Mountain over 24 years (2010-2033): 63,000 MTHM of commercial SNF, 2,333 MTHM of DOE SNF, and 8,315 canisters of DOE HLW (equivalent to about 4,667 MTHM). [FEIS, p. S-78] This means that at the end of DOE's Proposed Action, in 2034, there would still be 42,000 MTHM of commercial SNF stored at 63 nuclear power plant sites in 31 states, 167 MTHM of DOE SNF stored at DOE sites in 4 states, and 13,965 canisters of DOE HLW (equivalent to about 6,833 MTHM) stored at DOE sites in 3 States. Additionally, all of the projected GTCC and SPAR wastes would also still be stored at 63 commercial and 4 DOE sites in 32 states. [FEIS, Pp. S-78, A-2 to A-16, and J-10 to J-22]

Because there are currently no plans for a second repository, the State of Nevada believes that DOE's Module 2 inventory is the most appropriate basis for assessing Yucca Mountain transportation impacts and risks. Nevada's analysis of DOE's proposed Yucca Mountain transportation system is therefore based on the 38-year (2010-2048) shipment numbers provided in Appendix J of the FEIS [Tables J-1, J-4, J-5, J-6, J-7, J-9, and J-27]

Yucca Mountain Shipment Modes and Numbers of Shipments

DOE's "mostly legal-weight truck scenario" is the only transportation scenario which is currently feasible. At present, there is no railroad access to Yucca Mountain. The feasibility of longdistance heavy haul truck (HHT) transport of rail casks is unproven. All 72 power plant sites and all 5 DOE sites can ship by legal-weight truck. If the repository goes forward, there would be more than 108,500 cross-country truck shipments of spent nuclear fuel and high- level radioactive waste over 38 years. That works out to 2,855 truckloads per year over 38 years. By comparison, over the past 40 years, there have been less than 100 shipments per year in the United States.[1]

Even if DOE is able to develop rail access, there would still be tens of thousands of shipments. DOE acknowledges that 25 of the 72 power plant sites cannot ship directly by rail. Nevada studies show that number could be up to 32 sites. The combined truck and rail total of commercial SNF shipments would be 36,400 if 25 sites ship by truck, and 42,300 if 32 sites ship by truck. All 5 DOE sites can ship by rail, and are projected to make 5,700 rail shipments over 38 years. The combined total of truck and rail shipments, from 72 utility sites and 5 DOE sites, would be 42,100 to 47,000, over 38 years, or an average of 1,100 to 1,240 per year.

In the FEIS, DOE designates the "mostly rail scenario" as the preferred mode for repository shipments. Under this scenario, 6 power plant sites would ship by truck, and all other sites would ship by rail, resulting in 3,122 truck shipments and 18,935 rail shipments, or a combined total of 22,057 cross-country shipments over 38 years. To this total must be added 3,000 barge shipments and 1,600 HHT shipments from 24 reactor sites, which cannot otherwise ship by rail. [FEIS, Pp. J-10 to J-12]

If there is no rail access to Yucca Mountain, there would be another 18,935 HHT shipments in Nevada, each of which would be considered a separate shipment requiring a separate State permit. If DOE ships by general freight service to a rail spur in Nevada, the casks will have to be switched out, parked on a siding, and reassembled into new trains. Assuming 3 to 5 casks per train trip to the repository, there would be an additional 3,800 to 6,300 rail shipments in Nevada. If DOE decides to use dedicated trains, averaging 3 casks per train, and makes direct deliveries to the repository via a new rail spur, the total number of rail shipments

(as opposed to caskshipments) could be reduced to about 6,300 over 38 years. The actual number of "shipments" under the "mostly rail scenario" could therefore range from 14,000 to 45,600, or an average of about 370 to 1200 per year, for 38 years.

However, all of the available evidence indicates that DOE's "mostly rail scenario" is unlikely to occur. The FEIS assumes that DOE can ship thousands of casks by barge into Boston, New Haven, Newark, Jersey City, Wilmington (DE), Baltimore, Norfolk, Miami, Milwaukee, Muskegon, Omaha, Vicksburg, and Port Hueneme (CA). Barge shipments would raise a host of concerns about accidents, including criticality accidents, terrorism, sabotage, and port security generally. The FEIS also assumes that DOE can make 1,600 cask shipments from reactors in 7 states to rail lines using 220- foot- long, slow- moving heavy haul trucks, each of which will require special state permits and route approvals.

The FEIS "mostly rail scenario" also assumes that DOE can construct a new rail spur to Yucca Mountain, 99 to 344 miles in length, at a cost of more than $1 billion. Even the shortest of the five spur options would be the largest new rail construction project in the United States since World War I. Environmental approvals, right-of-way acquisition, and litigation could delay rail construction for 10 years or more. The alternative, delivery of large rail casks by 220- foot- long, heavy haul truck (HHT), over distances of 112 to 330 miles on public highways, is probably not feasible. HHT route constraints include highly congested segments through rapidly urbanizing areas, and steep grades and sharp curves through high mountain passes. All of the potential HHT routes would require substantial upgrading, and would likely cost more than a rail spur.

Moreover, certain programmatic and policy factors favor truck shipment, especially during the first 10-15 years of repository operations. DOE's "hot repository" thermal loading strategy may require truck shipment of 5 year-cooled SNF. Some utilities may exercise contract options to ship 5 year-cooled SNF from storage pools by truck, rather than shipping older SNF by rail. DOE's transportation privatization plan does not require transportation service providers to ship oldest fuel first or to maximize use of rail. Indeed, under DOE's fixed-cost contracting approach to privatization, rail transportation may not be cost-competitive with legal-weight at many sites.

Yucca Mountain Transportation Routes

In the Draft EIS, DOE chose to conceal the specific routes used for impact and risk analyses in Chapter 6 and Appendix J. DOE did not identify the routes in its Federal Register notice nor in its public notices of scheduled hearings. During the public hearings that began in September, 1999, DOE provided some state-specific transportation maps at individual hearings around the country. But DOE did not release national maps showing the full cross country routes from shipping sites to Yucca Mountain until sometime in late January, 2000, near the end of the public comment process.

In the Final EIS, DOE decided to reveal the routes used for risk and impact analysis. The DOE national map of highway routes is shown in Exhibit A. These routes were generated by the HIGHWAY computer model, and generally represent the quickest truck travel routes consistent with the current Federal routing regulations (HM-164). DOE refers to these as "representative routes." However, with two exceptions, DOE's cross-country routes agree with the highway routes identified in previous routing studies by DOE and Nevada contractors. Absent additional state designation of preferred alternatives or DOE policy decisions, we believe that these are the most likely highway routes to Nevada, with two notable exceptions.

In between publication of the Draft and Final EISs, the State of Colorado exercised its authority under U.S. DOT regulations to prohibit SNF and HLW shipments on I-70 west of Denver. Colorado took this action to avoid shipments through the Eisenhower and Glenwood Tunnels. Under the Colorado designation, shipments would be diverted north or south on I-25. Nevada routing analyses show that the new preferred route to Yucca

Mountain for shipments using I-70 would be through the Northeastern Denver metropolitan area to I-25, then connecting with I-80 at Cheyenne, Wyoming. For reasons we do not understand, DOE's FEISmap has the trucks on I- 70 turning north on I-29 to connect with I-680/I-80 near Omaha, so that the major stream of shipments from the Southeastern region avoids Colorado altogether. Preliminary analysis indicates that DOE's route choice could add more than 20 miles to each of tens of thousands of shipments, compared to the new preferred route in Colorado. We are continuing to study this route.

A second DOE highway route of concern was called to our attention by the State of Pennsylvania. DOE's FEIS map shows shipments from six reactor sites using the Pennsylvania Turnpike (I-76) West of Harrisburg. Pennsylvania authorities informed us that all placarded hazardous material shipments must use bypasses to avoid four tunnels along this segment of the Turnpike, and that no SNF shipments have ever used this route. It is not clear how DOE could have missed these restrictions, since the Pennsylvania bypass requirements are clearly stated in a U.S. DOT guidance document cited as a reference in the FEIS. We are continuing to study this route also.

Otherwise, DOE's FEIS routes agree with those identified by Nevada as most likely routes to Yucca Mountain. The primary truck routes out of New England and the Middle Atlantic states converge on I-80/90 near Cleveland, pick up shipments from Midwestern reactors, and follow I- 80 west from Chicago through Des Moines, Omaha, Cheyenne, and Salt Lake City to I-15. The primary truck routes out of the South are I-75 from Florida, I-24 from Atlanta, and I-64 from Virginia. These routes converge on I-70 near St. Louis, and follow I-70 west through Kansas City and Denver to I-25, then join I-80 near Cheyenne..

The primary route from the Pacific Northwest is I-84 to I-15 in Utah. Other major routes are I-40 and I-10 from the MidSouth and I-5 in California. These routes converge on I-15 in Southern California.

As with highway routes, DOE chose to conceal the rail routes analyzed in the Draft EIS DOE until late January 2000, near the end of the public comment process. In the Final EIS, DOE decided to reveal the rail routes used for risk and impact analysis. The DOE national map of rail routes is shown in Exhibit B. These routes were generated by the INTERLINE computer model, and generally represent the most direct routes to Nevada consistent with the current industry practice of maximizing freight- miles on the originating railroad.

Since DOE has not yet identified a preferred rail destination in Nevada, the map shows all potential cross-country routes from the 77 sites. For about 85 percent of the originating locations, the most likely route is unchanged by the Nevada destination. DOE's rail routes to Nevada generally agree with the rail routes identified in previous routing studies by DOE and Nevada contractors. While mergers and other rail industry developments would continue to affect routing , Nevada believes that the FEIS map shows the most likely rail routes to Nevada. The primary rail routes out of New England and the Middle Atlantic states are the former Conrail mainlines from Buffalo and Harrisburg to Cleveland and Chicago. These shipments switch to the Union Pacific near Chicago, are joined by shipments from Midwestern reactors in Illinois and Iowa, and continue west via Fremont, Gibbon, Cheyenne, and Salt Lake City to Nevada. The primary routes out of the South are the CSXT from Atlanta to East St. Louis, and the Norfolk Southern from Atlanta to Kansas City via Birmingham and Cairo. These two streams merge on the Union Pacific in Kansas City, and in turn merge with the northern UP shipments at Gibbon, Nebraska. Other major rail routes are the UP from Oregon via Boise, and the UP and BNSF from California and the Southwest via San Bernardino and Daggett.

The potential highway and rail routes identified in DOE's Final Environmental Impact Statement could affect 45 states and the District of Columbia. More than 123 million people currently live in the 703 counties traversed by DOE's highway routes, and 106 million live in counties along DOE's rail routes. DOE predicts that between 10.4 and 16.4 million people will live within onehalf mile of a transportation route in 2035.

Yucca Mountain Routine Transportation Impacts

Ninety percent of the waste shipped to Yucca Mountain will be spent fuel from nuclear power plants. This irradiated reactor fuel gives off deadly, penetrating gamma and neutron radiation. Extraordinary precautions and effective shielding are required in order to safeguard workers and the public from its lethal effects. A person standing one yard away from an unshielded, 10 year old fuel assembly, for example, would receive a lethal dose of radiation (600 rem) in less than five minutes and would incur significant health damage in less than a minute.

NRC regulations allow a certain amount of neutron and gamma radiation to be emitted from shipping casks during routine operations and transport (1,000 mrem/hr at the cask surface and 10 mrem/hr 2 meters from the cask surface). The dose rate allowed under NRC regulations results in near-cask exposures of about 2.5 mrem per hour at 5 meters (16 feet), in measurable exposures (less than 0.2 mrem per hour) at 30 meters (98 feet), and calculated exposures (less than 0.0002 mrem per hour) at 800 meters (one-half mile) from the cask surface. [FEIS, p. J-38] Cumulative exposures at these rates can result in adverse health affects for some workers and some members of public. Moreover, the very fact that these exposures would occur has been shown to cause adverse socioeconomic impacts, such as loss of property values, even though the dose levels are well below the established thresholds for cancer and other health effects.

The FEIS acknowledges that routine radiation from shipping casks poses a significant health threat to certain transportation workers. In the most extreme example, motor carrier safety inspectors could receive cumulative doses (200 rem over 24 years) large enough to increase their risk of cancer death by 10 percent or more, and their risk of other serious health effects by 40 percent or more. DOE proposes to control these exposures and risks by severely restricting work hours and doses for certain jobs. [FEIS, Pp. J-44 to J-45]

Yucca Mountain Transportation Accident and Terrorism Impacts

In the Draft and Final EISs, DOE acknowledges that a very severe highway or rail accident, or a successful terrorist attack using high energy explosives, could release radioactive materials from a shipping cask, resulting in radiation exposures to members of the public and latent cancer fatalities (LCFs) among the exposed population.

In the Draft EIS, DOE evaluated a" maximum reasonably foreseeable accident scenario" involving a rail at a generic urban lo cation. Following the accident severity categories designated by the NRC Modal Study, DOE estimated the consequences of the most severe (category 6) rail accident using the RISKIND computer code. DOE estimated that the accident would release and disperse enough radioactive materials to inflict a collective population dose of 61,000 personrem (enough to give 61,000 persons a one rem dose) and cause about 31 latent cancer fatalities.

In the Final EIS, DOE changed the basis of its transportation risk assessment, relying solely upon a controversial new NRC contractor report prepared by Sandia National Laboratories (NUREG/CR-6672). As a result, DOE's estimated consequence of the " maximum reasonably foreseeable accident scenario" involving a rail cask was reduced to a collective dose of 9,900 person-rem and 5 latent cancer fatalities. [FEIS, Pp. 6-45 to 6-47, 6-49 to 6-50]

The FEIS acknowledges that the July 2001 Baltimore rail tunnel fire was so severe that it would have resulted in a release of radioactive materials if a rail cask had been involved. [FEIS, p. 6- 50] The FEIS also acknowledges that clean- up costs following a severe transportation accident could range from $300,000 to $10 billion. [FEIS, p. J-73]

As part of its review of the Draft EIS, the State of Nevada commissioned several SNF accident consequence analyses by Radioactive Waste Management Associates (RWMA). In 2000, RWMA reexamined the DEIS truck and rail accident estimates, using the RADTRAN and RISKIND computer models and a range of credible alternative assumptions. In 2001, RWMA estimated the consequences of a rail SNF accident similar to the July 2001 Baltimore rail tunnel fire. Also in 2001, RWMA studied the consequences of credible worst case truck and rail accidents at representative urban and rural locations along potential Nevada highway routes. These studies concluded that DOE systematically underestimated the consequences of severe transportation accidents. The results of these studies are reported in State of Nevada impact report, A Mountain of Trouble, which can be accessed on the web at www.state.nv.us/nucwaste, or obtained in hardcopy by request from the Nevada Agency for Nuclear Projects (phone: 775- 687-3744).

The Nevada-sponsored study of the July 2001 Baltimore rail tunnel fire concluded that it would have resulted in significant release of radioactive materials. It burned for more than three days with temperatures as high as 1500°F. A single rail cask in such an accident could have released enough radio-cesium to contaminate an area of 32 square miles. Failure to cleanup the contamination, at a cost of $13.7 billion, would cause 4,000 to 28,000 cancer deaths over the next 50 years. Between 200 and 1,400 latent cancer fatalities would be expected from exposures during the first year.

In both the Draft and Final EISs, DOE acknowledges that SNF truck casks are especially vulnerable to terrorist attack and sabotage. DOE and NRC testing in the 1980s demonstrated that a high-energy explosive device (HED) such as a military demolition charge could breach the wall of a truck cask. DOE sponsored a 1999 study of cask sabotage by Sandia National Laboratories (SNL) in support of the DEIS. The SNL study demonstrated that HEDs are "capable of penetrating a cask's shield wall, leading to the dispersal of contaminants to the environment." [DEIS, p. 6-33] The SNL study also concluded that a successful attack on a truck cask would release more radioactive materials than an attack on a rail cask. [DEIS, p. 6-34].

In the Draft EIS, DOE estimated that a successful attack on a GA-4 truck cask in an urbanized area under average weather conditions would result in a population dose of 31,000 person-rem, causing about 15 cancer fatalities among those exposed to the release of radioactive materials. In the Final EIS, DOE updated its sabotage analysis, assuming the cask contained more radioactive SNF and assuming a higher future average population density for U.S. cities. The Final EIS estimated that the same successful attack on a truck cask would result in a population dose of 96,000 person-rem and 48 latent cancer fatalities. [FEIS, Pp. 6-50 to 6-52] In neither case did DOE evaluate any environmental impacts other than health effects. In particular, DOE ignored the economic impacts of a successful act of sabotage in both the Draft and Final EIS. Analyses prepared for Nevada by RWMA estimated sabotage impacts would be considerably greater than DOE's estimate. RWMA replicated both the Draft and Final EIS sabotage consequence analyses, using the RISKIND model for health effects and the RADTRAN model for economic impacts, the SNL study average and maximum inventory release fractions, and a range of population densities and weather conditions.

The Nevada-sponsored study of the Final EIS scenario concluded that an attack on a GA-4 truck cask using a common military demolition device could cause 300 to 1,800 latent cancer fatalities, assuming 90% penetration by a single blast. Full perforation of the cask, likely to occur in an attack involving a state-of-the art anti-tank weapon, such as the TOW missile, could cause 3,000 to 18,000 latent cancer fatalities. Cleanup and recovery costs would exceed $10 billion. Public perception of transportation risks could result in massive economic costs in communities along transportation routes. Even without an accident or incident, property values near routes could decline by 3% or more. In the event of an accident, residential property values along shipping routes could decline between 8% and 34 %, depending upon the severity of the accident.

Rail Shipments, Dedicated Trains, and Railroad Safety

Even if DOE is able to implement the "mostly rail" transportation plan, DOE's opposition to dedicated trains and other accident prevention measures raise grave concerns about DOE's commitment to transportation safety. The Association of American Railroads (AAR) has long contended that spent fuel should only be shipped in so-called special trains - dedicated or unit trains hauling only spent fuel and other radioactive materials, operating under special safety protocols such as speed restrictions (now 35 to 55 mph), buffer car specifications, and train passing rules.

Current USDOT regulations allow shipment of spent fuel casks in general freight service. The July 19-23, 2001, Baltimore rail tunnel fire has been cited as a prime example of the dangers of shipping spent fuel in mixed freight trains. The Baltimore fire has also rekindled calls for Federal regulation of spent fuel rail routing.

Nevada believes the following safety measures should be mandatory: (1) spent fuel should never be shipped in mixed freight trains; (2) spent fuel should always be shipped in dedicated trains; (3) these trains should operate under strict speed limits (35-55 mph) and special passing rules; (4) US DOT should regulate the selection of rail routes to minimize shipments through urban areas; (5) federal emergency response teams and security escorts should accompany all rail shipments at all times. DOE and the nuclear industry oppose these mandatory safety regulations.

Full-Scale Physical Testing for Spent Fuel Shipping Casks

NRC does not currently require full- scale physical testing of shipping casks as part of its certification process. Cask designers are allowed to demonstrate compliance with the NRC performance standards through a combination of scale-model testing and computer simulations. Nevada has long urged NRC to require full-scale testing as part of certification. Alternately, Nevada has suggested that DOE require full-scale testing as part of the procurement process. NRC is currently proposing demonstration testing of a "representative" shipping cask as part of the Package Performance Study being conducted by Sandia National Laboratories. Nevada has not formally opposed NRC's proposal, but it is not an acceptable substitute for full-scale testing of each new cask design prior to certification.

Nevada has proposed a five-part approach to full-scale testing: (1) meaningful stakeholder participation in development of testing protocols and selection of test facilities and personnel; (2) full-scale physical testing (sequential drop, fire, puncture, and immersion) prior to NRC certification; (3) additional computer simulations to determine performance in extra-regulatory accidents and to determine failure thresholds; (4) reevaluation of previous risk study findings, and if appropriate, revision of NRC cask performance standards; and (5) evaluation of costs and benefits of destructive testing of a randomly-selected production model cask.

Nevada believes that comprehensive full-scale testing would not only demonstrate compliance with NRC performance standards. It would improve the overall safety of the cask and vehicle system, and generally enhance confidence in both qualitative and probabilistic risk analysis techniques. It could potentially increase acceptance of shipments by state and local officials and the general public, and potentially reduce adverse social and economic impacts caused by public perception of transportation risks.

Nevada estimates that the cost of a full-scale regulatory fire test for a truck cask would be less than $5 million. Comprehensive regulatory testing (drop, fire, puncture, and immersion) of a truck cask (up to 30 tons) would be between $8 million and $15 million. Comprehensive regulatory testing of a large rail cask (up to 125 tons) would cost $12 million to $25 million for the first cask, including the cost of required upgrading at the testing facility. By comparison, Nevada estimates the life-cycle cost of the repository transportation system at about $9.2 billion.

None of the SNF shipping casks currently used in the United States have ever been tested fullscale. This fact was confirmed by NRC Chairman Richard Meserve in a letter to Senator Harry Reid dated April 2, 2002. DOE has no plans for full-scale testing of the casks which would be used for shipments to Yucca Mountain. DOE and the nuclear industry oppose mandatory fullscale testing.

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1. There were about 3,025 shipments in the United States between 1964 and 1997, about 92 per year. Reliable estimates of worldwide cask-shipments, through 1998, range from 24,000 to 40,041. Most of the international cask-shipments moved in trains carrying multiple casks, so the actual number of shipments would be considerably less, but precise information is unavailable. The estimate of 40,041 cask-shipments worldwide was published by the International Atomic Energy Agency in July 1999 and includes the following country totals: United Kingdom, 28,854; U.S.A, 2,425; Germany, 1,612; France, 1,570; Japan, 1,399; and Sweden, 900. Source: R. Pope, IAEA, "International Experience with SNF/HLW Transport," Presentation before the U.S. National Academy of Sciences, National Transportation Research Board, Washington, DC, September 11, 2000.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
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Testimony of Edward M. Davis

President/CEO, NAC International

April 25, 2002

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 beginning 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.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
2165 Rayburn HOB, Washington, DC 20515
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Testimony of Dr. James David Ballard

Grand Valley State University, Grand Rapids, Michigan

April 25, 2002

Good morning Mr. Chairman and the distinguished members of the Subcommittees gathered here today. As a scholar of terrorism tactics related to the transportation of radioactive waste materials, I appreciate the opportunity to appear before you today to discuss the evolving nature of the security and safety risks involved in the shipment of highly radioactive waste materials.

This testimony will provide information on several transportation related issues relative to the vulnerability of the proposed shipments of nuclear waste to the Yucca Mountain facility and possible attacks by terrorists. These shipments will transpire by road, rail, and barge if the Yucca Mountain facility were to be licensed for use by the Nuclear Regulatory Commission [NRC]. Once that process would be complete, then the Department of Energy [DOE] would have to finalize the planning for its construction before Yucca Mountain would become ready to accept shipments from around the country. The discussion presented herein addresses several significant issues relative to the regulation and safety of the proposed massive transportation effort involving highly radioactive materials.

Nature of the Problem

The first step in addressing the issue of terrorism risk against spent nuclear fuel [SNF] shipments is to recognize the nature of the problem. What is being transported sounds benign when it is termed “waste products” or “spent fuel rods,” but we should recognize these cargos for what they could become: Potential weapons of mass contamination. Each of these shipments represent a huge inventory of highly radioactive materials and if released during transit, they would create: potentially massive public health impacts; cascading response demands on the emergency response infrastructure of the United States; severe impacts on the social fabric of this country; economic impacts that could dwarf those seen from the September 11, 2001 attacks; and severe stigmatization of communities where the release occurs.

A release from one of these shipments has the potential to contaminate the adjacent transportation infrastructure as well as large areas of the local community where an incident occurs. To avoid long-term dislocation of vital services would require immediate intervention, extensive environmental remediation, and would ultimately require an unprecedented national response. Continued access and use of the affected transportation infrastructure would be disrupted for an extensive period of time and cause intermediate term disruption in our highly integrated national transportation system until such time as these radioactive hazards were mitigated.

The deliberate release of the radioactive cargo would constitute a radiological dispersion incident. Radiological terrorism encompasses two categories of weapons. The first category is bombs that create a nuclear reaction and involve a massive explosion, radiation dispersion, and widespread destruction of property. The materials in SNF cargos will not be equal to these types of weapons in terms of effects. The

second category is radiological dispersion devices. These weapons do not necessarily have the potential for causing a chain reaction, but nevertheless have the ability to create a mass contamination event. It is this latter category that concerns us today.

For radiological dispersion to occur, two components are needed: (1) explosives or a physical release mechanism and (2) radioactive source materials. Logic dictates that the larger the inventory of source materials and the more dangerous the inventory of radionuclides, the greater the impact of dispersion into the environment. SNF shipments clearly have the potential for use as radiological dispersion devices under certain circumstances. These circumstances depend on a variety of factors and five relative topics related to these are noted in the discussion below.

The transportation effort as proposed will ensure a target rich environment wherein a terrorist could pick and chose the time and place for an attack.

Potential shipment saboteurs and attackers will be presented with what is called a “target rich” environment. This tactically advantageous environment will provide them the opportunity to plan and execute a terrorist attack, using features of the proposed transportation effort to their advantage.

The overall time and effort necessary to transport the materials across the country is one such advantage. Because of the choice of a single centralized repository that is located far from the majority of production sites, these shipments will need to travel long distances across road, rails, and waterways. Such sustained transportation efforts over great distances will produce easily identifiable and predictable shipment characteristics such as set times of day when a shipment is most likely to pass an attack location and large numbers of shipments along identifiable routes, from which an adversary could pick and choose its target. The numbers of shipments (be they in the form of the DOE’s mostly rail plan, the mixed rail/highway plan, or the primary highway shipment plan) will increase the likelihood of an adversary being able to acquire the target (shipment) and thereafter execute an attack on either a highway, railway, or waterway shipment.

Massive numbers of shipments, predictable schedules, identifiable cargos, and the overall length of the transportation routes add additional risks to the proposed Yucca Mountain program. The additional miles equal many more insecure areas for the transportation effort and lower the potential for appropriate defenses that can be planned and executed. Moving these materials out of their current safe and secure locations decreases the potential defense options available to counterterrorism planners since the ability to secure tens of thousands of miles of roadways, railways, and waterways at the same level as a power plant would be impossible to achieve under current plans.

Recognizable and readily identifiable routes for transportation of these wastes are codified in regulations, bounded by shipment vehicle limitations, and the options available for shipment routes are limited by distance and geography.

Critical geographically disadvantageous locations are impossible to avoid during transportation efforts. These include such transportation infrastructure components as tunnels; bridges; trusses; steep grades; co-existent pipelines carrying petroleum products; multiple use transportation corridors (e.g. highway, rail routes, and waterways that are side by side); and others. Securing all of these locations will be necessary to insure that the shipments themselves do not encourage an attack simply because of their proximity to critical and usable (from the attackers perspective) infrastructure.

NRC, DOE, and other agencies have regulations that dictate the avoidance of highly populated areas wherever possible, control the access to certain transportation infrastructure features, and otherwise may limit the safest and most secure options available for transporting SNF. These regulations convey unrealistic assumptions

about SNF transportation risks when considering the location of production sites and the many jurisdictions that the cargos must unavoidably traverse. As population densities, traffic densities, and other growth factors increase over the lifespan of the program, risks to population centers and infrastructure will also increase.

Transportation targets are different than fixed targets; they are much more difficult to defend. As such, they will need appropriate levels of security relative to their different threat profiles. Nevada argues that these shipments are more in need of security than has been planned and anticipated for by the NRC, DOE, and other agencies.

For example, certain characteristics of the vehicles themselves present a different risk profile than would a fixed target. Shipment vehicles will contain varying amounts of flammable fuel, will pass within close proximity to fuel bearing or potentially explosive cargos on other vehicles, and/or require refueling at locations wherein a significant inventory of explosive fuel is stored. These factors and many others make the shipments more vulnerable to an attack based on their interaction with these co-existent features.

If on-board and co-existent fuels were to be used to create a multiple layered incident scene, the actual trucks and/or trains could create a larger on-scene fire hazard and increase the dispersion of a radioactive plume. The bottom line is that such fuels could be used as part of the release mechanism for the radioactive cargos and increases the effect of a breach.

Fuel is just one of many hazards faced when transporting nuclear wastes from safe, secure facilities and across the transportation infrastructure. While these shipments would represent a lower level of overall releasable inventory than an attack on a nuclear power plant, the chances of a breach on insecure roadways, difficult to secure rail corridors, and yet-to-be studied hazards associated with the use of waterways, make shipments more likely attack targets than a containment vessel at a nuclear power plant.

There are several varieties of terrorism related attack tactics with a higher-than-anticipated probability of breaching shipping casks.

The attack scenarios presented below are composites of more detailed work presented by Nevada and academics over the years. They represent several varieties of tactics that have yet to be studied in any meaningful way as real and probable transportation events during the lifespan of the proposed shipment effort.

The first is a capture and breach scenario. If the transportation vehicle were to be captured, placed in an immobile state by any number of means, or once acquired it was able to be moved at will by the terrorists, it would be susceptible to the application of explosives and/or a human engineered breach. Success at fielding this tactic would depend on how long the incident response would take and how effective the terrorists could be at holding off local emergency responders. Thus, the cargo could become a radiological dispersion device if the attackers where to breach cargo shielding and release the radioactive contents into the environment. This scenario may represent one variety of a maximum severe incident and could result in a moderate release of radioactive cargo not anticipated by current regulations and/or cask design specifications.

A transportation infrastructure attack scenario would likewise represent a risk to these cargos. The huge variety of topography and transportation infrastructure components that would be traversed in the nationwide shipment of SNF presents unique challenges to safety and security planners. For example, the deliberate attack on a shipment in a tunnel could expose the cargo to risks of an impact breach, a crush breach, and/or a fire related incident sufficient to cause a failure of the controls engineered into cask designs. This scenario may represent a maximum severe incident and could potentially result in a moderate release of radioactive cargo not anticipated by current regulations and/or cask design specifications.

The last scenario that should be considered is that of a remote attack using current generation weapons. If the transportation vehicle and its cargo were to become vulnerable to line of sight attack tactics and weapons (e.g., readily available anti-tank missiles, stolen military amour piercing weapons, and/or one of an emerging generation of recoilless rifle munitions with sufficient penetrating power) an adversary could use existing regulatory protocols like the disabling device on these vehicles, and/or in conjunction with geographically disadvantageous locations, to attack the vehicle from a distance of upwards of 3000 meters. This scenario may represent a maximum severe incident and could potentially realize a massive release of the radioactive cargo not anticipated by current regulations and/or cask design specifications.

NRC and DOE regulatory and management cultures seem unwilling to adopt a more proactive stance on counter terrorism planning, attacks prevention, and risk mitigation.

Nevada and others have consistently made suggestions on necessary security and safety regulations for these radioactive shipments. These comments have been directed to both the NRC and DOE but as of now they have not been addressed. These suggestions predate the recent attacks in New York and Washington and include:

1. A demand not to reduce security for the shipments of highly radioactive materials as was proposed by a modification in NRC regulations.
2. The absolute necessity of using dedicated trains for rail shipments to allow for more robust security and fewer chances for co-existent attacks.
3. Modifications in design threat basis to account for the possibility of multiple attackers using advanced weapons, asymmetrical tactics and the potential for multiple simultaneous attacks.
4. Changes in regulations to better account for the potential of group suicide attacks on the shipments of radioactive wastes.
5. The absolute need for full scale testing of shipment containers that are going to be used in the actual shipment effort and not outdated casks.

Nevada's intent in suggesting these regulatory changes is to reduce the risk of the overall transportation effort, minimize the potential of a terrorist attack, and to lower the outcomes if one where to transpire.

After September 11, 2001, Nevada and other researchers began to build upon these preexisting proposals in an effort to stimulate better planning and management of the transportation effort given the new realities of a world where terrorism can create such catastrophic consequences. These emerging suggestions include potential attack scenarios wherein asymmetrical tactics are used to breach the integrity of the casks and/or create a transportation accident scene that increases the likelihood of a radioactive release. Asymmetrical terrorist tactics would employ heretofore undocumented methods of terror, perhaps coupled with time tested terrorist tactics, to accomplish a large-scale incident. For example, the September 11 attacks incorporated very traditional tactics like bombing and hostage taking, with new tactics like planned group suicide, multiple targets, and simultaneous attack sites.

Examples of several asymmetrical tactics that could be employed against waste shipments include:

- Theft of a petroleum transportation vehicle and use thereafter as a mobile bomb device against a truck or rail shipment.
- Use of an explosive device against a co-existent rail shipment of volatile chemicals that would act as an attack device for a mixed car rail shipment.
- Use of falsified transportation credentials or insider knowledge to gain access to shipments with the intent to create a radiological dispersion.

- The taking hostages and using them as human shields until the final attack consequences are achieved.
- The use of large numbers of attackers as part of a capture and radiological release scenario.

One severely underdeveloped area of counterterrorism analysis is the emerging terrorist paradigm wherein the motivation of the attackers is not to promote change within the political structure of the country under attack but rather to relay a message of aggression and defiance to other countries, cultures or sub-populations therein. For example, some terrorist experts and the NRC/DOE have generally considered suicide attacks against shipments a low level priority since the use of radioactive materials as a weapon would create heretofore unacceptable consequences for the individual doing the attack. September 11, 2001 demonstrated the outdated nature of this assumption.

The prohibition against large-scale attacks in the old “rules of terrorism” have changed, and regulations, procedures, and indeed the very basis for a transportation risk assessment need to be reexamined in light of the events of September 11th, 2001. The typical cost-benefit risk assessment analysis is clearly challenged by the new and emerging reality of terrorism, a reality where political or social gain is not the ultimate goal of an attack.

We do it all the time, why be concerned now?

While quantities of radioactive materials are transported everyday around this country and the world, the amount of radiation in the shipments to the proposed Yucca Mountain repository is many times greater that that contained in these mostly lower-level sources and generally smaller cargoes. In addition, the Yucca Mountain shipping campaign will be unprecedented in a number of important ways. More shipments of SNF will occur in the first full year of repository operations than have been made nationwide during the past 40 years. Not only will the numbers of shipments drastically increase, but also the distances from the production sites, mostly in the Eastern United States, will be substantially greater and affect far larger geographical areas than the historical shipments offered as exemplars by the NRC, DOE, and the nuclear industry.

This committee should recognize that the proposed shipments to Yucca Mountain could average more than two thousand miles per shipment. The truck shipments alone will affect 703 different counties with a combined population of over 123 million.

These shipments will also represent a large-scale, high profile federal program. As such, they have symbolic value to terrorist groups opposed to the U.S. government. A successful attack could be publicized as a blow against the military or business related technological dominance of the United States. In addition to the threat from foreign terrorist organizations like al-Qeada, specific types of adversaries could include domestic groups opposed to a particular federal action like the decommissioning of nuclear weapons or nuclear power in general, violent protesters opposed to the SNF transportation effort who wished to create a situation wherein the shippers and/or regulators would be embarrassed, and a whole plethora of localized shipment specific adversaries.

Conclusion

While many of the examples presented today were developed over the last 20 or so years, they are clearly sharpened and made more critical by the events of September 11, 2001 and other incidents that transpired directly thereafter. These tragic experiences serve to heighten the urgency for transportation planners and decision makers to more effectively account for the risks associated with moving massive quantities of highly radioactive materials from their existing safe and secure locations, across the nation’s vulnerable transportation infrastructure, to a facility thousands of miles away from production or storage sites.

The proposed effort to transport SNF to Yucca Mountain will expose the cargoes and public to risks that are not adequately addressed within regulatory structures, including the potential for highly radioactive waste shipments to be used as weapons of mass victimization. Transportation terrorism is a very real threat. Shipments of SNF pose particular challenges because of their unique symbolic value as a targets, because of the shipment frequency and predictability, and because we are facing a new variety of terrorist who would think nothing of committing what they would consider an act of altruistic suicide against highly radioactive cargos.

The bottom line is that there must be adequate consideration given to the risks posed by massive numbers of radioactive waste shipments. Disturbingly, this has not been the case, even though Congress is being asked to approve a plan that would remove SNF from safe, secure fixed storage locations and move it across the country via less secure and potentially vulnerable highways, railroads, and waterways. We must recognize that the failure to address terrorism concerns could become a human health, transportation infrastructure, social, and political disaster.

Before taking any action, Congress should insist that a robust and inclusive assessment of the terrorist threat be undertaken. Such an assessment should take into account the changing nature of the terrorism threat, the extraordinary and unprecedented length of time necessary to transfer these materials from production sites to a geologic repository, the enormous number of shipments needed to make this transfer of risk, and the physical characteristics of radionuclides in the cargos. The nation stands to make a mistake of tremendous proportions and potentially devastating consequences if politically expedient action is permitted to supplant sound policy and decision making with respect to the critical issue of terrorism against radiological shipments.

Mr. Chairman and distinguished members of the committee, thank you again for the attention you are giving these issues.

BACK

United States House of Representatives

Committee on Transportation & Infrastructure
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Testimony of Dr. Marvin Resnikoff

on behalf of Radioactive Waste Management Associates

April 25, 2002

I thank the Chair of the Committee on Transportation and Infrastructure, Rep. Don Young, the Chair of the Subcommittee on Highway and Trust, Rep. Thomas Petri, and the Chair of the Subcommittee on Railroads, Rep. Jack Quinn, for holding this hearing and bringing these important matters to the attention of the Congress. Good morning. My name is Marvin Resnikoff. I am a physicist and Senior Associate at Radioactive Waste Management Associates. We are technical consultants to the State of Nevada on transportation issues, and also technical consultants to the State of Utah on transportation and storage issues. Many of the estimates of the health and economic consequences of transporting spent nuclear fuel used by Nevada were calculated by us. In this statement I would like to summarize our work and compare it to the calculations reported by the Department of Energy (DOE) in its Environmental Impact Statement on Yucca Mountain. The more detailed calculations appear on the Nevada Office of Nuclear Waste Projects web site.

Beginning with standard truck and train accident rates and the number of expected truck and train shipments, we estimate between 100 and 450 truck and train accidents over the life of the proposed Yucca Mountain repository. The Department of Energy estimates less. A large majority of these accidents would be fender-denters, but some could be severe enough to release radioactive materials, particulates and gases. Spent fuel shipping containers or casks are extremely rugged, but they are not designed to withstand every credible accident. A severe accident could be a high impact accident or a long duration fire, such as the Baltimore Tunnel fire that occurred July 18th of last year. Shipping casks are designed to withstand a 1475 oF fire for ½ hour, but the Baltimore Tunnel fire burned for several days at flame temperatures that exceeded 1500 oF. Two points are important in discussing the hazard of transporting spent fuel:

1) A rail cask like the ones proposed for the Yucca Mountain repository contains an enormous inventory of radionuclides, about 240 times the cesium and strontium released by the Hiroshima bomb.

2) Maybe lost in any discussion of casks and accidents is the nature of radiation, that radioactivity is a carcinogen. The overwhelming scientific opinion states the more radiation dose a person receives, the more likely that a fatal cancer will result.

Credible severe accidents could result in a significant release of radioactive materials. The July 2001 Baltimore rail tunnel fire is one example. The fire temperatures exceeded the cask design criteria, 1475 oF for ½ hour. According to the Baltimore Sun, temperatures in the tunnel fire reached 1500oF, “hot enough to cause some of the CSX rail cars to glow, according to Battalion Chief Hector L. Torres, a Fire Department spokesman.”[1] One firefighter described the glowing cars as “a deep orange, like a horseshoe just pulled out of the oven.”[2] These descriptions are extremely useful because the color of glowing steel can be used to determine its temperature. For example, steel begins to glow at around 1000oF, with a dark red color, and begins to glow orange around 1650oF.

Our report [3] for the State of Nevada traced the progressive degradation of a hypothetical rail cask in the tunnel fire. We estimated the release of radionuclides, primarily cesium, from the cask. We determined that a single rail cask in such an accident could have contaminated an area of 32 square miles. Failure to cleanup the resulting contamination, at a cost of $13.7 billion, would cause 4,000 to 28,000 cancer deaths over the next 50 years. Between 200 and 1,400 latent cancer fatalities would be expected from exposures during the first year. The Baltimore Tunnel fire report is attached to this testimony.

Our study assumed that ½ the released radioactivity exited the Baltimore Tunnel and contaminated the Baltimore area. The remainder we assumed plated out. Anyone entering the tunnel, such as firefighters, emergency personnel, and CSX workers, would have received a dose due to the tunnel plateout. If one assumes 50% of the released cesium plates out in the tunnel, and one distributes this cesium over the entire area of the curved roof of the tunnel, the average gamma dose rate within the tunnel is 80 mr/h, not counting the released cobalt-60. In addition, if the neutron absorbing material on the shipping cask melts, the neutron dose near the cask greatly increases, to 500 mrem/h. These doses should be compared to the allowable dose to the public, or the allowable dose to nuclear workers, 5 rems/yr. Firefighters are not nuclear workers. One 50 hour week in the tunnel aqmounts to the allowable yearly dose to a nuclear worker. Note: these doses are just due to direct gamma and neutrons. If first responders get to the accident scene while radioactive particulates are still in the air, they would incur an additional dose due to inhaling radioactive particulates.

A successful terrorist attack on a shipping cask in an urban area could also cause serious impacts. To estimate the consequences of a terrorist attack, we first used the identical computer models, such as RISKIND and RADTRAN, to reproduce the numbers in the Yucca Mountain EIS. We then altered the inputs to bound the radiation dose to the maximally exposed individual. Some major assumptions were: realistic release height, fuel cooled only 10 years (not 15, the Yucca Mountain EIS value), and an increased cesium release fraction. The latter change accounts for much of our differences with calculations by Sandia Labs and requires an explanation.

When fuel is heated in reactors, a percentage of volatile radionuclides, such as cesium, will migrate out of the fuel matrix under the influence of temperature gradients and concentrate in the fuel-clad gap.[4] This “gap cesium” inventory is directly related to the respirable aerosol release fraction in the event of an accident because this cesium is volatile, and it can be released in the event of any cladding breach. In fact, virtually all of the cesium released from the fuel in the event of a spent fuel shipping accident will be this “gap cesium.” For the fuel matrix, the Sandia study [5] assumes 0.3% of the cask inventory of cesium will be present between the cladding and the fuel pellet. However, other studies have estimated higher fractions. For example, one older Oak Ridge study estimated a cesium gap inventory of up to 20%.[6] Another NRC study estimates the gap cesium inventory to be in the range of 10-27%. [7] Finally, a more recent study performed as part of the Yucca Mountain site assessment, which involved actual measurements of the cesium content in fuel rods, estimated the gap cesium inventory in LWR rods to be as high as 9.9%,[8] 33 times higher than that assumed in the Luna sabotage study. We believe that this estimate, based on measurements of different types of fuel with different burnup histories, is the more appropriate model to use for the estimate of the “gap cesium” inventory. Assuming the cesium release fraction is directly proportional to the gap inventory, the release fraction posited in the Sandia Study must be increased by a factor of 33.

An attack on a GA-4 truck cask using a common military demolition device could cause 300 to 1,800 latent cancer fatalities, assuming 90% penetration by a single blast. Full perforation of the cask, likely to occur in an attack involving a state-of-the art antitank weapon, such as the TOW missile, could cause 3,000 to 18,000 latent cancer fatalities. Cleanup and recovery costs would exceed $17 billion. It would be easier for terrorists to attack these shipments than to attack storage facilities at power plants, and these DOE shipments may be

symbolically more attractive targets than civilian facilities. The sabotage paper is attached to my testimony.

A further study we did for the State of Nevada discussed emergency response with fire and police department and emergency response officials. Discussions with emergency personnel in Las Vegas and Clark County clearly indicate the accident would overwhelm local response capabilities. Before local emergency responders could accurately assess the problem, the radioactive plume would have already contaminated an extensive area. Radioactive particulates settling on roads and highways are likely to be spread by traffic, possibly contaminating distant locations and extending the area of contamination past that assumed in this study. This may result in the contamination of many more people than was estimated in our report. There is little precedent for emergency response to a severe transportation accident involving irradiated fuel leading to the release of radioactive particulates. The technical literature regarding decontamination following a major radioactive release in a transportation accident is almost non-existent.[9] However, emergency response in the event of a major nuclear reactor accident has been analyzed extensively, particularly for the purpose of determining liability and Price Anderson coverage. While a nuclear reactor accident could lead to far greater releases of radionuclides than transportation casks, reactors are generally sited far from population centers. A transportation accident could happen in a city center. Issues involving emergency response and evacuation are therefore critical. Our report showed that areas exceeding 5 rem long-term dose (this is EPA's Protective Action Guide) could range from 40 to 500 square miles, depending on the severity of the accident. The maximally exposed person could receive a dose from 22.5 to 224 rems. The expected latent cancer fatalities could run into the 10's of thousands, depending on the cleanup undertaken.

In light of these numbers, the Committee on Transportation and Infrastructure should ask the question, are there safer ways to move spent nuclear fuel? The answer is definitely yes. Casks can be designed and tested to withstand realistic highway and rail accidents. No casks presently being used on the highway and rails in the United States has actually been physically tested. There is still time. There is no rush to ship radioactive waste from nuclear power plants. Storage of nuclear fuel in dry storage casks takes only ½ acre of land; reactors are not running out of space. Storing radioactive waste at reactors has a benefit; over time, radioactive decay allows safer handling and shipping, particularly in the event of a transportation accident.

The debate about cask safety reminds me of the debate in the 1970's concerning the safety of shipping plutonium by air. New York Attorney General Lefkowitz took the NRC to court on the matter of plutonium being flown out of JFK airport in containers designed to withstand a 30' drop. Against all logic and valid safety concerns we raised, the NRC fought New York until Congress (Rep. Scheuer) directed the NRC to design containers that could withstand an air crash. In other words, the matter was taken out of the NRC and put into the Congressional arena where a sensible solution emerged.

Similarly here, the NRC has no plans to require testing of these new generation nuclear fuel shipping containers. The NRC has no plans to conduct an environmental impact statement on transportation. But Congress can direct the NRC to increase safety.

A careful reading of the Department of Energy's environmental impact statement for the proposed Yucca Mountain repository shows that it is not the Nevada geology that holds radioactive waste from reaching humans, but the engineered containers. Once they degrade, the aquifer becomes contaminated. That being the case, these containers can be stored anywhere, including reactor sites, while careful safety studies proceed, while radioactivity decays, and while shipping casks are designed and constructed to withstand credible highway and rail accidents.

Again, thank you for holding this hearing and considering these points.

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BACK

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Testimony of Robert J. Halstead

on behalf of the Agency for Nuclear Projects, State of Nevada

May 22, 2002

I am Robert J. Halstead, Transportation Advisor, Agency for Nuclear Projects, State of Nevada. I have worked on nuclear waste transportation issues for the past 24 years. I have been Transportation Advisor to the Nevada Agency for Nuclear Projects since 1988. My primary responsibility is assessment of the impacts and risks of transporting spent nuclear fuel and high-level radioactive wastes to the proposed Yucca Mountain repository site. In addition to reviewing the U.S. Department of Energy's Draft and Final Environmental Impact Statements for Yucca Mountain, my recent work for Nevada includes managing contractor studies on the vulnerability of shipments to sabotage and terrorist attack, on the radiological consequences of severe highway and rail accidents, and on radiation exposures from incident-free shipments.

From 1983 to 1988, I was senior policy analyst for the State of Wisconsin Radioactive Waste Review Board, an agency created by the Wisconsin Legislature to represent the State in dealings with the U.S. Department of Energy, the U.S. Nuclear Regulatory Commission, other federal agencies, and nuclear electric utilities. I advised the Board and Wisconsin's congressional delegation on federal legislation that resulted in the Nuclear Waste Policy Act of 1982, and the Nuclear Waste Policy Amendments Act of 1987. I monitored on-going spent nuclear fuel shipments; evaluated transportation impacts of repository candidate sites in Wisconsin, Minnesota, and Michigan; and represented the Board on all matters pertaining to transportation.

From 1978 to 1983, I worked for the State of Wisconsin Energy Office. I evaluated utility plans for nuclear and coal-fired power plants, and represented the State in proceedings before the Public Service Commission of Wisconsin. I prepared policy recommendations on transportation of coal, petroleum, spent nuclear fuel, and low-level radioactive wastes.

I have also worked as a consultant on nuclear waste transportation and storage for the States of Minnesota, Tennessee, and Texas. I also advised the Law and Water Fund of the Rockies on the transportation impacts of the Private Fuel Storage facility proposed for the Skull Valley Goshute Reservation in Tooele County, Utah.

The U.S. Department of Energy's Final Environmental Impact Statement for Yucca Mountain

The Department of Energy (DOE) released the Final Environmental Impact Statement (FEIS) for Yucca Mountain on February 14, 2002. The FEIS was made available from DOE's website (www.ymp.gov) shortly thereafter. DOE apparently published no paper copies of the FEIS for direct distribution to the public. DOE has apparently provided paper copies of the FEIS to DOE Reading Rooms in some cities.

The FEIS "analyzes a Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain." [p. 1-3]

Transportation of spent nuclear fuel and high-level radioactive waste from 72 commercial and 5 DOE sites across the United States is an integral part of DOE's Proposed Action. The Proposed Action would "require surface and subsurface facilities and operations for the receipt, packaging, possible surface aging, and emplacement of spent nuclear fuel and high-level radioactive waste" and "transportation of these materials to the repository." [FEIS, p. 2-5]

DOE has made no final decisions about the transportation options proposed in the FEIS. Decisions about "how spent nuclear fuel and high-level radioactive waste would be shipped to the repository (for example, truck or rail) and how spent nuclear fuel would be packaged (uncanistered or in disposable or dual-purpose canisters) would be part of future transportation planning efforts." [FEIS, p. 2-5] For shipments nationally, "DOE would use both legal-weight truck and rail transportation, and would determine the number of shipments by either mode as part of future transportation planning efforts." [FEIS, p. 2-13] "DOE could use one of three options or modes of transportation in Nevada to reach the Yucca Mountain site: legal-weight trucks, rail, or heavy haul trucks." [FEIS, p. 2-48]

The FEIS does not contain a specific transportation plan. DOE's discussions of potential transportation scenarios and DOE's transportation impact analyses are spread over more than 750 pages in the FEIS Summary, eight chapters, and four appendices. In order to obtain print-optimized files for the FEIS Summary and Reader's Guide, it is necessary to go to DOE's website and download 48,425 KB. To obtain the eight chapters and four appendices dealing with transportation and related issues, it is necessary to download more than 113,300 KB.

Projected Nuclear Waste Inventories and Shipment Numbers

Under the Proposed Action, DOE would transport 70,000 metric tons of heavy metal (MTHM) of spent nuclear fuel and high-level radioactive waste to a repository over 24 years (2010-2034). The Proposed Action complies with Section 114(d) of the Nuclear Waste Policy Amendments Act. The FEIS also evaluates the transportation impacts of the entire projected inventory of about 120,000 MTHM over 38 years (2010-2048). [Pp. S-77 to S-78]

The FEIS estimates the total projected inventory of commercial spent nuclear fuel (SNF) and high-level radioactive wastes (HLW) to be generated through 2046. This inventory, referred to by DOE as Module 1, includes 105, 000 MTHM of commercial SNF, 2,500 MTHM of DOE SNF, and 22,280 canisters of DOE HLW (equivalent to about 11,500 MTHM). DOE also evaluates a projected inventory, referred to as Module 2, in which 2,000 cubic meters of Greater-than-Class-C (GTCC) waste, and 4,000 cubic meters of Special-Performance-Assessment-Required (SPAR) waste, are added to Module 1. [FEIS, p. S-78, and Appendix A]

Yucca Mountain, under DOE's Proposed Action, would receive the following wastes over 24 years (2010-2033): 63,000 MTHM of commercial SNF, 2,333 MTHM of DOE SNF, and 8,315 canisters of DOE HLW (equivalent to about 4,667 MTHM). [FEIS, p. S-78] At the end of DOE's Proposed Action, in 2034, there would still be about 42,000 MTHM of commercial SNF stored at 63 nuclear power plant sites in 31 states, 167 MTHM of DOE SNF stored at DOE sites in 4 states, and 13,965 canisters of DOE HLW (equivalent to about 6,833 MTHM) stored at DOE sites in 3 States. Additionally, all of the projected GTCC and SPAR wastes would also still be stored at 63 commercial and 4 DOE sites in 32 states. [FEIS, Pp. S-78, A-2 to A-16, and J-10 to J-22]

DOE developed two national transportation scenarios - "mostly legal-weight truck" and "mostly rail" - in order to estimate the number of shipments required under the Proposed Action (24 years) and under Modules 1 and 2 (38 years). DOE adopted this approach "because, more than 10 years before the projected start of

operations at the repository, it cannot accurately predict the actual mix of rail and truck transportation that would occur from the 77 sites to the repository. Therefore, the selected scenarios enable the analysis to bound (or bracket) the ranges of legal-weight truck and rail shipments that could occur." [FEIS, p. J-10] DOE states that the "estimated number of shipments for the mostly legal-weight truck and mostly rail scenarios represents the two extremes in the possible mix of transportation modes." [FEIS, p. 6-35] Table 1 shows the number of shipments estimated by DOE for these transportation and inventory scenarios.

Table 1. DOE Estimated Number of Shipments for Transportation Scenario Combinations Inventory Scenario (Mostly Truck) Truck Shipments (Mostly Truck) Rail Shipments (Mostly Rail) Truck Shipments (Mostly Rail) Rail Shipments Proposed Action (2010-2034) 52,786 300 1,079 9,646 Module 1 (2010-2048) 105,685 300 3,122 18,243 Module 2 (2010-2048) 108,544 355 3,122 18,935 Source: DOE/EIS-0250, Table J-11

DOE's "mostly legal-weight truck" national scenario would result in the largest number of shipments. Over 24 years, there would be more than 53,000 shipments, or about 2,200 per year. Over 38 years, there would be about 108,900 shipments, or about 2,870 per year.. By comparison, over the past 40 years, there have been less than 100 shipments per year in the United States.*

DOE's "mostly rail" national scenario would result in fewer cross-country shipments than the "mostly legal-weight truck" scenario. Over 24 years, there would be more than 10,700 cross-country shipments, or about 450 per year. Over 38 years, there would be more than 22,000 cross-country shipments, or about 580 per year.

However, the "mostly rail" cross-country shipment numbers do not include barge and heavy haul truck shipments from 24 reactor that lack rail access, which would add 2,200 shipments for the Proposed Action and 4,065 shipments for Module 2. Nor do the DOE numbers include the heavy haul truck shipments required in Nevada if there is no rail spur to Yucca Mountain, which could add 9,646 shipments for the Proposed Action and 18,935 shipments for Module 2.

When the barge and heavy haul truck shipments are included, DOE's "mostly rail" total for 24 years could be more than 22,500 shipments, or about 935 per year. DOE's "mostly rail" total for 38 years could be more than 45,000 shipments, or about 1,185 per year.

Yucca Mountain Shipment Modes

The DOE "mostly legal-weight truck scenario" is the only national transportation scenario that is currently feasible. All 72 power plant sites and all 5 DOE sites can ship by legal-weight truck. At present, there is no railroad access to Yucca Mountain., and the feasibility of long-distance heavy haul truck (HHT) transport of rail casks in Nevada is unproven.

The DOE "mostly rail scenario" is unlikely to occur. Even if DOE is able to develop rail access to Yucca Mountain, the objective of shipping 90 percent of the commercial SNF by rail is unrealistic. DOE acknowledges that 25 of the 72 power plant sites cannot ship directly by rail. Nevada studies show that number could be up to 32 sites. The "mostly rail" scenario assumes that DOE can ship thousands of casks by barge into Boston, New Haven, Newark, Jersey City, Wilmington (DE), Baltimore, Norfolk, Miami, Milwaukee, Muskegon, Omaha, Vicksburg, and Port Hueneme (CA). Alternately, DOE would have to move thousands of casks from reactors to rail lines using HHTs, each of which will require special state permits and route approvals.

The "mostly rail scenario" assumes that DOE can construct a new rail spur to Yucca Mountain, 99 to 344 miles in length, at a cost of more than $1 billion. Even the shortest of the five spur options would be the largest new rail construction project in the United States since World War I. Environmental approvals, right-

of-way acquisition, and litigation could delay rail construction for 10 years or more. In the FEIS, DOE declined to identify a preference among the five potential rail corridors to Yucca Mountain.

The alternative to rail spur construction, delivery of thousands of large rail casks by 220-foot-long HHTs over distances of 112 to 330 miles on public highways, is probably not feasible. HHT route constraints include highly congested segments through rapidly urbanizing areas, and steep grades and sharp curves through high-mountain passes. All of the potential HHT routes would require substantial upgrading, and would likely cost more than a rail spur. State permits and operating restrictions apply to all use of HHTs in Nevada. In the FEIS, DOE declined to identify a preference among three potential locations for intermodal transfer stations.

Certain programmatic and policy factors favor truck shipment, especially during the first 10-15 years of repository operations. DOE's "hot repository" thermal loading strategy may require truck shipment of 5-10 year-cooled SNF. Some utilities may exercise contract options to ship 5-10 year-cooled SNF from storage pools by truck, rather than shipping older SNF by rail. DOE's transportation privatization plan does not require transportation service providers to ship oldest fuel first or to maximize use of rail. Indeed, under DOE's fixed-cost contracting approach to privatization, rail transportation may not be cost-competitive with legal-weight at many sites.

Yucca Mountain Transportation Routes

In the Draft EIS, DOE chose to conceal the specific routes used for impact and risk analyses in Chapter 6 and Appendix J. DOE did not identify the routes in its Federal Register notice nor in its public notices of scheduled hearings. During the public hearings that began in September, 1999, DOE provided some state-specific transportation maps at individual hearings around the country. But DOE did not release national maps showing the full cross country routes from shipping sites to Yucca Mountain until sometime in late January, 2000, near the end of the public comment process

In the Final EIS, DOE decided to reveal the routes used for risk and impact analysis. DOE included national and state maps. [FEIS, Figure J-5, and Figures J-31 to J-53] The FEIS states that "DOE has not determined the specific routes it would use to ship spent nuclear fuel and high-level radioactive waste to the proposed repository." [FEIS, p. J-23]

The FEIS truck routes were generated by the HIGHWAY computer model, and generally represent the quickest truck travel routes consistent with the current Federal routing regulations (HM-164). DOE refers to these as "representative" routes. [FEIS, p. 6-5] However, with two exceptions, DOE's cross-country routes agree with the highway routes identified in previous routing studies by DOE and Nevada contractors. Absent additional state designation of preferred alternatives or DOE policy decisions, we believe that these are the most likely highway routes to Nevada, with two notable exceptions.

In between publication of the Draft and Final EISs, the State of Colorado exercised its authority under U.S. DOT regulations to prohibit SNF and HLW shipments on I-70 west of Denver. Colorado took this action to avoid shipments through the Eisenhower and Glenwood Tunnels. Under the Colorado designation, shipments would be diverted north or south on I-25. Nevada routing analyses show that the new preferred route to Yucca Mountain for shipments using I-70 would be through the Northeastern Denver metropolitan area to I-25, then connecting with I-80 at Cheyenne, Wyoming. For reasons we do not understand, DOE's FEIS map has the trucks on I-70 turning north on I-29 to connect with I-680/I-80 near Omaha, so that the major stream of shipments from the Southeastern region avoids Kansas and Colorado altogether. [Figures 35, 39, and 47] Preliminary analysis indicates that DOE's route choice could add more than 20 miles to each of tens of thousands of shipments, compared to the new preferred route in Colorado. We are continuing to study this

route.

A second DOE highway route of concern was called to our attention by the State of Pennsylvania. DOE's FEIS map shows shipments from six reactor sites using the Pennsylvania Turnpike (I-76) West of Harrisburg. [Figure 49] Pennsylvania authorities informed us that all placarded hazardous material shipments must use bypasses to avoid four tunnels along this segment of the Turnpike, and that no SNF shipments have ever used this route. It is not clear how DOE could have missed these restrictions, since the Pennsylvania bypass requirements are clearly stated in a U.S. DOT guidance document cited as a reference in the FEIS. We are continuing to study this route also.

Otherwise, DOE's FEIS routes agree with those identified by Nevada as most likely routes to Yucca Mountain. The primary truck routes out of New England and the Middle Atlantic states converge on I-80/90 near Cleveland, pick up shipments from Midwestern reactors, and follow I-80 west from Chicago through Des Moines, Omaha, Cheyenne, and Salt Lake City to I-15.

The primary truck routes out of the South are I-75 from Florida, I-24 from Atlanta, and I-64 from Virginia. These routes converge on I-70 near St. Louis, and follow I-70 west through Kansas City and Denver to I-25, then join I-80 near Cheyenne..

The primary route from the Pacific Northwest is I-84 to I-15 in Utah. Other major routes are I-40 and I-10 from the Mid-South and I-5 in California. These routes converge on I-15 in Southern California.

As with highway routes, DOE chose to conceal the rail routes analyzed in the Draft EIS DOE until late January 2000, near the end of the public comment process. In the Final EIS, DOE decided to reveal the rail routes used for risk and impact analysis. DOE included national and state maps. [FEIS, Figure J-6, and Figures J-31 to J-53] These routes were generated by the INTERLINE computer model, and generally represent the most direct routes to Nevada consistent with the current industry practice of maximizing freight-miles on the originating railroad.

Since DOE has not yet identified a preferred rail destination in Nevada, the map shows all potential cross-country routes from the 77 sites. For about 85 percent of the originating locations, the most likely route is unchanged by the Nevada destination. DOE's rail routes to Nevada generally agree with the rail routes identified in previous routing studies by DOE and Nevada contractors. While mergers and other rail industry developments would continue to affect routing, Nevada believes that the FEIS map shows the most likely rail routes to Nevada.

The primary rail routes out of New England and the Middle Atlantic states are the former Conrail mainlines from Buffalo and Harrisburg to Cleveland and Chicago. These shipments switch to the Union Pacific near Chicago, are joined by shipments from Midwestern reactors in Illinois and Iowa, and continue west via Fremont, Gibbon, Cheyenne, and Salt Lake City to Nevada.

The primary routes out of the South are the CSXT from Atlanta to East St. Louis, and the Norfolk Southern from Atlanta to Kansas City via Birmingham and Cairo. These two streams merge on the Union Pacific in Kansas City, and in turn merge with the northern UP shipments at Gibbon, Nebraska. Other major rail routes are the UP from Oregon via Boise, and the UP and BNSF from California and the Southwest via San Bernardino and Daggett.

The potential highway and rail routes identified in DOE's Final Environmental Impact Statement could affect 45 states and the District of Columbia. More than 123 million people currently live in the 703 counties traversed by DOE's highway routes, and 106 million live in counties along DOE's rail routes. DOE predicts

that between 10.4 and 16.4 million people will live within one-half mile of a transportation route in 2035.

Recent Spent Nuclear Fuel Shipments

During the past two decades, nuclear power plants and research facilities in the United States have made relatively few off-site shipments of SNF. The U.S. Nuclear Regulatory Commission (NRC) regulates such shipments, and maintains a detailed SNF shipment database. Between 1979 and 1997, the most recent period reported by NRC, there were 1,334 domestic shipments containing 1,453 metric tons uranium (MTU) of civilian SNF. Table 2 summarizes significant characteristics of these shipments.

Table 2. U.S. Civilian SNF Shipment Experience, 1979 - 1997 Amount Shipped 1,453 MTU (76.5 MTU per year) Total Shipments 1,334 (70 per year) Truck Shipments 1,181 (62 per year) Rail Shipments 153 (8 per year) Truck Share of SNF Shipments 88.5% Rail Share of MTU Shipped 75.5% Average Truck Shipment Distance 684 miles (82%<900 miles) Average Rail Shipment Distance 327 miles (80%<600 miles) Shipment Origin & Destination 70% East of Mississippi River (935/1334) Number of Reactor Sites Making One or More Shipments 27 (9 sites>2 shipments) Source: NRC, NUREG-0725, Rev. 13 (October 1998)

During the same period, the U.S. Department of Energy made several dozen shipments of Three Mile Island reactor core debris and intact commercial reactor SNF. These shipments were not regulated by NRC, and were therefore not included in the NRC database. There were also an undisclosed number of naval reactor fuel shipments, estimated at several hundred.

Radiological Characteristics of Spent Nuclear Fuel

Spent nuclear fuel (SNF) from commercial power reactors would comprise about 90 percent of the wastes shipped to the repository. DOE acknowledges that SNF is "usually intensely radioactive." [FEIS, Pp. S-3, 1-6] Otherwise, the Final EIS provides little information on the radiological characteristics of SNF that affect transportation safety until the reader reaches Appendices A, F, and J.

Fission products, especially strontium-90 (half-life 28 years) and cesium-137 (half-life 30 years), account for most of the radioactivity in SNF for the first hundred years after removal from reactors. Fission products, which emit both beta and gamma radiation, are the primary sources of exposure during routine transportation operations. Cesium-137 is the major potential source of irradiation and contamination if a shipping cask is breached during a severe transportation accident or successful terrorist attack.

Table 3, based on data developed by DOE, illustrates the general relationship between SNF age (cooling time) and the two radiological characteristics most important for assessing SNF transportation risks, total activity and surface dose rate. The table is based on average characteristics of older SNF (pressurized water reactor fuel with a burn-up of 33,000 MWd/MTHM). The average SNF assumed by DOE in the FEIS [p. A-13] (pressurized water reactor fuel with a burn-up of 41,200 MWd/MTHM), for shipments to Yucca Mountain, would be even more radioactive.

Table 3. Radiological Characteristics of Commercial Spent Nuclear Fuel SNF Age (Years Cooled) Total Activity (Curies) Surface Dose Rate (Rem/Hour) 1 2,500,000 234,000 5 600,000 46,800 10 400,000 23,400 50 100,000 8,640

Source: U.S. DOE, DOE/NE-0007, 1980.

After one-year in a water-filled storage pool, unshielded SNF is so radioactive that it delivers a lethal, acute dose of radiation (600 rem) in about 10 seconds. After 50 years of cooling, the total radioactivity (measured in

curies) and the surface dose rate (measured in rem/hour) decline by more than 95 percent, but SNF can still deliver a lethal radiation exposure in minutes. The lethal exposure time for unshielded SNF is less than one minute after 5 years cooling, less than 2 minutes after 10 years, and less than 5 minutes after 50 years.

DOE assumes that the average age (cooling time) of SNF shipped to the repository would be about 23 years. [FEIS, p. A-13] DOE calculates that the average rail cask shipped to the repository would contain a total radioactivity of 2.1 million curies, including 816,000 curies of Cesium-137. [FEIS, p. J-33] While DOE does not provide specific data for the average truck cask, it would about one-sixth as much as the rail cask (355,000 curies total activity, including 136,000 curies of Cesium-137). For accident and sabotage consequence analysis, DOE assumed that the casks would be loaded with SNF aged 14-15 years, [FEIS, p. J-52] which would double the radiological hazard, compared to average SNF. [FEIS, p. 6-46] However, repository shipments could include 5-year cooled SNF in truck casks and 10-year cooled SNF in rail casks, resulting in significantly greater radiological hazards than those evaluated by DOE.

Routine Transportation Impacts

NRC regulations allow a certain amount of neutron and gamma radiation to be emitted from shipping casks during routine operations and transport (1,000 mrem/hr at the cask surface and 10 mrem/hr 2 meters from the cask surface). The dose rate allowed under NRC regulations results in near-cask exposures of about 2.5 mrem per hour at 5 meters (16 feet), in measurable exposures (less than 0.2 mrem per hour) at 30 meters (98 feet), and calculated exposures (less than 0.0002 mrem per hour) at 800 meters (one-half mile) from the cask surface. [FEIS, p. J-38] Cumulative exposures at these rates can result in adverse health affects for some workers and some members of public. Moreover, the very fact that these exposures would occur has been shown to cause adverse socioeconomic impacts, such as loss of property values, even though the dose levels are well below the established thresholds for cancer and other health effects.

The FEIS acknowledges that routine radiation from shipping casks poses a significant health threat to certain transportation workers. In the most extreme example, motor carrier safety inspectors could receive cumulative doses (200 rem over 24 years) large enough to increase their risk of cancer death by 10 percent or more, and their risk of other serious health effects by 40 percent or more. DOE proposes to control these exposures and risks by severely restricting work hours and doses for certain jobs. [FEIS, Pp. J-44 to J-45]

Expected Number of Accidents

DOE and the nuclear power industry are quick to point to their record of safely shipping limited quantities of spent fuel during the past 30 years. What DOE and the industry do not publicize is that, prior to 1971, there were, in fact, transportation accidents and incidents that resulted in radiation releases. Between 1957 and 1964, there were 11 transportation incidents and accidents involving spent fuel shipments by the US Atomic Energy Commission and its contractors. Several of these incidents resulted in radioactive releases requiring cleanup, including leakage from a rail cask in 1960 and leakage from a truck cask in 1962. There is no comparable data for the period from 1964 to 1970, when utility shipments to reprocessing facilities began.

Between 1971 and 1990, there were six accidents and 47 regulatory incidents involving spent fuel cask shipments. Most of the regulatory incidents involved excess radioactive contamination of cask surfaces (often referred to as "weeping"), but a few involved violations that could have contributed to increased accident risks. Three accidents (two truck, one rail) involved casks loaded with spent fuel. Fortunately, no radioactivity was released in these accidents, although one truck accident was severe enough to kill the driver. However, the record clearly indicates that accidents do happen and that the potential for accidents involving radiation releases exists.

DOE contractors evaluated these SNF accidents and incidents, and developed historical SNF accident and incident rates for use in projecting the impacts of future shipments to a Yucca Mountain repository. [OCRWM, YMP/91-17] These accident and incident rates have not changed appreciably, because of the relatively small number of shipments and shipment-miles during the 1990s. DOE chose to ignore this information in preparing the transportation impact analysis for the FEIS.

Table 4 shows the results of applying the historical accident rates for U.S. SNF shipments to the projected shipment-miles for DOE's "mostly legal-weight truck" and "mostly rail" scenarios, plus an additional scenario developed by Nevada which assumes that each site ships based on its current modal capability. The Nevada analysis concludes that 160 - 390 accidents and 850 - 2,400 regulatory violations would be expected over 38 years if future shipments were to be as safe as past shipments.

Table 4. Projected Repository Transportation Accidents and Incidents, 2010-2048. Scenario & Mode Shipments Shipment-Miles Accidents Incidents Mostly Truck (Sites) Truck (77) 108,544 227,735,000 159 2,391 Rail to NV (1) 355 181,000 2 4 HHT in NV 355 118,000 Not Available Not Available Mostly Rail (Sites) Truck (6) 3,122 8,657,000 6 91 Rail to NV (77) 18,935 37,484,000 364 727 Rail in NV 6,312 2,039,000 20 40 Current Capabilities (Sites) Truck (25) 27,435 65,784,000 46 691 Rail to NV (52) 14,886 28,353,000 275 550 Rail in NV 4,962 1,603,000 16 31

Transportation Accident and Terrorism Impacts

In the Draft and Final EISs, DOE acknowledges that a very severe highway or rail accident, or a successful terrorist attack using high energy explosives, could release radioactive materials from a shipping cask, resulting in radiation exposures to members of the public and latent cancer fatalities (LCFs) among the exposed population

In the Draft EIS, DOE evaluated a" maximum reasonably foreseeable accident scenario" involving a rail at a generic urban location. Following the accident severity categories designated by the NRC Modal Study, DOE estimated the consequences of the most severe (category 6) rail accident using the RISKIND computer code. DOE estimated that the accident would release and disperse enough radioactive materials to inflict a collective population dose of 61,000 person-rem (enough to give 61,000 persons a one rem dose) and cause about 31 latent cancer fatalities.

In the Final EIS, DOE changed the basis of its transportation risk assessment, relying solely upon a controversial new NRC contractor report prepared by Sandia National Laboratories (NUREG/CR-6672). As a result, DOE's estimated consequence of the " maximum reasonably foreseeable accident scenario" involving a rail cask was reduced to a collective dose of 9,900 person-rem and 5 latent cancer fatalities. [FEIS, Pp. 6-45 to 6-47, 6-49 to 6-50]

The FEIS acknowledges that the July 2001 Baltimore rail tunnel fire was so severe that it would have resulted in a release of radioactive materials if a rail cask had been involved. [FEIS, p. 6-50] The FEIS also acknowledges that clean-up costs following a severe transportation accident could range from $300,000 to $10 billion. [FEIS, p. J-73]

As part of its review of the Draft EIS, the State of Nevada commissioned several SNF accident consequence analyses by Radioactive Waste Management Associates (RWMA). In 2000, RWMA reexamined the DEIS truck and rail accident estimates, using the RADTRAN and RISKIND computer models and a range of credible alternative assumptions. In 2001, RWMA estimated the consequences of a rail SNF accident similar to the July 2001 Baltimore rail tunnel fire. Also in 2001, RWMA studied the consequences of credible worst

case truck and rail accidents at representative urban and rural locations along potential Nevada highway routes. These studies concluded that DOE systematically underestimated the consequences of severe transportation accidents. The results of these studies are reported in State of Nevada impact report, A Mountain of Trouble, which can be accessed on the web at www.state.nv.us/nucwaste, or obtained in hardcopy by request from the Nevada Agency for Nuclear Projects (phone: 775-687-3744).

The Nevada-sponsored study of the July 2001 Baltimore rail tunnel fire concluded that it would have resulted in significant release of radioactive materials. It burned for more than three days with temperatures as high as 1500°F. A single rail cask in such an accident could have released enough radio-cesium to contaminate an area of 32 square miles. Failure to cleanup the contamination, at a cost of $13.7 billion, would cause 4,000 to 28,000 cancer deaths over the next 50 years. Between 200 and 1,400 latent cancer fatalities would be expected from exposures during the first year.

In both the Draft and Final EISs, DOE acknowledges that SNF truck casks are especially vulnerable to terrorist attack and sabotage. DOE and NRC testing in the 1980s demonstrated that a high-energy explosive device (HED) such as a military demolition charge could breach the wall of a truck cask. DOE sponsored a 1999 study of cask sabotage by Sandia National Laboratories (SNL) in support of the DEIS. The SNL study demonstrated that HEDs are "capable of penetrating a cask's shield wall, leading to the dispersal of contaminants to the environment." [DEIS, p. 6-33] The SNL study also concluded that a successful attack on a truck cask would release more radioactive materials than an attack on a rail cask. [DEIS, p. 6-34]

In the Draft EIS, DOE estimated that a successful attack on a GA-4 truck cask in an urbanized area under average weather conditions would result in a population dose of 31,000 person-rem, causing about 15 cancer fatalities among those exposed to the release of radioactive materials. In the Final EIS, DOE updated its sabotage analysis, assuming the cask contained more radioactive SNF and assuming a higher future average population density for U.S. cities. The Final EIS estimated that the same successful attack on a truck cask would result in a population dose of 96,000 person-rem and 48 latent cancer fatalities. [FEIS, Pp. 6-50 to 6-52] In neither case did DOE evaluate any environmental impacts other than health effects. In particular, DOE ignored the economic impacts of a successful act of sabotage in both the Draft and Final EIS.

Analyses prepared for Nevada by RWMA estimated sabotage impacts would be considerably greater than DOE's estimate. RWMA replicated both the Draft and Final EIS sabotage consequence analyses, using the RISKIND model for health effects and the RADTRAN model for economic impacts, the SNL study average and maximum inventory release fractions, and a range of population densities and weather conditions.

The Nevada-sponsored study of the Final EIS scenario concluded that an attack on a GA-4 truck cask using a common military demolition device could cause 300 to 1,800 latent cancer fatalities, assuming 90% penetration by a single blast. Full perforation of the cask, likely to occur in an attack involving a state-of-the art anti-tank weapon, such as the TOW missile, could cause 3,000 to 18,000 latent cancer fatalities. Cleanup and recovery costs would exceed $10 billion.

Public perception of transportation risks could result in massive economic costs in communities along transportation routes. Even without an accident or incident, property values near routes could decline by 3% or more. In the event of an accident, residential property values along shipping routes could decline between 8% and 34 %, depending upon the severity of the accident.

Rail Shipments, Dedicated Trains, and Railroad Safety

Even if DOE is able to implement the "mostly rail" transportation plan, DOE's opposition to dedicated trains

and other accident prevention measures raise grave concerns about DOE's commitment to transportation safety. The Association of American Railroads (AAR) has long contended that spent fuel should only be shipped in so-called special trains - dedicated or unit trains hauling only spent fuel and other radioactive materials, operating under special safety protocols such as speed restrictions (now 35 to 55 mph), buffer car specifications, and train passing rules.

Current USDOT regulations allow shipment of spent fuel casks in general freight service. The July 19-23, 2001, Baltimore rail tunnel fire has been cited as a prime example of the dangers of shipping spent fuel in mixed freight trains. The Baltimore fire has also rekindled calls for Federal regulation of spent fuel rail routing.

Nevada believes the following safety measures should be mandatory: (1) spent fuel should never be shipped in mixed freight trains; (2) spent fuel should always be shipped in dedicated trains; (3) these trains should operate under strict speed limits (35-55 mph) and special passing rules; (4) US DOT should regulate the selection of rail routes to minimize shipments through urban areas; (5) federal emergency response teams and security escorts should accompany all rail shipments at all times. DOE and the nuclear industry oppose these mandatory safety regulations.

Full-Scale Physical Testing for Spent Fuel Shipping Casks

NRC does not currently require full-scale physical testing of shipping casks as part of its certification process. Cask designers are allowed to demonstrate compliance with the NRC performance standards through a combination of scale-model testing and computer simulations. Nevada has long urged NRC to require full-scale testing as part of certification. Alternately, Nevada has suggested that DOE require full-scale testing as part of the procurement process. NRC is currently proposing demonstration testing of a "representative" shipping cask as part of the Package Performance Study being conducted by Sandia National Laboratories. Nevada has not formally opposed NRC's proposal, but it is not an acceptable substitute for full-scale testing of each new cask design prior to certification.

Nevada has proposed a five-part approach to full-scale testing: (1) meaningful stakeholder participation in development of testing protocols and selection of test facilities and personnel; (2) full-scale physical testing (sequential drop, fire, puncture, and immersion) prior to NRC certification; (3) additional computer simulations to determine performance in extra-regulatory accidents and to determine failure thresholds; (4) reevaluation of previous risk study findings, and if appropriate, revision of NRC cask performance standards; and (5) evaluation of costs and benefits of destructive testing of a randomly-selected production model cask.

Nevada believes that comprehensive full-scale testing would not only demonstrate compliance with NRC performance standards. It would improve the overall safety of the cask and vehicle system, and generally enhance confidence in both qualitative and probabilistic risk analysis techniques. It could potentially increase acceptance of shipments by state and local officials and the general public, and potentially reduce adverse social and economic impacts caused by public perception of transportation risks.

Nevada estimates that the cost of a full-scale regulatory fire test for a truck cask would be less than $5 million. Comprehensive regulatory testing (drop, fire, puncture, and immersion) of a truck cask (up to 30 tons) would be between $8 million and $15 million. Comprehensive regulatory testing of a large rail cask (up to 125 tons) would cost $12 million to $25 million for the first cask, including the cost of required upgrading at the testing facility. By comparison, Nevada estimates the life-cycle cost of the repository transportation system at about $9.2 billion.

None of the SNF shipping casks currently used in the United States have ever been tested full-scale. This fact was confirmed by NRC Chairman Richard Meserve in letters to Senator Harry Reid dated April 2, 2002 and April 24, 2002. DOE has no plans for full-scale testing of the casks which would be used for shipments to Yucca Mountain. DOE and the nuclear industry oppose mandatory full-scale testing.

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*There were about 3,025 shipments in the United States between 1964 and 1997, about 92 per year. Reliable estimates of worldwide cask-shipments, through 1998, range from 24,000 to 40,041. Most of the international cask-shipments moved in trains carrying multiple casks, so the actual number of shipments would be considerably less, but precise information is unavailable. The estimate of 40,041 cask-shipments worldwide was published by the International Atomic Energy Agency in July 1999 and includes the following country totals: United Kingdom, 28,854; U.S.A, 2,425; Germany, 1,612; France, 1,570; Japan, 1,399; and Sweden, 900. Source: R. Pope, IAEA, "International Experience with SNF/HLW Transport," Presentation before the U.S. National Academy of Sciences, National Transportation Research Board, Washington, DC, September 11, 2000.

Nevada's transportation studies are available on the web at www.state.nv.us/nucwaste/trans.htm

BACK

United States Senate

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Testimony of Dr. James David Ballard

Grand Valley State University, Grand Rapids, Michigan

May 22, 2002

Mr. Chairman and Members of the Committee, my name is Dr. James David Ballard. I am an Assistant Professor of Criminal Justice at Grand Valley State University in Grand Rapids, Michigan where I teach a variety of courses on terrorism, research methods, criminology, and criminal justice. I am a sociologist and my training at the University of Nevada, Las Vegas was in political sociology, deviance, and criminology.

Currently, around the world research is being done on the potential for attacks against nuclear facilities and radioactive waste shipments. I am involved in one such working group. This international effort includes a number of researchers from Stanford University, experts tied to various government agencies, and is being funded by a grant from the North Atlantic Treaty Organization [NATO]. For the last seven years, I have studied the risk of terrorism attacks on nuclear waste shipments to the proposed Yucca Mountain storage facility. In particular, I study the changing nature of terrorism and the terrorist tactics that could be employed against nuclear waste shipments. I appreciate the opportunity to provide this body with some information on the potential of terrorism attacks against the shipments of spent nuclear fuel [SNF] and high-level radioactive wastes [HLRW] that could be made to the proposed Yucca Mountain facility.

Introduction

Several factors are important to recognize when considering the potential of terrorism against nuclear waste shipments to the Yucca Mountain facility. The proposed shipments to the Yucca Mountain facility will come from energy, research, and defense related facilities. These shipments will traverse the roadways, rail corridors, and shipping lanes of America and require decades of effort to transfer from their existing safe and secure facilities and to the proposed repository.

This process could happen under a variety of circumstances. For example, it could start once the Yucca Mountain facility is licensed for use by the Nuclear Regulatory Commission [NRC]. If that process is completed, and the decision then passes expected legal challenges, the Department of Energy [DOE] would then have to finalize the planning for the construction of the Yucca Mountain repository, construct a huge fleet of shipment containers, and only then would the proposed facility be ready to accept shipments from around the country. Other possibilities exist, but what matters is that you have a chance to influence the eventual outcome. Understanding terrorism as a risk to these shipments may help that policy decision.

Most experts would agree that removing such highly radioactive cargoes from the confines of their existing safe and secure facilities and exposing them to the dangers inherent in the massive transportation effort necessary to move them to Nevada is not an optimal safety and security risk reduction strategy. For example, two significant and unique risks would arise when removing these cargoes from their existing facilities and the subsequent transportation effort: Transportation accidents and in-transit terrorism attacks. The discussion

that follows is focused around several of the most common questions surrounding the risk posed by these shipments with respect to in-transit terrorism attacks.

Is Terrorism a Threat to These Shipments?

When we ask the question is terrorism a threat to these shipments, the answer is a definitive yes. The attacks of September 11, 2001 demonstrated that terrorists continue to develop an interest in weapons of mass victimization and have seemingly perfected the use of asymmetrical tactics that can wreak havoc on the economic, social, and political stability of our nation with a single act of terror. Subsequent investigations of the infrastructure behind these particular attacks revealed an active interest by al Qaeda and others in the development of nuclear weapons of mass destruction and radiological weapons of mass contamination. The latter category is where the risks lie for shipments of radioactive wastes like SNF and HWRW to the proposed Yucca Mountain facility.

What is being transported sounds benign when it is labeled "waste products" or "spent fuel rods," but terrorists and counter terrorism experts recognize these cargoes for what they could become: Potential weapons of mass radiological contamination. Each of these shipments represents a huge inventory of highly radioactive materials including such cargoes as pressurized fuel assemblies, transuranic wastes, and surplus weapon grade plutonium. If these materials were to be deliberately released into the environment during transit, they would create potentially massive public health impacts, cascading response demands on the emergency response infrastructure of the United States, severe impacts on the social fabric of this country, economic impacts that could dwarf those seen from the September 11, 2001 attacks, and severe radiological contamination based stigmatization of the communities where the release occurs.

Obviously, a human initiated release from any one of these shipments has the potential to contaminate the local community where an incident occurs with radiation. To avoid long-term national level dislocation of vital services that such an attack could induce, and to counteract potential negative human health consequences that would occur from such a deliberate exposure to these radioactive cargoes, would require immediate intervention, extensive environmental remediation, and would ultimately require an unprecedented national response equal or greater than that mounted to counteract the September 11, 2001 attacks.

Nuclear and radiological terrorism encompass two large categories of weapons. The first category is related to bombs that create a nuclear reaction and involve a massive explosion, radiation dispersion, and widespread destruction of property. The materials in SNF and HLRW cargoes will not be equal to these types of weapons in terms of overall effect, but they can be weaponized and thus fall into the second category of radiological weapons. The weaponization process using radioactive source materials like SNF and HLRW is referred to as a radiological dispersion device. The human initiated release of these particular radioactive cargoes would constitute a potential large-scale radiological dispersion incident.

For radiological dispersion to occur, two components are needed: (1) explosives or a physical release mechanism and (2) radioactive source materials. The larger the inventory of source materials, and the more dangerous the inventory of radionuclides, the greater the impact of dispersion into the environment an incident would have. SNF and HLRW shipments clearly have the potential for use as radiological dispersion devices under certain circumstances. These circumstances depend on a variety of factors and several are noted in the discussion below.

Why Target These Shipments and Not Other Hazardous Materials, Radioactive Cargoes, or Radioactive Sources?

Several factors would make these shipments prime targets for a terrorist attack and attract the attention of potential adversaries. These include both factors that may attract international groups and those that may inspire domestic groups to commit an act of violence against the shipment. After noting these factors, it will be argued that another more important factor has been neglected in the discussion of safety and security; that is the symbolic value of the attack against radioactive waste shipments and disposition of the cargoes thereafter.

First, it is important to recognize that these shipments might be an attractive target for international groups. They will represent an easily identifiable target, one that is predictable, and one that because of the longevity of the shipping campaign will allow for detailed planning and support from transnational sources. Because of the connection between the cargoes and our military infrastructure, there also exists the potential for retaliation attacks. Likewise, attacks on energy infrastructure have been a concern of terrorist experts for decades and were the discussion topic de jour for a recent G8 Energy Ministers meeting in Detroit. Also, anyone attacking these cargoes would be able to create an enormous economic impact by the introduction of "event risk" into the energy industry and its related commodities markets. These and many other factors all raise the international terrorism risk profile for the agencies and industries wishing to transport shipments of highly radioactive wastes, especially on the scale proposed for the Yucca facility.

The shipments may also attract considerable attention from domestic groups willing to perpetrate violence to press their political and social agendas. These domestic terrorists could be motivated by a variety of factors. For example, they could be opposed to the forced acceptance of energy wastes into their state. Deeply held distrust of the DOE and its motives with respect to nuclear wastes may inspire individuals to commit violence against SNF and HLRW shipments.

Domestic groups could also be motivated to commit violent acts in opposition to the shipments and nuclear facilities by using a variety of tactics. One example that is illustrative of the potential for attacks was a 1972 hijack incident where the perpetrator threatened to crash an airplane into a research facility at Oak Ridge, Tennessee. Additionally, potential domestic adversaries could include radical groups similar in philosophy to the Earth First and Sagebrush Rebellion movements. Such groups, and those who would emerge over the lifespan of the proposed project, could represent as large a threat as a well-financed international terrorist organization.

Domestic groups may have different motives than international terrorists, but we must recognize that America is not immune to internal attacks, even potential devastating attacks using mass radiological contamination tactics. After all, we have already witnessed a 1986 domestic terrorist incident where a group was willing to remove a rail section in front of a train carrying SNF at a location just outside of Minneapolis, Minnesota. While not successful, this was an organized attempt to derail the radioactive cargo and draw attention to the groups' opposition to the shipment of nuclear wastes.

Make no mistake, interest in radiological terrorism is not only on the terrorists' radar, but should be on policy makers' radar as well, since counter terrorist experts recognize that the future is not without serious risk of such attacks. While noting which groups could mount an attack is one way to begin to identify the risks these shipments pose, this exercise misses one of the most important aspects of why these shipments will become targets. The primary reason why SNF and HLRW shipments could become targets is their symbolic value to terrorists. The next section addresses this critical issue.

What is the Link Between Symbolic Value and Terrorism Attacks Against Nuclear Waste Shipments?

Terrorism is generally defined in terms of the tactics used in the attacks, by use of a typology of potential

adversaries, and/or within the confines of criminal law. Another way of understanding terrorism is to focus on why certain targets are more attractive than others. For example, why was the World Trade Center the target of repeated attacks? To answer that question we must understand that these buildings represented more than just steel and concrete. To the terrorists that attacked the complex in February 1993 and again in September 2001, this office and commercial complex represented American economic strength. These attacks were against the core values of this society and the financial force behind American global economic dominance. They were not merely attacks against buildings, nor were the buildings just a target for random violence. The attacks meant something and were designed to convey a message to America and the world community. So, could an attack against SNF and HLRW shipments be seen as such a symbolic act? Absolutely. To examine this idea, it is important to note several relative features that will help in an understanding of the symbolic value of these shipments.

First, at a most basic level, we should not forget that these shipments are radioactive and the general public fears this fact. The cultural conditioning represented by such historical facts as the decades long Cold War doctrine of mutual assured destruction, and the images of mass victimization and destruction documented after the use of nuclear weapons during WW II, has contributed to a generalized and specific anxiety about radioactivity and all things nuclear.

These historical facts are coupled with a generalized public distrust of the DOE and its management of the nation's nuclear weapons arsenal, the by-products of the weaponization of the atom, and what some consider the trivializing attitude taken by the energy industry and this federal agency when it comes to the safety and security of the public health, environment, and economic well being of the nation. Critics would point out that this is, after all, the same federal agency that was responsible for unethical medical tests on humans to determine the health effects of radiation and it is the agency most responsible for the serious mismanagement of such radioactive sites as Hanford, Washington and Rocky Flats, Colorado.

Regardless of the actual health hazards posed by these shipments, any incident involving these cargoes would elicit a public response of fear, panic, and distrust of any authority figure wishing to explain the health science of radioactivity over the reality of the public perception of the risks they were exposed to during a contamination event. The symbolic value of an attack against highly radioactive waste shipments should not be underestimated, since such perceptions are very real in their adverse political, economic, and social consequences.

Secondly, the cargoes are dangerous. The DOE itself reports that truck and rail casks will carry inventories of between hundreds of thousands to millions of curies respectively. Thus, they are not only dangerous in a symbolic manner, they represent a potential weapon of mass radiological contamination. A weapon that if used would create a backlash against the continued use of nuclear power in America, a backlash against federal agencies and their efforts at transporting these materials, and a backlash against anyone in charge at the time of the attack, and responsible for protecting public health and welfare against such actions.

For example, imagine if you will how an attack, successful or not, would threaten all nuclear power and research, create an immediate stoppage of shipments and cause an extensive investigation into safety and security procedures. Additionally, it would be a publicity disaster of unimaginable proportions for those charged with the moral, legal, and ethical responsibility of protecting the public.

A proactive search for a more viable and safe alternative, like a 50 -100 year term strategy of sheltering the wastes in place at their existing storage facilities, would allow the public to gain a semblance of acceptance for DOE actions and thus reduce the potential impact of this particular symbolic effect. The current DOE efforts to push ahead with the Yucca Mountain proposal, without completing the scientific study of the

proposed repository, can only fuel fear of the DOE and increase the symbolic impact of this type of attack. Likewise, the failure by the NRC and DOE to adjust to the new reality of terrorism may have an equal or greater devastating consequence. Lastly, the whole shipment effort has the potential to create a mass counter culture based revolutionary opposition movement similar to that seen in recent years regarding the negative effects of globalization. Here, public safety and security experts saw the banding together of dissimilar groups like anarchists, labor advocates, and human rights activists to symbolically fight what they may consider the negative aspects of globalization.

This is an illustrative model for future large-scale opposition groups who will oppose the shipments to the proposed Yucca facility. The result of this social development is that America will be facing what has already transpired in Germany and other industrial nations: Widespread anti nuclear protests from well-organized and highly motivated protest groups. These shipments have the symbolic value of sparking such protests and these in turn increase the risks of an attack when transporting the materials, not necessarily by the groups themselves, but by others and within the context of their protests.

The symbolic nature of terrorism is multifaceted and difficult to codify into risk assessment methodologies, especially when those methods do not account for asymmetrical situations that could lead to an increased risk of an attack. Likewise, it is difficult to assess the risk of attacks when the DOE and NRC consider few, if any, non-traditional terrorist tactics that may form the basis of a human initiated mass contamination event using radioactive wastes. The connection between symbolic events and waste shipments is examined in the next section of this testimony.

What Types of Symbolic or Everyday Situations Could be Envisioned and Could They be a Threat to Shipment Security?

One symbolic issue not necessarily recognized in shipment planning, and that is subject to change over time as America becomes more populated, is that of geographic location. The attack location plays an important symbolic part in the identification and assessment of situational terrorism risks for SNF and HLRW shipments from the existing production and storage sites and to the proposed repository. Examples include:

1. Highly populated urban locations, especially large downtown office buildings, shopping districts, hotel complexes, convention centers, and specialized tourism areas are a different area of concern. These locations are different from other populated areas since urban attacks pose a different level of logistical challenge to the first responder community. Urban attacks may also create an initial higher public relations profile for the terrorist cause because of their proximity to a more intense concentration of media outlets.

2. Locations of special events such as the Olympics, the Super Bowl, and other major sporting events, major international trade shows or conventions, and national political party conventions are examples of other types of situational events that will offer attractive symbolic target opportunities. These events have a symbolic value that could potentially draw an adversary because of the potential media coverage and/or because of the adversary’s ability to communicate a message by attacking a particular type of event.

3. Suburban locations near residences and difficult-to-evacuate facilities such as schools, hospitals, airports, shopping malls, industrial plants, amusement parks, sports stadiums, race tracks, and concert halls. The symbolic value of these targets and the motivation to perpetrate an attack in close proximity to these types of areas differs from that found in other areas. For example, a terrorist could choose to perpetrate an attack on these geographic areas to create a highly disruptive mass evacuation event.

4. Rural locations near environmentally sensitive activities and resources such as farms, ranches, surface and

underground water supplies, resorts, wildlife refuges, parks, and other public recreation facilities. Such areas have a different symbolic factor than that posed by other geographic areas, and the aggravated use of that value depends on the motives of the adversary. While location and situational factors are important, the outcome of a human initiated mass radiological contamination event can vary, depending on a number of variables. These factors could include the motivation of the adversary, the type of attack, the weaponry used, and other salient variables. Proactive terrorist risk assessment methodologies would account for such variations in tactics and recognize the variability of the symbolic value a terrorist could attach to such tactical considerations.

For example, when considering these shipments and the contemporary terrorism threat potential, it is important to consider a range of terrorist attack outcomes such as:

1. Attacks designed to induce a breach of the cask where the contents are damaged, where the various radioactive cargoes to be transported are released into the environment, and where the effects of radiation emissions as a result of the loss of shielding could be a danger to human health.

2. Attacks can also yield a result where the cask is damaged, but with no large-scale release of radioactive materials. This could result in a measurable radiation emission from loss of shielding, but not a radiological dispersion equal to that from a full breach.

3. An attack could also yield a cask, the transportation vehicle, or the transportation infrastructure being damaged during the attack, but because of the engineered controls and physical design of the cask, the shipment would suffer no release and no loss of shielding. The recovery effort for such an incident would be delicate since there would exist a potential loss of containment and/or shielding, but in general this would be a less risky situation than that posed by a full or partial breach of the shielding.

4. The fourth category is where the cask is undamaged and the attack fails to yield any chance, or actuality, of a radiological dispersion. Under this scenario the actual attempt itself would have symbolic ramifications as noted above.

Considering the range of outcomes of an attack against these shipments by use of such a typology is a critical omission in current analytical and methodological assessment models being used by the DOE, NRC, and various agencies and contractors who are assessing the security of these shipments. In the next section specific types of attack scenarios are discussed to help illustrate the evolving nature of the vulnerability of these shipments and how transportation planners who focus only on past experiences with shipments, and not on the future risk realities that these shipments will face, underestimate the impact of the changing face of terrorism.

What Types of Attacks are Viable Against These Shipments?

The attack scenarios presented below are composites of more detailed work presented by Nevada and various academic experts from around the world. They represent several of the many varieties of in-transit terrorism tactics that have yet to be studied in any meaningful way as very real and probable transportation events during the lifespan of the proposed shipment effort. They also represent one way to understand the risks these shipments pose, since they are exemplars of asymmetrical tactics not addressed by DOE/NRC regulation and/or security practice in the American radioactive waste transportation industry.

The first is a capture and breach scenario. If the transportation vehicle and cargo were to be captured and placed in an immobile state by any number of means, it would be susceptible to the application of explosives and/or a human engineered breach.

Traditionally, most regulatory and security tactics focus on denial of the opportunity to capture and transport the radioactive cargoes thereafter, but this is an altogether different tactic and requires different responses.

Success by the terrorists at fielding a capture and breach tactic would depend on how long the incident response would take and how effective the terrorists could be at holding off local emergency responders. Thus, depending on their success, the cargo could become a radiological dispersion device if the attackers were to breach cargo shielding and release the radioactive contents into the environment wherever the location of the incident.

Several relative capture and breach factors not currently anticipated, or underestimated, by waste shipment risk analysis and security practice, include the presence of pressurized cargoes and the potential radiological dispersion effect of internal cask gasses, the preexisting physical degradation of the fuel pellets in SNF cargoes that could increase the amount of respiratable particles subject to dispersion, and the potential to further degrade the integrity of the cargoes as a result of a co-existent fire resulting from the terrorist attack, and thus increasing the radioactive dispersion plume.

The capture and breach scenario may represent one variety of a maximum severe incident and could result in a release of radioactive cargo not anticipated by current regulations and/or cask design specifications. Compounding the analysis of this scenario would be such variables as the type of cargoes, the preexisting integrity of the cargoes, and the potential for a co-existent fire that may increase the distribution of the plume after an incident would transpire.

A transportation infrastructure attack scenario would likewise represent a risk to these cargoes. The huge variety of topography, and the enormous range of infrastructure components that would be traversed in the nationwide shipment of SNF and HLRW present unique challenges to Yucca Mountain transportation safety and security planners. For example, a deliberate collapse attack on a radioactive waste shipment in a tunnel could expose the cargo to risks of an impact breach, a crush breach, and/or a fire related incident sufficient to cause a failure of the controls engineered into the physical design of the casks that would eventually be used to move these cargoes. Likewise, an attack that took place on a bridge and in proximity to populated areas (e.g., the Hudson, Delaware, etc.) may also pose unique security challenges.

The transportation infrastructure breach is likewise a type of asymmetrical scenario that may represent a maximum severe incident and could potentially result in a release of radioactive cargo not anticipated by current regulations and/or cask design specifications.

Another scenario example is that of a remote attack using current generation weapons. If the transportation vehicle and its cargo were to become vulnerable to line of sight or direct attack tactics and weapons (e.g., readily available anti-tank missiles, stolen military armor piercing weapons, and/or one of an emerging generation of munitions with sufficient penetrating power), an adversary could use existing regulatory protocols like the disabling device on these vehicles, and/or in conjunction with geographically disadvantageous locations, to isolate the moving target, fix that target, and attack the vehicle from a distance of upwards of 3000 meters.

Remote attacks using such weapons as the Milan or TOW II missiles are a type of scenario that may represent a maximum severe incident and could potentially realize a release of the radioactive cargo not anticipated by current regulations and/or cask design specifications. This type of attack scenario will evolve over time and as increasingly more sophisticated weapons become available on the black market.

Why Repository Shipments are More Vulnerable to Attack Than Fixed Site Locations.

Once repository shipments begin, saboteurs and attackers will be presented with what is called a "target rich" environment. This tactically advantageous environment will provide them the opportunity to plan and execute a terrorist attack, using features of the proposed transportation effort to their advantage. The shipments will not be as secure as they would be if stored at nuclear power plants or DOE facilities, since it would be impossible to recreate the same level of safety and security used in these facilities. In fact, these waste shipments will be more vulnerable than if they were left where they currently are. They will become a symbolic target, face a variety of adversaries both foreign and domestic, and have the potential to be used as weapons of mass radiological contamination.

The overall time and effort necessary to transport the materials across the country is an advantage to terrorists. The choice of a single centralized repository that is located far from the majority of production sites is another advantage, since these shipments will need to travel long distances. Such sustained transportation efforts will produce easily identifiable and predictable shipment characteristics such as set times of day when a shipment is most likely to pass an attack location and large numbers of shipments along identifiable routes from which adversaries could pick and choose their targets. Such a massive shipment effort also affords the terrorist multiple and simultaneous attack opportunities. After September 11, 2001 it is hard to disregard the potential for large-scale suicide based terrorist attacks transpiring in different locations at the same time and focused on the same type of symbolic target. The numbers of shipments (be they in the form of the DOE's mostly rail plan, the mixed rail/highway plan, or the primary highway shipment plan) will increase the likelihood of an adversary being able to acquire the target (shipment) and thereafter execute an attack on one or more of the many highway, railway, or waterway shipments that will transpire.

Massive numbers of shipments, predictable schedules, identifiable cargoes, and the overall length of the transportation routes, are all factors that add additional risks to the proposed Yucca Mountain program. The additional miles equal many more insecure areas and lower the potential for appropriate security defenses that can be planned and executed. Moving these materials out of their current safe and secure locations decreases the potential defense options available to counter terrorism planners, since the ability to secure tens of thousands of miles of roadways, railways, and waterways at the same level as that available at a power plant would be nearly impossible to achieve.

The policy alternative available to you today is far easier and more logical than adding more targets for terrorists to attack across the span of America's transportation infrastructure. From a strictly security and safety standpoint, these materials are better off where they sit, behind the security of walls and fences, protected by trained and professional plant security, and secured by regulations and procedures that have been designed to protect fixed site locations where nuclear wastes are stored.

If allowed to be sheltered in place at those facilities for 50 to 100 years, these wastes will become less and less toxic. That means that their radioactive inventory will become less of a risk to move, and the symbolic value of an attack will be reduced. We are in an enduring period of threat by terrorists and since this nation will not soon be abandoning its use of nuclear energy, allowing these cargoes to be sheltered in place is a viable alternative.

Concluding Remarks

Terrorism is a viable threat to nuclear waste shipments and the engineered controls put into the shipment casks are not equal to the challenge of asymmetrical tactics and motivated adversaries willing to commit what they consider altruistic suicide in the name of a cause. Current regulations, practice, and engineering do not account for the potential of 21st century terrorism and emerging modifications in terrorism tactics and

philosophy. Terrorism is changing, and to counteract the enduring threat posed to our way of life, we must reconsider our existing and future tactics and security arrangements. Until a safe and secure transportation plan capable of protecting the public interest can not only be articulated but battle tested, a plan that accounts for the radical change in terrorism illustrated by the September 11, 2001 attacks, we should stop the forward movement of this risky process.

Without due consideration and contingencies for the emerging asymmetrical terrorism tactics, it is folly to proceed with the Yucca Mountain project. Likewise, allowing the DOE and NRC to proceed without due consideration of the actual risks posed by terrorism is tantamount to endorsing bureaucratic indifference of unimaginable consequences.

I urge this body to solicit testimony not only on the historical safety and security records of these agencies, but to seek out the actual plans that have been developed to face the world we live in today, a world where large groups of well trained and highly motivated adversaries are willing to commit mass suicide to achieve an objective. A world where the unwritten prohibitions against mass murder by terrorist attack has not only been replaced, but what has been embraced in its place is a world where the terrorists are rewarded for mass victimization.

While no assurances can be made for the future, one thing is certain -- if we offer an attractive target, someone will make an attempt to attack it. Do not allow the nation's nuclear waste products to become the golden carrot for would be terrorists. Nuclear waste shipments will be targets and unlike other targets, these shipments will have sufficient symbolic value to attract well-motivated and dangerous adversaries. Do not give them the easy opportunity to prove us unprepared once again.

Mr. Chairman and Members of the Committee, thank you for the opportunity to testify and answer questions today.

BACK

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Testimony of Dr. Victor Gilinsky

former member of the U.S. Nuclear Regulatory Commission

May 22, 2002

Mr. Chairman, Members of the Committee:

I am Victor Gilinsky. I am an energy consultant and have been engaged by the State of Nevada to assist on Yucca Mountain issues. I am here to present my views on the Senate Joint Resolution to approve Yucca Mountain as the site for a national high-level nuclear waste repository.

My involvement with nuclear power and nuclear waste issues is long-standing. I served two terms as a Commissioner with the U.S. Nuclear Regulatory Commission (NRC), having been appointed by President Ford and re-appointed by President Carter. Prior to the NRC, I was head of the Physical Sciences Department at the Rand Corporation in California. In the early 1970s, I was on the planning staff of the NRC's predecessor agency, the Atomic Energy Commission.

The issue is not nuclear power's future

At that time the government's plan for long-term storage of nuclear waste was what would now be called monitored retrievable storage. After the reorganization of nuclear agencies in 1975, the government abandoned this approach and adopted the permanent geologic repository concept. This was done not to protect public safety in the distant future, but to protect the licensing of nuclear plants against then-ongoing court challenges by environmental activists and other opponents. The supporters of nuclear power thought it was essential for the industry's immediate future to be able to say the nuclear waste problem was solved permanently. In this way, without much consideration of its wisdom or thought to the difficulty of actually carrying it out, the government lashed itself to this concept and its long-term obligations. Because permanent, deep geologic disposal of nuclear waste carries with it the possibility of irretrievable and irremediable error, the subject quickly became enmeshed in controversy that continues to this day.

I mention this because the current effort to stampede the nation into adopting Yucca Mountain as the site for a deep geologic repository continues to be premised on the mistaken assumption that the immediate future of nuclear power in this country depends on bringing this project to fruition. This view was expressed by the Wall Street Journal's editorial page: "The real debate here," the Journal said, "is less about Yucca than it is about nuclear power," and has been echoed by several other major newspapers. The truth is that Yucca Mountain is not needed to continue, or even expand, nuclear power use. In fact, there is ample opportunity to expand existing, NRC-approved, on-site storage. In time, we should collect the spent fuel casks at locations dedicated to long-term spent fuel storage. But the important thing now is to recognize that there is no immediate crisis, that there is time to do this and to do a good and responsible job in terms of safety and security, and to do it at a much lower cost to ratepayers than Yucca Mountain represents.

Yucca Mountain is not likely be a boon to nuclear power, as some industry people seem to think it will be. Indeed, Yucca Mountain is much more likely to become an unhelpful and continuing reminder of nuclear power's history of contentions - over safety, over the environment, over federal preemption, over licensing short-cuts, over transportation, and over expense.

The project has taken on a life of its own

The expense associated with Yucca Mountain is already huge, and continues to grow - approaching as much as $100 billion. Like other projects that don't meet a pressing need or have a definite measure of performance, it has taken on a life of its own - it is propelled by public money, supported by interested lobbies, and protected by a shifting array of arguments. These arguments don't, however, stand up to serious examination. You should not accept them as a basis for approval.

Yucca Mountain is not the answer to current concerns over spent fuel security

The most egregious of the pro-Yucca arguments has to do with spent fuel security - egregious because it exploits public fears in the wake of September 11th. People have been given the idea that spent fuel from around the country will be moved quickly to Yucca Mountain where it will be placed deep underground. The mantra is "better one site than 131." But even if Yucca Mountain opened on schedule, according to the Department's projections, it would be several decades before the spent fuel could be shipped to Nevada, and probably decades more before the fuel actually went underground. And this scenario plays out even if we never license another nuclear plant. If we do license more nuclear power plants (which is in large part the point of opening a spent fuel repository), we will have lots of spent fuel in storage at reactor sites indefinitely. Because of the built-in delays involved, Yucca Mountain is not the answer to the current spent fuel security problem. The best thing we can do right now in this regard is to get the spent fuel at the reactor sites promptly moved into secure storage casks in a protected area at the reactor site. Such casks have already been licensed by the NRC and are in use at several sites.

Appeal to national security is quite a stretch

DOE also diverts attention from the important long-term Yucca Mountain issues with the claim that Yucca Mountain is important to our national security. The claim is that without Yucca Mountain our nuclear Navy operations could be constrained and U.S. nonproliferation policy could be undermined. First, let's face it; Naval operations are not going to be constrained no matter what happens at Yucca Mountain. That's a hollow argument. Second, DOE has the nonproliferation argument backwards. The proposed US-Russian plutonium-recycling program to which DOE refers – the waste from which DOE wants to put in Yucca Mountain - would in my view raise the risks of proliferation and nuclear terrorism by encouraging the commercial use of plutonium.

Aside from the deficiency of these DOE arguments, there is something basically worrisome about the lopsided appeal to national security interests in support of Yucca Mountain. Is the Department merely distracting attention from the problems of the site's geology? Or is it setting the predicate for future national security exemptions from safety and environmental requirements?

DOE did not apply its own geologic site criteria

The site obviously has problems, the chief one being lots more water than anyone expected. (I was myself surprised to find water dripping on my head in the test cavity in the center of the Mountain.) Water promotes corrosion and movement of radioactive material and so its presence in a repository is a serious drawback. The current design concept now includes titanium drip shields - in effect, titanium umbrellas - over the waste

packages to be placed in the Yucca Mountain tunnels. But the water problems don't end there. The 15 years of geologic investigation and the several billions that DOE spent don't make this a good site. The bottom line is that the site didn't pass DOE's own geologic selection criteria -DOE never risked applying them. In fact, in December 2001, shortly before it forwarded the site recommendation to the president, DOE threw out the set of geologic criteria it had adopted as a formal rule in 1984. In its place, DOE then adopted a new rule that made site geology irrelevant if the metal container encasing the waste was good enough.

DOE site selection did not comply with the Act

This action was at odds with DOE's responsibilities under the Nuclear Waste Policy Act. The Act tells DOE to do two separate things—(1) select a suitable site, and (2) make sure it can be licensed by NRC for its intended purpose. First, DOE was to recommend or reject Yucca Mountain, with geologic considerations to be the primary criteria. DOE sloughed off this responsibility and decided all it had to do was satisfy NRC's licensing limit on potential radiation doses to the nearby human population. But NRC's licensing rule doesn't have any separate requirement for effectiveness of geologic barriers. In short, DOE avoided the Act's demand for an answer to the question of site suitability by "deferring" to NRC, but NRC will not answer the question either. This cannot be what Congress intended.

It now appears that DOE's waste bureaucracy has rationalized its failure to comply with the Act's tough geologic requirements on their view that Congress already selected Yucca Mountain back in 1987. Congress was not, however, lowering the geologic standards in selecting Yucca Mountain for characterization. Indeed, that was also DOE's reading of the 1987 Amendment to the Act up until about 1996. Since DOE has now abandoned its geologic criteria, Congress is now being asked not merely to ratify a DOE site suitability decision, but instead to make one itself in view of DOE's default. Under this approach, a site suitability analysis and recommendation, as contemplated in the Act, will never be made. Congress should not allow this and should insist that DOE comply with the Act.

If DOE will rely mainly on its miracle metal container—why then Yucca Mountain?

As it is, DOE plans to get around Yucca Mountain's geologic deficiencies with its "miracle metal" container (to use the Nuclear Energy Institute's appellation), which is purported to meet NRC's licensing standards all by itself. If we are to suppose this is true, and therefore the repository site doesn't need favorable natural characteristics, why then should such a repository be in Nevada as opposed to anywhere else? Why not store the miracle containers at or near existing reactor sites and eliminate the risk of transporting high-level radioactive waste by truck, rail and barge thousands of miles across the country?

Congress should rely on NWTRB regarding "sound science" assurances

A phrase that appears over and over in documents in support of putting the waste in Yucca Mountain is "sound science." We are assured that the project is based on "sound science." Significantly, the Secretary of Energy has said he would not have recommended the site were he not convinced that it was based on "sound science." That says this body, the United States Senate, should not be approving the site if you are not similarly convinced.

So now consider what the real experts—the members of the U.S. Nuclear Waste Technical Review Board—have said. If there are any heroes in this struggle, they are the Board members and their Chairman. They have carried out their responsibilities competently and even-handedly in difficult circumstances and have expressed themselves clearly and precisely. In the din of exaggeration on all sides it is possible to miss the vital importance of their message. You will hear from them directly tomorrow, but we should listen today

to what they have already said.

Nuclear Waste Technical Review Board: technical basis is "weak to moderate"

The Board has termed the technical basis for DOE's repository performance estimates as "weak to moderate" - not an encouraging evaluation. The Board has criticized the lack of critical corrosion data on the metal waste containers to support DOE's basic design concept. That's especially important as DOE relies almost entirely on the integrity of the metal waste containers to meet NRC's licensing standard. As one of the Board members said, "We are betting the performance of the systems on the long term performance of these effectively new materials."

Parenthetically, earlier this year a steel pressure vessel at an Ohio nuclear plant was found to be severely and dangerously corroded, to the point that a serious accident was barely averted. I mention this only because the metals involved and their environment were much better known than those planned for use in Yucca Mountain, and yet the corrosion came as a great surprise. In short, the lack of corrosion data the Board points to is a serious deficiency.

In March the Board wrote DOE expressing concern that important water flow processes around Yucca Mountain "remain poorly understood" and should be studied. DOE wrote back with the bureaucratic equivalent of "don't call us, we'll call you." It wasn't the response of an agency dedicated to assuring a firm project basis in sound science. In a more general comment, at last week's meeting of the Technical Review Board, the Board chairman said very simply and clearly that technical work that should have been done before site selection has not been done.

The Board members are not only experts; they are your experts, your technical watchdogs. Congress created the Board in 1987 to "evaluate the technical and scientific validity of activities undertaken by the Secretary." In this sea of controversy, they are the ones you appointed and can rely on for highly competent and impartial advice. If the Board doesn't give this project its strong endorsement for "sound science," how can Congress do so?

Time to stop to think

One thing is clear. DOE is not remotely ready to comply with the law's requirement to file an NRC license application 90 days after Congressional approval. DOE is talking about applying to NRC for a license in 2004, and there are some suggestions that it will be even later. They say they are keeping all options open—that it may be a high temperature repository or it may be a low temperature repository. That's another way of saying they don't even have a design. The trouble is, one concept may require a much larger repository than the other, and so the cost is up in the air, too.

The project doesn't make sense in terms of expense, security, or safety, or even in terms of the future of nuclear power. This is not the time to give the Department a green light. This is the time to rethink the present course.

BACK

United States Senate

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Testimony of Hon. Ross Anderson

Mayor, Salt Lake City, Utah

May 22, 2002

I am Ross Anderson, Mayor of Salt Lake City, Utah. I appreciate the opportunity to comment on the wholly inadequate proposal to transport deadly nuclear waste across country for storage at Yucca Mountain and the shortsighted national nuclear policy that has led to that proposal.

The people of Salt Lake City are intimately familiar with the tragic politics of nuclear exploitation. Thousands of Utah downwinders have suffered and died – and more continue to suffer and die – as the result of nuclear weapons testing in Nevada during the Cold War. Private companies target Utah as a prime dumping ground for so-called “low-level” radioactive wastes. Further, a coalition of electric utilities is seeking to exploit the impoverished Goshute Indian tribe to create a purported “temporary” storage site for spent nuclear fuel rods just 70 miles from Salt Lake City.

From experience, we know that the Yucca Mountain proposal would put most Americans, including all the citizens of Salt Lake City, at tremendous risk, by creating tens of thousands of highly lethal “dirty bombs” and shipping them through large metropolitan areas on a daily basis. To make matters worse, even if there were no serious risks from the transportation of this high-level nuclear waste, the Yucca Mountain project would not be a long-term solution to the problem of nuclear waste. The project only further accommodates the irresponsible actions of our nation’s nuclear industry – facilitating the production of even more nuclear waste and worsening our federal government’s addiction to nuclear power, without addressing the fundamental issue of how to deal with the ever-increasing amounts of these deadly substances.

Transportation Risks

A detailed transportation plan for shipping nuclear waste to Yucca Mountain has not yet been developed, and not one transportation cask in use has been physically tested to withstand plausible accident or terrorism scenarios. These facts illustrate the irresponsible and undemocratic manner in which this project is being developed. Without adequate research as to the safety of transporting this waste, without details of where and how it will travel, the American public, our representatives in Congress, and our federal regulatory agencies are being asked to sign off on one of the most expensive projects – and perhaps the most dangerous project – in the history of the United States.

If the Yucca Mountain proposal were approved, huge amounts of nuclear waste would be transported through Salt Lake City every day for many years. Virtually all of the major shipping routes to Yucca Mountain from the eastern US, both rail and highway, traverse Utah. Salt Lake City will, by all estimations, see more traffic of nuclear waste than any other US city except Las Vegas. Utah will be second only to Nevada in the number of high-level waste and spent nuclear fuel shipments routed through the state.

Rail lines that may be used to transport spent fuel rods through Salt Lake City to Yucca Mountain lie 25 feet from residents' backyards. The trains travel within 100 feet of playgrounds. Six schools are within half a mile of transportation routes, well in range to receive measurable daily doses of radiation from incident-free transportation. Two interstate highways, the major arterials for truck transport from the east coast, run right through the heart of our city. Trains stopped at crossings and trucks stopped in traffic will sit only a few feet away from our citizens on a daily basis.

Scientists estimate that incident-free transportation, mostly by truck, will cause as many as 31 cancer fatalities nationwide.3 This incident-free scenario assumes transportation utopia and does not take into account the Department of Energy estimates for transportation incidents and accidents.

Catastrophic loss of life could accompany a single major accident in a metropolitan area or in a major watershed area like Salt Lake City's. Such a scenario is almost a certainty. Human error is inevitable. Scientists predict as many as 340 transportation accidents and 2,395 incidents involving the waste during the transport period. These numbers do not include the risks of terrorism – a very real possibility even before the September 11, 2001 terrorist attacks. A single terrorist attack, which could be carried out with far less planning and resources than the September 11th attacks, could result in thousands of cancer fatalities and cost up to $17 billion in adverse economic impacts.

Protecting the Salt Lake 2002 Winter Olympic Games for less than two weeks, in a relatively constrained geographical area, was a monumental task, requiring over 15,000 law enforcement officers and costing over $310 million. Adequately protecting tens of thousands of highly lethal shipments of nuclear waste as they travel thousands of miles through dozens of major cities over a period of 38 years will be impossible.

With tragic ramifications, our federal government has failed in the past to responsibly deal with major terrorism-related security concerns. We implore you to acknowledge the horrendous terrorism-related security risks entailed in transporting, by rail and truck, highly lethal spent nuclear fuel and to assume the responsibility that is yours to protect the people of this country, including later generations – and to protect our economy – from those risks.

The Yucca Mountain Proposal is Not a Solution to Our Long-Term Nuclear Fuel Storage Problems.

The most astounding fact about all the transportation risks inherent in the Yucca Mountain proposal is that they serve no fundamental long-term purpose. The safety of communities where nuclear waste is generated will not be significantly increased. Plants will still produce waste on site and will still be just as likely to fail in generation and storage operations. They will also remain just as likely targets of terrorist attack as they are today.

There are no plans for the storage of waste after 2036, when Yucca Mountain will be at capacity. Therefore, after creating all of the significant risks to millions of Americans resulting from the Yucca Mountain project, we will not be able to say we have solved the long-term problem of nuclear waste storage. We will only have facilitated the continuation – and exacerbation – of a dangerous situation that has no foreseeable solution short of vastly reducing or eliminating the production of nuclear waste.

Congress has created a process with a foregone conclusion. It has made promises to the nuclear utilities that it cannot keep and continues to appease the utilities that have profited while creating this enormous, dangerous dilemma for our nation. It is guaranteeing that an ever-growing amount of nuclear waste will be strewn across the United States, putting many generations of Americans at serious risk.

A Better, Long-Term Approach

There is a better approach. Instead of pursuing half-measures that put millions of Americans at risk, we can take effective steps now to accomplish permanent solutions, including the reduction of threats posed by the disposal of existing spent nuclear fuel and vastly curtailing the production of nuclear waste in the future.

First, nuclear fuel should be stored where it is produced until a comprehensive, safe, and permanent solution to the entire storage problem is found. While nuclear power advocates dismiss this plea of Nevadans and Utahns as a "Not-In-My-Backyard" argument, they epitomize the crass hypocrisy of the industries and communities that welcomed inexpensive nuclear power at their doorsteps but now refuse to take responsibility for it in their backyards. The utilities proposing "temporary" storage of nuclear fuel at the Goshute Reservation near Salt Lake City have represented that these lethal materials can be safely stored in aboveground casks. If that is true, the materials can be stored in those casks where the materials are produced while Congress plans for an effective, long-term solution to nuclear waste in America.

Second, we must decommission nuclear power plants, at least until reprocessing or some other technology eliminates the problems of nuclear waste. Only 20% of electricity generated in the US comes from nuclear power. We can and should make investments in conservation and alternative generation technologies that will make up for the energy generated by nuclear power plants. In the same way we led the atomic age, the United States has the opportunity to be a leader in conservation and alternative production technologies.

Conclusion

The people of Utah were lied to repeatedly when told that government plans were safe. We will not be lied to again. We will not allow Congress and the Department of Energy to treat Utah and Nevada as remote, disposable places, where the self-inflicted problems of the reckless nuclear power industry – and of a federal government that has been astoundingly irresponsible in its nuclear policy – can be conveniently dumped.

Reversing the momentum behind the Yucca Mountain proposal will not be easy. It will take political courage. It will take an honest admission of failure. It will take a return to integrity. But it is the only way to take real steps toward reaching a permanent solution to the long-term problems of nuclear waste in America. Together, we can make the hard decisions and take a leadership role in global environmental responsibility. While seeking to make good on broken promises of the past regarding the safe, permanent storage of nuclear waste, Congress can finally set right our nation's nuclear policy – for the long-term benefit of our country's public health, safety and security.

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Testimony of Michael Ervin, Sr.

Vice President, Peach Officers Research Association of California

May 22, 2002

Thank you, Mr. Chairman. My name is Sergeant Mike Ervin. I live right outside of Los Angeles. I am a police officer with the Pomona, California Police Department. I have been a police officer for 22 years.

Before becoming a police officer I was a professional truck driver. I drove tractor trailers – either 48 foot long single trailers or short double trailers – on the interstates in Southern California for five years and logged about half a million miles.

I realize that this hearing is about the proposal to transport and store nuclear waste at Yucca Mountain in Nevada. I have been asked to tell you what I know about truck driving and truck safety.

When I was 23, I became a police officer. I had always wanted to be one, and thought that I had better do it when I could. I am still licensed to drive trucks though. I can drive Class I or combination vehicles or a bus. I take a written test every four years or so, before my license expires. There is no requirement that I take a road test. I have never hauled hazardous materials, although if I wanted to drive a combination vehicle carrying hazardous materials, I could. All I would have to do is to take another written test. In California, that is all that is required for a truck driver to be licensed to drive a truck carrying hazardous materials – pass a written test and a have clean driving record.

As a truck driver and as a police officer, I have seen a lot of truck crashes. I have concluded that there are two elements to truck safety. The first is mechanical – the truck itself. It is important to understand that an 80,000-pound 18-wheeler is inherently dangerous. This fact is borne out by statistics: According to data from the National Highway Traffic Safety Administration, 457,000 large trucks were involved in traffic crashes in 2000.

There are a number of factors that make trucks so dangerous. The first is the weight of a truck. Heavy tractor-trailers tend to have a high center of gravity because the extra weight is typically stacked vertically. The higher center of gravity increases the risk of dangerous rollovers. Heavy tractor-trailers are likely to accelerate more slowly and have difficulty maintaining speed on upgrades, increasing speed differentials with other traffic and increasing the risk of accidents.

If a truck is perfectly maintained it will be a lot less likely to be involved in a crash. Some trucking companies do an excellent job of maintaining their trucks. The trucks are checked thoroughly every night and needed repairs are made immediately. However, I have to operate in the real world. And there are other trucking companies that are not so scrupulous. They put off some repairs because they are expensive. In addition, sometimes with even the best-maintained trucks, mechanical things go wrong. The way I see it, the only way to have a perfectly maintained truck is if God turns all the wrenches.

What does this mean? It means that when brakes that need adjustment are pumped, that great big heavy truck barreling down the highway may need hundreds of more feet to stop. It means that steering those heavy trucks, which is always difficult, will be more so. It means that a sharp turn, made to avoid a too close motorist, will result in a rollover. I think of a tractor-trailer rig as a missile. The question is, is it under control or out of control?

These are all factors that this Committee should take into account when considering any proposal to transport nuclear waste on public highways.

The second element to truck safety is the human element. Again, there are many very good, experienced, responsible drivers who work for trucking companies which are very strict about limiting the hours that their drivers are on the road, and which insist that they get enough rest. Some of these companies do not put sleepers in their cabs because they do not want their drivers sleeping in their trucks. They give them hotel vouchers – they want them sleeping in beds and getting a good night's rest. But again, there are other trucking companies that are not so careful. And truck drivers often feel that they must keep moving in order to make enough money to support themselves. They cannot afford to stop by the side of the road to rest when they are tired. These tired truck drivers make the roads unsafe for all of us.

Long haul truck driving is extremely stressful and tiring. You have to monitor your speed, make sure you keep a safe distance from the car in front of you, and adjust for any wind or rain or bumps in the road, all with the knowledge that you are the heaviest vehicle out there. That is a huge obligation. You always have to think about what could go wrong and what you would do if it actually happened.

Besides truck drivers, there are other human elements that make the road dangerous. Trucks must share the roads with automobile drivers. Most auto drivers are not trained to deal with trucks that take up most of a lane. They are not as aware as we would like them to be of the "no-zone" area around a truck where they are hidden from a truck driver's view. There are automobile drivers who can be careless, and some that are just plain weird. I can remember a number of instances where I was driving along, tired, fighting the wind, when a car would pull along right beside me so that the driver could peer into my cab. He would stay with me, very close, peering. It was nerve wracking. The fact is, all truck drivers run into strange people on the road. Dealing with them is part of the job. But, it makes truck driving more dangerous, and if you throw in congested traffic conditions, poor roads, inclement weather, it seems almost impossible for truck accidents not to occur.

I feel that truck driving is a profession. A driver must be licensed, and I personally felt a great responsibility to everyone on the road. I felt that while I was driving, everyone on the road with me was depending on me to do my job faithfully and carefully. If I drove past my skill level or beyond my truck's capacity, the result would be disaster.

I understand that the trucks in question would be typical 80,000-pound tractor-trailers, but that heavier trucks may be used, as well. Everything I have said here today about the mechanical and human elements of driving heavy trucks is even more important as trucks get heavier. The University of Michigan Transportation Research Institute found that there is a strong statistical link within the same truck configuration between higher weights and a greater risk of fatalities. As weights go from 65,000 to 80,000 pounds the risk of an accident involving a fatality goes up 50%. Just imagine the fatality rate at 120,000 pounds or more. In conclusion, Mr. Chairman, there are hundreds of thousands of truck crashes every year in this country. In the real world, there is no such thing as a perfect truck, a perfect road and perfect weather conditions. Even if there were, you will always have the human element. You can have the best-trained truck drivers, but they may be tired. And you can never predict how the truck and its driver will interact with the motorist.

I am happy to answer any questions.

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United States Senate

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Testimony of Dr. Stephen Prescott

on behalf of The Huntsman Cancer Institute, Salt Lake City Utah

May 22, 2002

Mr. Chairman, Members of the Committee, and Guests:

My name is Stephen Prescott. I am the Executive Director of the Huntsman Cancer Institute in Salt Lake City, Utah. I am a physician and a medical scientist and it is in these roles that I appear today. At the Huntsman Cancer Institute we conduct research into the causes of cancer, we work to prevent cancer, and we treat cancer patients. Most of the patients we serve are from Utah, or Nevada, or our other neighboring states. Every day we see patients who come from families who have borne the burden of environmental exposure to radiation – exposure that resulted from federal policy. This began in the 1950s with the atmospheric testing of nuclear devices at the Nevada Test Site – the location now proposed for storage of spent nuclear fuel and high level radioactive waste. Citizens of Nevada were exposed to this fallout and, because of the typical weather patterns, individuals in Utah, Arizona, and New Mexico were as well.

One of our cancer patients recently told me a horrifying story; as children in Southern Utah he and his brothers would take a Geiger counter out into the pasture on their farm to find the areas that gave the loudest response. Why did their parents allow behavior that now appalls us? Not because of disinterest in the well-being of their children, but because they had been reassured that there was no danger.

As illustrated by the experience of the Downwinders, the residents of the intermountain west already have been asked to stand in harm's way, with respect to nuclear exposure, more than other citizens of the United States. And yet, there is another historical example. During the same time period, it was deemed important to have large stockpiles of uranium, and our region was a key area for mining and refining uranium ore. For many years I have kept this photograph of a man who had worked as a uranium miner. He gave me this photograph when he was my patient while I was in intern at the VA Hospital in Salt Lake City. I would talk with him every evening when my rounds were done because he had no family to visit him; he was lonely and he knew that he was dying. And I couldn't stop that. He was dying from metastatic lung cancer—a type that is caused by the radon gas he breathed in uranium mines. He died, alone, in the VA hospital.

This is another example of how some individuals in the intermountain west were exposed to radiation that caused cancer. They were assured that the mines and refineries were safe. Now the citizens of the same region are being asked to assume the risk of a third round of radiation exposure. We are told, again, that the risk will be low. But, will an unanticipated accident during the transportation cause my neighbors to develop lung cancer? Leukemia? Bone tumors? What suffering will come again to the people of Utah? Nevada? Colorado? Arizona? New Mexico? Will my colleagues and I be able to stop their premature deaths?

I recognize that there are difficult questions to answer regarding nuclear waste. My purpose today is to

emphasize that there are serious consequences if we err on the side of not enough safety. In the course of this public debate I've heard it claimed that the risk from radiation has been overstated. We should be clear: decades of medical research show that exposure to radiation causes many types of cancer. Whether an individual will develop cancer is hard to predict because the risk depends on the type of radiation, the amount received, and how quickly it happens. Thus, high-level waste is more dangerous than low-level. We need to be certain that precautions are in place to prevent the release of the stored material either rapidly, as might happen in a natural disaster like an earthquake, or gradually, as would happen if the design did not prevent leakage. Likewise, the procedures for transporting high-level waste must prevent sudden release, which could cause severe radiation exposure if it were to occur in a populated area.

In conclusion, I plead with you today to not repeat the mistakes of the past. Please do not create a situation in which my successor will be sitting in front of your successors reporting on an excess of cancer deaths in Utah and Nevada and Colorado because there were accidents during the transport of this material to Yucca Mountain or Skull Valley. Or, because the storage protocol had an unanticipated flaw. None of us will be here to answer for our mistakes because cancer isn't apparent until years after the radiation exposure. But posterity will not let us escape the responsibility today to insure that we have done everything feasible to protect our neighbors. Thank you.

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Testimony of Kenny Guinn

Governor, State of Nevada

May 22, 2002

Honorable Mr. Chairman and members of the Committee, my name is Kenny C. Guinn and I am Governor of the State of Nevada. These written comments are submitted for inclusion in the hearing record. The state of Nevada compliments Chairman Bingaman for holding this important hearing and providing an opportunity for every member of the Senate to review in detail an issue of profound national importance - whether to proceed with the development of Yucca Mountain in Nevada as a site for a national nuclear waste repository. This is an issue that will tangibly affect tens of millions of Americans and it is hurtling toward finality in a manner that is premature, unnecessary and ill-conceived.

As is widely known by this time, Nevada considers the Yucca Mountain project to be the product of extremely bad science, extremely bad law, and extremely bad public policy. With regard to Yucca Mountain, each of these elements is strongly negative on its own and when the three are combined, the totality of their weight cannot, and should not, be ignored. This project has failed to meet the scientific criteria established by this very body for a deep geologic repository, it has failed to meet the law in numerous instances and ways, and it would implement an unprecedented public transportation policy that literally puts tens of millions of Americans at risk on a routine basis.

Attached to this statement are three documents: 1) the Notice of Disapproval and an accompanying Statement of Reasons I filed with the U.S. Congress pursuant to Section 116 of the Nuclear Waste Policy Act; 2) a copy of a recent peer review report commissioned by the U.S. Department of Energy (DOE) and conducted for DOE by the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD); and, 3) a copy of an affidavit from John W. Bartlett, DOE's former Director of the Office of Civilian Radioactive Waste Management, outlining his experience overseeing the Yucca Mountain project and his reasons for concluding that the Yucca Mountain site is unsuitable for use as a high-level nuclear waste repository. Please consider these attachments as part of my written testimony to the Committee.

For the reasons stated therein, as supported and augmented by the information in this written testimony, we in Nevada believe that the Senate should take no further action in support of the Yucca Mountain project.

The IAEA/OECD Report on the Unsound Science of Yucca Mountain

I would like to call the Committee's attention to a new document, a key document, which recently appeared from within the scientific community that excoriates the scientific work of DOE in connection with Yucca Mountain. Numerous independent scientific reviewers have now evaluated the project during the past year, and all have reached the same conclusion: There is nowhere near enough information to certify the suitability

of the Yucca Mountain site for high-level nuclear waste disposal, and the information that is available suggests the site is woefully unsuitable geologically.

This latest report, the aforementioned peer review report commissioned by DOE from the International Atomic Energy Agency and the Nuclear Energy Agency (IAEA) of the Organization for Economic Cooperation and Development (OECD), reaches shocking new conclusions. These agencies assembled some of the world's leading scientists to evaluate, over several months, the total system performance of Yucca Mountain as represented by DOE and its computer models. Among other things, these leading scientists concluded that DOE lacks sufficient information even to build a model to predict the suitability and hydrogeologic performance of the proposed repository. According to the peer review group, the water flow system at Yucca Mountain is "not sufficiently understood to propose a conceptual model for a realistic transport scenario."

Moreover, according to the peer review group, DOE's level of understanding of the hydrogeology of the site is "low, unclear, and insufficient to support an assessment of realistic performance." DOE's sensitivity studies in its computer models "do not give any clues to the important pathways for the water in the system." Perhaps most troubling of all, in DOE's performance model of Yucca Mountain, "increased ignorance leads to lower expected doses, which does not appear to be a sensible basis for decision-making."

It is truly amazing to me, as an elected executive official, that DOE commissioned this peer review report many months ago, and then made a final "site suitability" determination to the President and the Congress in spite of its stunning conclusions. It shows once again, in my view, that politics has long prevailed over science when it comes to Yucca Mountain. This is another reason for Nevada to redouble its efforts to stop this project - government bureaucrats seem unable to pull the plug, even in the face of shocking independent evidence that the science is bad or nonexistent.

The PECO Solution and the Myth of One Central Storage Site

It is almost certain that, even if Yucca Mountain proceeds, every nuclear utility in the United States will nonetheless have to build an interim dry storage facility for their inventories of spent nuclear fuel, if they have not already done so. This is because Yucca Mountain will not be ready to receive high-level radioactive waste until long after spent fuel pools at reactor sites have been filled to capacity. Moreover, as I have explained in my Statement of Reasons, Yucca Mountain will not reduce the number of storage sites across America for 60 to 100 years, even if no new plants are built, and Yucca Mountain will never reduce the number of storage sites as long as nuclear reactors continue to be built and operated.

In July 2000, the Department of Energy reached an agreement with PECO Energy Company, a division of Exelon Corp., the nation's largest nuclear utility, for managing spent nuclear fuel from PECO's Peach Bottom nuclear plant in Pennsylvania.

The PECO alternative is simple: If DOE is unable to take PECO's spent fuel by a date certain, PECO will build a specially-constructed dry cask spent fuel storage facility at the Peach Bottom plant for storage of their spent fuel until such time as a permanent federal repository, or alternative, is operational. PECO will be allowed to reduce its contributions to the Nuclear Waste Fund (a $9 billion fund collected from the nation's nuclear plant operators through annual assessments), and use those funds to pay for the new facility.

At PECO's request, DOE must become the title holder, owner, operator, and NRC licensee of the Peach Bottom independent spent fuel storage facility and its contents no later than five years after permanent shutdown of the Peach Bottom station, but no sooner than five years after the full 40-year license term of the

station.

As explained in my Statement of Reasons, the PECO deal is the safe, practical, economic alternative to a severely flawed Yucca Mountain project. It represents what utilities are planning to do, and will have to do anyway, in the real world. I urge the Committee to explore the PECO deal carefully, and to question DOE and the nuclear industry as to why it has recently been ignored, or even hidden from public view.

So the cat is out of the bag - opening Yucca Mountain will not reduce from 131 to one (1) the number of sites where high-level waste and spent nuclear fuel is stored in America. As long as nuclear reactors continue to operate, which is the main purpose of developing a waste "solution," there will continue to be waste stored above-ground at reactor sites across the nation. In fact, at current rates of spent fuel production, if Yucca Mountain were to open and be filled to capacity by around 2036, there would still be just about as much spent fuel stored at reactors sites as there is today. And that amount would continue to pile up for years to come, even if no new reactors are built, because nuclear plants generate about 2,000 tons of spent fuel each year, and will continue to do so regardless of what happens with Yucca Mountain.

To borrow a popular phrase, "Do the Math." Today, approximately 46,000 tons of spent fuel is stored at the nation's reactor sites. By the time shipments start in 2011, DOE's earliest predicted date, there will be at least 64,000 tons. Yucca Mountain is being designed and licensed to hold only 77,000 tons, and is probably physically incapable of holding more. The law precludes it from holding more.

DOE hopes to be able to ship 3,000 tons of waste per year to Yucca Mountain. But nuclear plants will continue operating on renewed licenses for decades beyond 2011, so spent fuel inventories will continue to grow at the rate of 2,000 tons per year. Thus, the net depletion rate will be only 1,000 tons per year.

If DOE meets its shipping targets, it will take approximately 25 years to fill Yucca Mountain with 77,000 tons of waste and spent fuel. But by then, operating reactors will have produced an extra 50,000 tons, leaving approximately 37,000 tons of spent fuel still sitting at reactor sites across America - a mere 9,000 tons less than we have today.

In short, on the day Yucca Mountain is filled to the brim, we would largely be right back where we started. Indeed, the 131 sites identified by DOE will not be reduced to one, but will in fact have risen by one. And in the interim, at least 50,000 shipments of highly radioactive waste will have been made through 43 states, almost every major city, and thousands of towns in between.

Transportation Issues

The main thing I want to bring to your attention are the issues and concerns associated with the proposed massive campaign to transport 77,000 tons of nuclear waste across the nation for up to 38 years. Some have accused Nevada of fear mongering simply for honestly and sincerely raising the many questions that these shipments to Yucca Mountain pose for our nation's citizens. But these are extremely legitimate questions, and they deserve legitimate answers.

In its Environmental Impact Statement for Yucca Mountain, DOE's own numbers point to as many as 108,000 high-level waste and spent nuclear fuel shipments to Yucca Mountain. Almost every state, and most major metropolitan areas, will be affected by these shipments. More than 123 million citizens reside within one-half-mile of the proposed transport routes. The modes and methodologies for shipment have not yet been determined, much less analyzed. For example, we recently learned from DOE that as many as 3,000 barge shipments may be involved, traversing numerous port cities and harbor areas. According to DOE's own analyses, a single accident scenario could produce thousands of latent cancer fatalities and lead to many

billions of dollars in cleanup costs.

Secretary Abraham testified last week that DOE now believes most spent fuel shipments would take place by rail, but that suggestion raises its own set of questions about practicality and physical possibility. For example, many reactor sites do not have rail access, and there are no known plans to create such access, so some form of truck or barge transport and transfer will still be necessary for many shipments. Additionally, in Nevada alone, DOE is proposing to construct more that 400 miles of new rail lines - that is more new rail capacity than we have built in the entire United States in the last century. My point, which I think is well illustrated by the Secretary's testimony announcing yet another change in approach, is that the transportation issue is a major concern - it is one that will affect literally millions of Americans, but it has not been well thought out. We are being asked to accept DOE platitudes and industry assurances in response to our questions and concerns, but that is not good enough, and it will not be good enough when the first problems arise, and we know they will.

Another very troubling aspect of this issue is that DOE has never done an analysis of the terrorism risks associated with mass transport to Yucca Mountain. In a recent brief filed in NRC license proceedings by nuclear utilities for the proposed Private Fuel Storage facility in Utah, the nuclear industry took the position that it is essentially no one's jurisdiction, other than the U.S. military, to evaluate terrorism risks in spent fuel transport. According to the utilities, this is not a proper subject for analysis by DOE, the NRC, the Department of Transportation, or the industry itself. In short, if you believe the industry, this is an area that only Congress can now evaluate, or direct others to evaluate. Put another way, if Congress does not order such an analysis to be done, none will be done. In the wake of September 11th, failure to perform such an analysis would appear unwise.

And there is something else our experts now tell us: DOE has never done an evaluation of the nuclear criticality risk of a spent fuel cask getting struck by a state-of-the-art armor-piercing weapon. In recent nuclear industry advertisements and press statements, it was suggested that if a warhead penetrated a cask, authorities would simply dispatch an emergency crew to "plug it up." This assumes the dose rate in the vicinity of the cask is not a lethal one. It assumes that the warhead does not essentially liquefy the contents of the cask, if it is not already liquid. It assumes that any inner explosion in the cask would not so alter the geometry of the contents that the contents would go critical, obliterating the cask. It assumes that the cask is not over a river or on a barge and will not subsequently fill with water, a neutron moderator. It assumes that the cask is not filled with U.S. or foreign research reactor spent fuel, which is usually comprised of highly-enriched, or weapons-grade, uranium.

Finally, there are questions regarding the casks that will be used for shipping high-level waste and spent nuclear fuel to any repository. First of all, very few casks exist today, so the ones that would be used for a 38-year shipping campaign to Yucca Mountain are still in various stages of development. That might be acceptable if we knew they were going to be subjected to rigorous physical testing prior to use, but that is not intended. Instead, computer- and some limited scale-model testing is the planned method of assessing cask integrity. Those ancient tapes we have all seen of discarded shipping casks being dropped from helicopters, run into cement walls and hit by trains - none of that is planned for the new generation of casks. NRC Commissioner Greta Dicus recently testified that NRC does now plan to physically test one cask, but that is the first time such an announcement has been made, and we therefore remain, respectfully, skeptical about what will actually be done.

So for now, we are being asked to believe recent industry claims that the new, not-yet-built casks can withstand "all but the most advanced armor-piercing weapons" and a "direct hit by a fully fueled Boeing 747." These wild claims are not based on actual testing, and we know from tests conducted at Sandia National

Laboratories in the 1980s and by the U.S. Army at Aberdeen Proving Grounds as recently as 1998 that even very robust casks are vulnerable to attacks from small missiles. Shouldn't the new generation of casks be subjected to full-scale physical testing under a range of conceivable scenarios, including an attack by terrorists willing to give their own lives?

The Role Of the Nuclear Regulatory Commission

The final issue I will raise is the notion being promoted here in Washington, and adopted by some mainstream media organizations, that Congress can responsibly move DOE's Yucca Mountain site selection forward because all remaining issues related to the site's suitability would be reexamined and resolved in licensing proceedings before the NRC. That is not the case.

In fact, under current rules for licensing Yucca Mountain, which Nevada is challenging in court, NRC will not be examining or determining the geologic suitability of the Yucca Mountain site at all. Under the Nuclear Waste Policy Act, this critically important task was supposed to have been performed by DOE. But DOE recently revised the rules, and in doing so virtually abdicated this function. NRC will essentially be determining only whether DOE's man-made waste packages can keep radiation emissions to within standards set by the Environmental Protection Agency.

In simple terms, NRC will be determining the suitability of the waste containers that DOE will put inside the mountain, but it will not be examining the suitability of the mountain itself at all. That's like making sure every deck chair on the Titanic can hold the heaviest passenger, without ever bothering to make sure the ship can float.

Under this approach, DOE is both the promoter and arbiter of the suitability of the Yucca Mountain site. There is no independent government oversight. That's how we used to regulate things nuclear until we learned the hard way that it was necessary, indeed vital to the protection of public health and safety, to separate the promotional and regulatory aspects of the government's involvement in nuclear energy. (For example, witness the $250 billion cleanup bill taxpayers now face for the nation's mismanaged nuclear weapons complex.) But that's exactly happening with Yucca Mountain, and the result is a site recommendation that was made prematurely and against the strong concerns of virtually the entire scientific community and the U.S. General Accounting Office.

Conclusion

Today, the President's recommendation to move forward with Yucca Mountain is heading down the path to finality, and only the Congress can stop it by choosing not to override my Congressionally-authorized site veto. If the matter of site suitability really were up to the NRC, Nevada and the scores of independent scientists alarmed by DOE's premature and falsely based site recommendation would be considerably reassured. But such is not the case.

If Congress overrides my veto and simply punts to the NRC, the suitability of the Yucca Mountain site will never be independently reviewed by any government authority, barring a court order. We will seek that court order, but we believe Congress should accept its responsibility, recognize that the Yucca Mountain project is fatally flawed on numerous fronts, and not act to override my veto.

BACK

United States Senate

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Testimony of Dr. Jared L. Cohen

on behalf of the Nuclear Waste Technical Review Board

May 23, 2002

Good morning, Mr. Chairman and members of the Committee. I am Jared Cohon, Chairman of the Nuclear Waste Technical Review Board. All members of the Board are appointed by the President and serve on a part-time basis. In my case, I also am president of Carnegie Mellon University in Pittsburgh, Pennsylvania.

I am pleased to be here today to present the Board's technical and scientific evaluation of the Department of Energy's work related to the recommendation of a site at Yucca Mountain in Nevada as the location of a permanent repository for spent nuclear fuel and high-level radioactive waste and to respond to questions posed by the Committee in its invitation letter. We hope that the Committee and other policy-makers will find the Board's testimony useful as you consider the various issues that will affect a decision on whether to proceed with repository development. With your permission, Mr. Chairman, I will summarize the Board's findings, and I request that my full statement and the Board's January 24, 2002, letter report to Congress and the Secretary of Energy be included in the hearing record.

As you know, Mr. Chairman, Congress created the Board in the 1987 amendments to the Nuclear Waste Policy Act. Congress charged the Board with performing an ongoing independent evaluation of the technical and scientific validity of activities undertaken by the Secretary of Energy related to disposing of spent nuclear fuel and high-level radioactive waste. The Board also reviews the DOE's activities related to transporting and packaging such waste. Since the Board was established, its primary focus has been the DOE's efforts to characterize a site at Yucca Mountain in Nevada to determine its suitability as the location of a potential repository. Early last year, Secretary of Energy Spencer Abraham indicated that he would make a decision at the end of 2001 on whether to recommend the Yucca Mountain site for repository development. As the Secretary's decision approached, the Board decided it was important to comment to the Secretary and Congress, within the context of the Board's ongoing evaluation of the technical and scientific validity of DOE activities, on the DOE's work related to a site recommendation. So, in November 2001, the Board met to review comprehensively the DOE's efforts in this area. In December 2001, the Board sent a letter to the Secretary indicating that the Board would provide its comments within a few weeks. The Board conveyed those comments in a letter, which included attachments with supporting details, that was sent to Congress and the Secretary on January 24, 2002.

I will now summarize the Board's review procedures and the results of the Board's evaluation. Questions posed by the Committee in its invitation letter are addressed in the context of the Board's evaluation.

The Board's evaluation of the DOE's work represents the collective judgment of its members and was based on the following:

· The results of the Board's ongoing review of the DOE's Yucca Mountain technical and scientific investigations since the Board's inception · An evaluation of the DOE's work on the natural and engineered components of the proposed repository system, using a list of technical questions identified by the Board

· A comprehensive Board review of draft and final documents supplied by the DOE through mid-November 2001

· Field observations by Board members at Yucca Mountain and related sites.

To focus its review, the Board considered the following 10 questions for components of the repository system:

1. Do the models used to generate input to the total system performance assessment (TSPA) and the representations of processes and linkages or relationships among processes within TSPA have a sound basis?

2. Have uncertainties and conservatisms in the analyses been identified, quantified, and described accurately and meaningfully?

3. Have sufficient data and observations been gathered using appropriate methodologies?

4. Have assumptions and expert judgments, including bounding estimates, been documented and justified?

5. Have model predictions been verified or tested?

6. Have available data that could challenge prevailing interpretations been collected and evaluated?

7. Have alternative conceptual models and model abstractions been evaluated, and have the bases for accepting preferred models been documented?

8. Are the bases for extrapolating data over long times or distances scientifically valid?

9. Can the repository and waste package designs be implemented so that the engineered and natural barriers perform as expected?

10. To the extent practical, have other lines of evidence, derived independently of performance assessments, been used to evaluate confidence in model estimates?

In evaluating the DOE's work related to individual natural and engineered components of the proposed repository system, the Board found varying degrees of strength and weakness. For example, the Board considers the DOE's estimates of the probabilities of volcanic events and earthquakes at Yucca Mountain strengths and the lack of data related to corrosion of materials proposed for the waste packages under conditions that would likely be present in the repository and the very short experience with these materials weaknesses.

This kind of variability is not surprising, given that the Yucca Mountain project is a complex, and, in many respects, a first-of-a-kind undertaking. An important conclusion in the Board's January letter is that when the DOE's technical and scientific work is taken as a whole, the Board's view is that the technical basis for the DOE's repository performance estimates is weak to moderate at this time. However, if all the recommendations in the Board's January 24, 2002, letter report are implemented and no surprises are found, the Board's view of the technical basis would likely improve. The predicted repository performance, however, might be either better or worse, depending on what is discovered.

The Board concurs with the consensus within the international scientific community that deep geologic disposal is technically feasible at a suitable site. However, the Board made no judgment in its January letter on the question of whether the Yucca Mountain site should be recommended or approved for repository development. Those judgments, which involve a number of public-policy considerations as well as an assessment of how much technical uncertainty is acceptable at various decision points, go beyond the Board's congressionally established mandate.

Let me explain in a little more detail, Mr. Chairman, the basis for the Board's conclusion on performance estimates. The DOE uses a complex, integrated performance assessment model to project repository system performance. Performance assessment is a useful tool because it assesses how well the repository system as a whole, not just the site or the engineered components, might perform. However, gaps in data and basic understanding cause important uncertainties in the concepts and assumptions on which the DOE's performance estimates are now based. Therefore, while no individual technical or scientific factor has been identified that would automatically eliminate Yucca Mountain from consideration at this point, the Board has limited confidence in current performance estimates generated by the DOE's performance assessment model. But first let me expand a bit on the comment I just made that at this point, no individual technical or scientific factor has been identified that would automatically eliminate Yucca Mountain from consideration. The Board considers this minimum threshold finding to be a necessary, but by itself not a sufficient, condition for a positive determination of site suitability.

How can confidence in the DOE's performance estimates be increased? As noted in the Board's January letter report, the Board believes that a fundamental understanding of the potential behavior of a proposed repository system is very important. Therefore, if policy-makers decide to approve the Yucca Mountain site, the Board strongly recommends that, in addition to demonstrating regulatory compliance, the DOE continue a vigorous, well-integrated scientific investigation to increase its fundamental understanding of the potential behavior of the repository system. Increased understanding could show that components of the repository system perform better than or not as well as the DOE's performance assessment model now projects. In either case, making performance projections more realistic and characterizing the full range of uncertainty could improve the DOE's performance estimates.

The DOE's estimates of repository performance currently rely heavily on engineered components of the repository system, making corrosion of the waste package very important.

As the Board has mentioned in many of its previous reports and letters, we believe that high temperatures in the DOE's base-case repository design increase uncertainties and decrease confidence in the performance of waste package materials. Confidence in projections of waste package and repository performance potentially could increase if the DOE adopts a low-temperature repository design. However, the Board continues to believe that the DOE should complete a full and objective comparison of high- and low-temperature repository designs before it selects a final repository design concept.

Over the last several years, the Board has made several other recommendations that could improve the DOE's projections of repository performance. For example, the Board recommended that the DOE identify, quantify, and communicate clearly the extent of the uncertainty associated with its performance estimates. The Board also recommended that the DOE use additional lines of evidence and argument to supplement the results of its performance assessment. Moreover, the DOE could strengthen its arguments about how multiple barriers in its proposed repository system provide "defense-in-depth" (or redundancy). Although the DOE has made progress in each of these areas, more work is needed.

Other actions that might be considered if policy-makers approve the Yucca Mountain site include

systematically integrating new data and analyses produced by ongoing scientific and engineering investigations; monitoring repository performance before, during, and after waste emplacement; developing a strategy for modifying or stopping repository development if potentially significant unforeseen circumstances are encountered; and continuing external review of the DOE's technical and scientific activities.

Mr. Chairman, your letter of invitation asked what the Board's views are on whether sufficient technical information is or will be available to the Nuclear Regulatory Commission to enable it to assess the safety and environmental impact of a repository at Yucca Mountain. This is the Board's answer to that question. The NRC issued the following statement in November 2001, "The NRC believes that sufficient at-depth site characterization analysis and waste form proposal information, although not available now, will be available at the time of a potential license application such that development of an acceptable license application is achievable." The NRC and the DOE have agreed on a list of "key technical issues" (KTI) that need to be addressed in the DOE's license application. The NRC, not the Board, will judge the adequacy of the DOE's efforts to resolve these issues for a license application. However, the Board believes that given the significant uncertainties associated with the DOE's current performance estimates, addressing all of the KTI's in the 2004 time frame that has been discussed will be an ambitious undertaking.

Mr. Chairman, let me close by observing that eliminating all uncertainty associated with estimates of repository performance would never be possible at any repository site. Policy-makers will decide how much scientific uncertainty is acceptable at the time various decisions are made on site recommendation or repository development. The Board hopes that the information provided in this testimony and in its letter report to Congress and the Secretary will be useful to policy-makers faced with making these important decisions.

Thank you for the opportunity to present the Board's views. I will be happy to respond to additional questions from the Committee.

BACK

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Testimony of Jim Hall

Former Chairman, National Transportation Safety Board

May 23, 2002

Members of the Committee:

My name is Jim Hall, and for more than seven years I served as Chairman of the National Transportation Safety Board (NTSB). In that capacity, I acted as the “eyes and ears” of the American people at transportation accidents across the country and around the world. Since leaving the National Transportation Safety Board in January of 2001, I have continued to work on transportation safety issues and serve as a strategic counselor in transportation safety and crisis management. In addition, I currently serve on the National Academy of Engineering’s Committee on Combating Terrorism. This project is aimed at helping the Federal Government, and more specifically the Executive Office of the President, effectively use the nation's and the world's scientific and technical community in a timely response to the threat of catastrophic terrorism. The specific audience for the study will be the Office of Homeland Security, federal and state legislators, and state and local government officials responsible for mitigating terrorist threats.

Prior to coming to Washington, I served as a member of Governor Ned McWherter’s cabinet and director of the Tennessee State Planning Office. In that role, I was deeply involved with spent nuclear fuel transportation and storage issues while Tennessee was being considered a potential host state for Department of Energy’s (DOE) proposed Monitored Retrievable Storage Facility. Additionally, I directed the State’s oversight of DOE operations at Oak Ridge during the cleanup and restructuring of the national nuclear weapons complex. I also directed Tennessee’s participation in the Southern States Energy Board Advisory Committee on Transportation of High- Level Radioactive Material and in the Southeast Compact Commission for Low-Level Radioactive Waste Management.

I am here today representing the Transportation Safety Coalition, a group of organizations concerned about the safety of transporting dangerous nuclear waste on America’s roads, railroads, and waterways. The coalition is composed of environmental, public health, and safety organizations, including the American Public Health Association, the Environmental Working Group, the National Environmental Trust, Physicians for Social Responsibility, U.S. Public Information Research Groups, and the Nevada Agency for Nuclear Projects. This coalition has come togethe r to inform policy makers and the public on the dangers of proceeding with a nuclear waste repository without a thorough risk assessment of transporting nuclear waste.

DOE Has No Transportation Plan

As the Chairman of the National Transportation Safety Board, I saw the results of a failure to adequately build a safety culture into transportation systems. I also saw how hard it can be for government bureaucracies to change directions to respond to new safety concerns. The National Transportation Safety Board’s Strategic Plan states that it is often difficult for Federal, State and local agencies to “recognize and acknowledge when

their safety regulations or programs are ineffective."

From my work with the State of Tennessee, I know firsthand about the failure to build a safety culture into the planning stage of an operation. The DOE's activities at the Oak Ridge National Laboratory site have contaminated soil, groundwater and rivers, even drinking water sources, as a result of leaks, spills, and past waste disposal practices. The resulting cleanup will cost taxpayers over $6.5 billion and could have been avoided if a plan for safe disposal had been in place when testing began.

What I find most shocking about the Yucca Mountain Project is that DOE has no plan to transport spent nuclear fuel to its proposed repository. Secretary Abraham testified last week that the DOE is "just beginning to formulate its preliminary thoughts about a transportation plan."

In fact, DOE's spending history suggests that transportation planning has never been a high priority. The Department has spent 7 billion dollars looking into Yucca Mountain's geology, but less than 200 million dollars on transportation of nuclear waste. That works out to less than 10 million dollars a year for the last twenty years. This is a fundamental flaw in the Department's approach. While some might have accepted this approach before 9/11, no one should now. Failing to plan for the safe and secure transport of nuclear waste is irresponsible.

We should not move ahead with this project without a plan for the most critical element of the project, the element that affects more people directly than any other element--that is the lesson of September 11th. The issue of safe transportation cannot be separated from the issue before Congress today, that of deciding whether or not to override Governor Guinn's veto and move ahead with a Yucca Mountain site license. The Nuclear Regulatory Commission, which will evaluate the DOE's work on Yucca Mountain, has no authority to require a transportation plan before deciding on a site license. Only Congress can demand that the DOE develop a credible, safety-based transportation plan. Today, we all live under the constant threat of terrorism. It is reckless and irresponsible to move ahead without a transportation plan. Congress must immediately demand a detailed transportation plan that protects our citizens before it considers a vote on this project.

Transportation Mode and Routes

Secretary Abraham testified last week that DOE has made no decisions on the mode or mechanism of transport. DOE's Final Environmental Impact Statement (FEIS) simply predicts the maximum number of shipments that would occur under two scenarios: (1) shipments mostly by truck, and (2) shipments mostly by rail, which would require barge shipments from some reactors to rail lines.

DOE's stated preference is to ship spent nuclear fuel mainly by rail. The rail industry concurs that safety and security are maximized by rail transport; however the Association of American Railroads testified to Congress that "the safest possible method of transporting spent nuclear fuel is through the use of dedicated trains." DOE has not committed to using dedicated trains.In fact the Department appears to be resistant to the ideabecauseit is cheaper to ship nuclear waste on a train that can also take on other types of cargo. Yet it appears there would be greater safety and security risks if the DOE does not use dedicated trains. A transportation plan should outline how the DOE will weigh safety against economic concerns. We don't know how the DOE is going to develop its transportation plan, and we don't know whether in fact it will rely on rail as its primary transportation mode.

Construction of a rail line to Yucca Mountain would be the largest new rail construction undertaking in America since World War I and cost 1.5 billion dollars or more. If there is no rail spur to Yucca Mountain, then high- level nuclear waste must be trucked. Without a new rail line to Yucca Mountain, large rail casks

would have to move long distances on public highways by heavy haul trucks through the country's fastest growing urban area. In this scenario the waste would have to be transferred three times, increasing the risk and the exposure to the general public.

The United States is undergoing a major demographic shift involving migration from rural areas to urban areas, meaning that both the population of urban areas and the size of urban areas will dramatically increase over the next ten to twenty years. Many of the interstate highways near urban areas already experience significant rush- hour congestion, which is expected to increase as the number of drivers increases. These interstates—such as I-75 through Atlanta, I-95 through Connecticut and New York, and I-24 through Nashville—are the routes that will most likely be used for truck shipments of nuclear waste. Nowhere in DOE's materials was I able to locate any use of projected traffic patterns, demographics, or highway expansion, which should be a critical element of a transportation plan. A route that might take a commuter—or a truck carrying nuclear waste—15 minutes today may take over an hour in future conditions, and transportation planning must include this kind of forward thinking.

It is worth noting here that even if shipments were to begin today, there are more than 200 million Americans living in the 700-plus counties that are traversed by DOE's potential roads and rail- lines. This population is only going to grow, and grow quickly, during the 24 years DOE needs to move nuclear waste across the country.

The DOE does not account for the fact that while nuclear waste shipments begin at scattered locations around the country, these shipments will begin to converge along certain routes as they near the proposed repository site. In these areas, nuclear waste shipments will become everyday occurrences, and the routes will become well known. This raises two concerns. First, risk is not constant across the country but may be higher along routes that converge near the repository, and a transportation plan should consider this. Second, in the past the DOE has usually been able to transport nuclear waste in relative secrecy. The proposed movement of 77,000 tons of nuclear waste is unprecedented, and in certain parts of the country, shipments will be frequent and predictable. We know that nuclear waste is an attractive target for terrorists—I have heard that al Qaeda has identified nuclear material as its target of choice—and it is unlikely that the DOE will be able to maintain a low profile for these shipments throughout the 24 years of shipments.

Shipment Casks

No government agency has demonstrated the safety of the casks that will be used to transport spent nuclear fuel under conditions that would be encountered in an accident or terrorist attack. Neither the Department of Transportation nor the Nuclear Regulatory Commission (NRC) has tested the truck or rail waste containers, which is why I have called for immediate full scale testing of the shipping casks. Before transportation vehicles are allowed to carry passengers, the vehicles undergo vigorous tests for crashworthiness, structural integrity and engineering reliability. The only tests that have been done on these casks to date were conducted on small-scale models or simulated with computer programs. These tests are no substitute for full-scale testing of the actual casks that will be used for transporting waste. This is especially true given the fact that these canisters, if breached in an accident or terrorist attack, could spread radioactive waste across many square miles and endangering the health of thousands of people.

Full-scale testing of truck and rail casks would provide cask designers, regulators, and policy makers with the information necessary to determine whether the casks could withstand such damage, and what corrective actions, if any, need to be taken. The experts I have consulted tell me that full- scale physical tests should include, at a minimum, the following elements: meaningful stakeholder participation in the development of testing protocols and the selection of test facilities and personnel; full-scale sequential testing (drop, fire,

puncture, and water immersion) on a single example of each new truck and rail cask type; and physical testing of casks against currently available armor-piercing weapons and other explosive devices.

The Human Factor

Rather than setting a goal of zero accidents and zero releases, the DOE estimates that there will be over 66 truck accidents and 10 rail accidents over the first 24 years of transportation to a repository. Based on information from the DOE and the department's past performance, other experts are estimating that there will be more than 150 truck or 360 rail accidents over 38 years. Whatever the number, the fact is that one accident resulting in radioactive release will have long-term devastating results. A transportation plan for nuclear waste shipments should have a zero-accident goal. The zero-accident goal would reflect a culture in which safety is paramount and drives all aspects of the transportation system. The goal encourages a culture of safety. The FAA and individual airline companies have set a goal of zero accidents and zero fatalities. The DuPont Corporation, with a 99.1 percent safety record, has set a zero tolerance policy for accidents and employee injuries. The company noted that if we all accepted 99.1 percent in other aspects of our lives, we would then accept:
· 4,500 incorrect surgical operations each year;
· 18 unsafe landings at O'Hare Airport in Chicago each day; and
· 150,000 pieces of mail lost each hour.

A transportation plan should include a careful look at all the human factors that contribute to risk in transporting nuclear waste. Over 80% and possibly up to 90% of all transportation accidents are caused by human error. In investigating the causes of accidents, the National Transportation Safety Board examines such human factors as operating practices and procedures; training; duty/rest cycles; fatigue; workload; control/display systems; crew coordination; situational awareness; and decision-making. These are all elements that should be in a transportation plan to ensure a culture of safety. September 11th and the anthrax mail incident have highlighted the importance of having a well-articulated communications system in place before it might become necessary to use such a system. But even before last fall, past incidents had already taught us that a strategy for crisis communication is essential. One of the most striking failures during the Three Mile Island incident was the series of miscommunications between plant operators, federal agencies, local officials, the press and the public. The widespread public panic that followed the first announcement of problems with the nuclear reactor has generally been blamed on poor communications, and the incident itself was in part caused by communication problems. It will be a huge, but critical, undertaking to develop a nationwide communications system as part of a nuclear waste transportation plan.

Full risk assessment

In the months following September 11th, nearly every federal agency has been engaged in evaluating their preparedness to deal with terrorist attacks and adopting measures to counter this new threat. Congress has approved billions of dollars for protecting federal facilities from terrorist attacks and is considering legislation to adapt the country's public health, emergency preparedness, and response systems to new threats (HR 3555). In 1998, federal agencies were directed to conduct vulnerability assessments of critical infrastructure (PDD 63). These ongoing efforts aim to protect citizens and infrastructure from terrorist acts, even those we have not yet confronted. In contrast, we already know that terrorists view nuclear material as the target of choice, and yet safeguarding the transportation of nuclear waste—a known hazard—has not received the same level of scrutiny.

The issues I have just raised must be addressed before the DOE can tell us where, how and for how long shipments will occur. To address these issues, the Department must make some difficult decisions and initiate

long-range planning. The DOE's decisions must be safety-driven, and safety-driven decisions are often not the most economical. The process by which the DOE makes these choices must be transparent and based on a system-wide risk analysis. What does that entail? In general terms, DOE must perform a comprehensive risk assessment that considers current and future conditions; identifies known hazards and anticipates unknown hazards; analyzes where, how, and how much the public may be at risk; and estimates how much each alternative—including security— will cost. It is essential that state and local officials, particularly transportation experts and emergency response providers, are involved in the risk assessment process. This risk assessment will provide the information needed to decide whether the unprecedented nationwide mobilization of spent nuclear fuel can be done safely and securely.

Conclusion

Secretary Abraham admitted last week that no decision on routes or transportation modes has been made, and that any suggestion to this effect is "completely fictitious." He further stated that those decisions can't be made until the "DOE has the opportunity to work with affected States, local governments, and other entities on how to proceed."

I couldn't agree more with the Secretary, but I disagree that this work can wait until after a site is designated. The Secretary argues that because the DOE has shipped nuclear materials before, there is a record of safety. But I can assure you as someone intimately familiar with transportation in this country that we have never shipped waste in the vast quantities or with the frequency that the DOE is proposing now. Before Yucca Mountain is approved Congress should demand that DOE conduct a full risk assessment of transporting nuclear waste.

My testimony is no different than what Secretary Abraham told the Committee last week with regard to the DOE's plan for transporting nuclear waste. There is no plan for shipping nuclear waste to Yucca Mountain. The potential consequences of an accident or terrorist attack on a nuclear waste shipment would be devastating, and the American people need to understand that their highways, their communities, and their neighborhoods are the sites for potential releases of this high level waste. History has shown us time and time again that if the essential elements of a safety plan are not put into place before an activity begins, the momentum of the activity overtakes safety considerations. We all have an obligation to ensure that everything that can be done is being done to protect the American people. I believe every member of Congress will fulfill their obligation by requiring DOE to develop a transportation plan with a full risk assessment before any repository site is approved.

BACK

Statement of Reasons Supporting the Governor of Nevada's Notice of Disapproval of the Proposed Yucca Mountain Project

Kenny C. Guinn

April 8, 2002

Honorable members of Congress, it is my privilege and duty, under Section 116(b)(2) of the Nuclear Waste Policy Act, to articulate my reasons for issuing a Notice of Disapproval of the designation of Yucca Mountain in Nevada as the site for the nation's high- level nuclear waste repository. I trust you will carefully consider Nevada's views. As a matter of science and the law, and in the interests of state comity and sound national policy, Yucca Mountain should not be developed as a high- level nuclear waste repository.

Introduction

Nevada strongly opposes the designation of Yucca Mountain for nuclear waste disposal because the project is scientifically flawed, fails to conform to numerous laws, and the policy behind it is ever changing and nonsensical. The Department of Energy has so compromised this project through years of mismanagement that Congress should have no confidence in any representation made by DOE about either its purpose or its safety. Nevada is not anti-nuclear and does not oppose nuclear power. Our state is pro-science and pro-common sense.

Because of the state's longstanding opposition to the Yucca Mountain project, some have accused Nevada of being a not- in-my-backyard, or NIMBY, state. Nothing could be further from the truth. Nevada has already borne more than its fair share of this nation's radioactive waste burdens. During the Cold War, Nevada served as host to hundreds of nuclear weapons tests, most with bombs several times more powerful than the Hiroshima blast. The government misrepresented the risks and impacts of those tests to our citizenry, and many Nevadans were injured as a result. Nearly 300 million curies of toxic radioactive contaminants remain in the ground in our state to this day. We have not forgotten this legacy.

Nevada is also being forced by the Energy Department to play host to the world's largest low-level and mixed radioactive waste disposal facility, at the Nevada Test Site. DOE plans to use this site for the disposal of hundreds of millions of cubic feet of radioactive and hazardous garbage and contaminated soil from the nation's nuclear weapons complex. Tens of thousands of shipments of this waste through our state are anticipated.

Once upon a time not long ago, the concept of "environmental equity" would have made it unthinkable, given the sacrifices already imposed on Nevada, that the state would be

forced to play host to yet an additional nuclear waste dump - indeed, the dump to end all dumps. DOE plans to use Yucca Mountain for the disposal of 77,000 tons of high-level radioactive waste and spent fuel from throughout the United States and 42 other countries. And we know if we permit it to happen, it won't end there. But Nevada will not permit it to happen. Not simply because it is the wrong thing to do, at the wrong time, from the standpoint of environmental equity. Even when carrying the load of others, Nevadans will never tire of serving their country for a worthy cause.

We will not permit Yucca Mountain to happen - and it will not happen - because the project is manifestly not a worthy cause. Yucca Mountain is but the latest in a long series of DOE boondoggles - one based on bad science, bad law, and bad public policy. In addition, better, cheaper, and safer alternatives exist. Finally, national security will not be helped, but hindered, by this ill-advised project. Some say Nevada should acquiesce to the project because the Yucca Mountain repository is now inevitable. Obviously, they fail to understand Nevadans, or the power of the American legal system. I assure you, the only thing inevitable about Yucca Mountain is that it will plot the course of so many other doomed DOE mega-projects.

The Science

Although DOE bureaucrats claim the Yucca Mountain site is suitable for nuclear waste disposal based on "sound science," it is hard to find a scientist who agrees. Even the project's apologists know that hundreds of technical issues remain unresolved. Initially, the scientific community was optimistic about the prospects of Yucca Mountain. When Congress selected the site in 1987 for intensive study, preliminary data showed it would likely have good geology. In the past four years, however, DOE's own studies proved the mountain was in fact so porous to water, and otherwise so geologically unfit, that the very concept of geologic isolation of the waste had to be abandoned. But geologic isolation was the very purpose of the federal repository program.

DOE no longer refers to the Yucca Mountain project as a deep "geologic" repository. Rejecting the global scientific consensus that nuclear waste should be disposed of by means of geologic isolation, DOE now calls Yucca Mountain merely a deep "underground" repository. This is no surprise. There is nothing "geologic" about it. As the former director of the Yucca Mountain project, Dr. John Bartlett, recently testified, the project has become nothing more than a series of fancy engineered waste packages that just happens to be located 1000 feet underground. The Nuclear Energy Institute recently bragged that the repository can be licensed "without the mountain." Which begs several questions: If the mountain itself is irrelevant, and waste packages can now be made to last for 10,000 years, why make tens of thousands of shipments of lethal radioactive waste through the nation's cities to the seismically adverse, volcanic zone of Yucca Mountain? It can go practically anywhere else - or stay where it is. If the only reason the waste must be buried is to protect it from terrorists, why spend $60 billion putting it 1000 feet underground, when a mere 20 feet would do the job? And this could surely be done at the reactor sites. NRC has recently re-affirmed the safety of on-site storage.

In the absence of geologic isolation, we don't believe for a minute that DOE can demonstrate the long-term safety of the Yucca Mountain repository. We don't believe an agency that, as the General Accounting Office has noted, has rarely succeeded at building anything can now build a first-of-a-kind waste package that will soak in Yucca Mountain groundwater for 10,000 years without a leak.

DOE's computer models of Yucca Mountain repository performance and radiation emissions currently have an uncertainty factor of up to 10,000. This incredible number bears some pondering. Imagine if a salesman with nothing but fancy computer models told you the brakes on his new model car would be safe for 10,000 miles, plus or minus an uncertainty factor of 10,000. Think about it. What this means is, your brakes could be safe for as many as 100 million miles, or as few as one mile. We simply can't know.

Maybe we Nevadans are a people of uncommon sense. Because that's a car we simply wouldn't buy. That's a car we wouldn't let on our roads. DOE has yet to finish the very design of the Yucca Mountain repository. We don't even know whether it will be a high temperature repository (above the boiling point of water) or a lo w temperature repository (below the boiling point of water), a feature that could change the amount of real estate required for the project by up to a factor of 10. Imagine if you submitted a plan for your new house to local authorities for a building permit. You tell them: It may be a 4,000 square-foot gas-heated house, or a 40,000 square-foot all-electric house; the design is still unfinished. I don't have to tell you what our local authorities would do with that plan.

The scientific uncertainties of the Yucca Mountain project are so numerous as to defy enumeration. Attempting to count them all, the Nuclear Regulatory Commission recently identified 293 unresolved technical issues in 9 critical areas. Though DOE dismisses these as trivial, perfunctory, or problems that will be solved "as we go" over the next 300 years, their mere specification belies this claim.

The unresolved issues include critical matters such as volcanism: DOE's gamblers say the odds of a volcano at Yucca Mountain are only 1 in 70 million per year. Yet, there have actually been three active volcanic eruptions within 50 kilometers of the Yucca Mountain site in the past 80,000 years. Indeed, Nevada's geologic studies indicate Yucca Mountain appears to be at the center of one of the most potentially active volcanic areas in the west.

Unresolved are issues such as the seismic integrity of the site: Yucca Mountain sits dead-center in one of the largest earthquake fault zones east of California. In 1992, a magnitude 5.6 earthquake caused tens of thousands of dollars of damage to DOE's own facilities right at Yucca Mountain. More than 600 earthquakes greater than magnitude 2.5 have been recorded at Yucca Mountain just in the past two decades.

Among other things, there remains a real question whether the above-ground storage facility required to facilitate storage and burial of spent fuel at the site can ever meet Nuclear Regulatory Commission temporary storage standards, given the site's adverse seismicity. In other words, it may not be possible to license an above-ground concrete storage pad at this earthquake-prone location. What does this say about the safety of

the complex underground facility? And why is it not necessary for DOE to complete seismic studies before plunging ahead with a site determination?

The plethora of unresolved issues includes critical problems such as rapid groundwater flow through the repository: Flows measured by DOE have been more than 100 times greater than was expected when Congress designated Yucca Mountain in 1987 as the only site to be characterized. Surface water that was supposed to have taken thousands of years to pass through the planned repository area to the underlying water table was found to have actually done so in less than 50 years. One former NRC Commissioner visiting the underground test area at Yucca Mountain described its humid environment as a "tropical rain forest."

Secretary Abraham recently wrote, in a Washington Post Op-Ed piece March 26, that "Yucca Mountain has an average precipitation of under 8 inches a year, less than half an inch of which actually makes it below the surface." If that is true, Mr. Secretary, why has DOE posted a sign deep within the mountain informing visitors not to worry about liquid dripping from the ceiling of underground caverns, that this liquid is only water, and that it is normal for the subterranean environment of Yucca Mountain? Why is DOE proposing to build a $5 billion titanium "drip shield" around buried spent fuel to channel away effusive dripping water?

The tangled web of man-made contrivances necessary to compensate for the stunning geological surprises at Yucca Mountain has turned the repository system into a kind of Rube Goldberg contraption. To prevent the unexpected water from corroding spent fuel containers, a titanium drip shield is required for each package to channel water away from the containers. But channeled water is apparently subject to boiling from the decay heat of buried spent fuel. Therefore, say independent experts, the repository must be redesigned to space the fuel packages further apart, vastly increasing the real estate, and of course the amount of titanium, required. But there may not be enough real estate within the Yucca Mountain site boundary to do that. And the titanium itself is subject to corrosion. Therefore, all waste packages must be fabricated from a "miracle metal," Alloy-22, to prevent them from corroding if the drip shield fails.

And what about Alloy 22? You guessed it. As recently as last month, the Chairman of the Nuclear Waste Technical Review Board wrote DOE that so little is known "it is not currently possible" to assess the likelihood of corrosion of Alloy 22 for the thousands of years that will be required to assure the safety of the facility. Indeed, Nevada's independent laboratory tests of Alloy 22 showed corrosion in less than half a year. And the titanium apparently fares no better. Just two weeks ago, DOE's own Waste Package Materials Performance Peer Review Panel issued its report with the astonishing revelation that, unless the proposed titanium drip shields somehow perform better in the ground than they have in laboratory tests, they cannot be used at Yucca Mountain. What's next? Maybe the drip shield will need a drip shield. Secretary Abraham calls this "sound science." We beg to differ.

The Law

Nevada currently has four legal actions pending against the Yucca Mountain project.

These include a challenge to the siting guidelines re-released at the eleventh hour by DOE, and a challenge to the Environmental Protection Agency's gerrymandered health and safety standards for Yucca Mountain licensing. They include a challenge to DOE's misuse of Nevada's precious water resources, and a challenge to the legal soundness of both the Secretary's and the President's Yucca Mountain site recommendations.

At least two additional actions, one challenging DOE's Environmental Impact Statement, and one challenging NRC's Yucca Mountain licensing rule, will be filed imminently by Nevada.

These are each serious lawsuits, raising fundamental, dispositive legal issues - issues that ought to concern every member of Congress. Issues such as whether DOE cavalierly ignored the dictates of your institution and blatantly violated the Nuclear Waste Policy Act or the National Environmental Policy Act. Issues such as whether the repository is fundamentally unsafe even if it is theoretically "licensable." Issues such as whether radioactive emissions from the site can be declared safe by EPA merely by first diluting them in Nevada's drinking water.

We are not suing simply for the sake of suing. We are suing to enforce the law, because, unfortunately, government bureaucrats pushing Yucca Mountain have chosen to ignore it. It is not necessary for us to win them all, though we believe all are legally sound. One and only one will suffice.

It is astounding to Nevada that DOE refused to postpone its site recommendation pending the outcome of any of these lawsuits. After all, DOE itself says it will not be ready to submit a license application to NRC until at least December 2004. What, then, is the rush? It is likely that all of Nevada's cases will have been decided long before that time.

Let me describe to you just one of our lawsuits - the one against DOE. It's really quite remarkable: After 17 years of using one set of site suitability rules, DOE made the surprising determination that Yucca Mountain, unlike the WIPP nuclear waste repository in New Mexico, couldn't pass the "good geology" test. Instead of reporting this bad news to Congress, as the law requires, DOE changed the rules late last fall. A mere 17 days or so later, DOE proclaimed the site "suitable" using these new rules, ignoring the bedrock geologic isolation requirements of Congress. "Good geology" - the cornerstone of every high- level nuclear waste repository program in the world - was simply ignored by DOE.

To Nevadans, we are like passengers sitting on the runway in a brand new experimental aircraft for 17 hours while mechanics crawl all over the plane inspecting it. After this enormously long wait, the mechanics finally determine the plane is unfit to fly. At the same time, bureaucrats come on the loudspeakers: "Not to worry, folks. We've just changed the flight fitness rules, and the plane will be taking off in 17 seconds." Needless to say, that's a plane none of us would dare dream of flying. But that is exactly what DOE has done with Yucca Mountain.

The New York Times recently published an editorial suggesting Congress should simply approve the Yucca Mountain site recommendation and refer all remaining issues of site

suitability to the NRC, which was purported to have the expertise to make appropriate decisions in this regard. Remarkably, notwithstanding his own agency's clear statutory duties, Secretary Abraham likewise adopted this view in his recent editorial.

This approach, however, poses both a scientific and a legal paradox. DOE and NRC have each taken the position, in their respective Yucca Mountain rules, that site suitability is a matter to be assessed by DOE and its geologists, not by NRC and its nuclear engineers. Under NRC's current licensing rule for Yucca Mountain (which Nevada will soon fight in court), site suitability is presumed determined the moment the Yucca Mountain application comes in the door. NRC merely determines repository licensability, not Yucca Mountain site suitability. NRC will not evaluate the suitability of Yucca Mountain's geology. That was supposed to have been DOE's job.

Adopting the approach suggested by *The New York Times* would mean DOE's bogus site suitability determination could never be reviewed on the technical merits. On an issue of this magnitude, Nevada and the country as a whole deserve their day in court. And we think Congress should wait until that day has come and gone.

National Security and Public Policy

In the wake of the terrorist attacks of 9/11, DOE has tried to paint the Yucca Mountain project as a badly needed national security measure. A well- financed promotional campaign by the nuclear industry appears to have helped shape the public policy debate in this regard. The Secretary himself, in his Washington Post piece last month, strongly urged that "one safe site" for the nation's nuclear waste is best for national security, rather than having the waste scattered at numerous reactor sites across America.

This national security myth is one that can and must be debunked. The Yucca Mountain site will contribute nothing to national security. Even if you believe DOE's optimistic schedule, Yucca Mountain will not be ready even to begin receiving spent fuel from reactor sites for a decade. DOE plans to ship 77,000 tons of high- level waste and spent fuel - the project's design capacity - in up to 98,000 shipments extending through 2046. Once there, the spent fuel will remain stored above ground at Yucca Mountain for up to 100 years while it cools. In the meantime, reactors (many operating on renewed licenses) will continue to generate at least 2000 additional tons of waste each year.

By 2046, even if (in the unlikely event) Yucca Mountain proceeds on schedule, there will be at least 77,000 tons of additional waste still stored at reactor sites, awaiting shipment to a supposed second repository. As the waste is removed, it will merely make room for an equivalent amount of newly generated waste that will take its place at the various sites. I'm no nuclear engineer, but this sounds like the status quo to me. I fail to understand how this aids national security.

DOE's Acting Director of the Yucca Mountain project affirmed last month before a House appropriations committee that as long as there are nuclear reactors operating, there will continue to be spent fuel stored above ground at sites all across America. In fact, he confirmed, given the slow pace at which spent fuel will be transported to Yucca Mountain, together with the fact that newly generated waste will continue to pile up

almost as fast as the old waste is removed, the current backlog of 46,000 tons at plant sites now will never be less than 42,000 tons by the time Yucca Mountain is filled to its design capacity. In short, Yucca Mountain will change nothing.

And that may not be the end, but apparently only the beginning. In its annual strategic plan, "Vision 2020," the Nuclear Energy Institute claims utilities will build as many as 50 new nuclear plants by 2020 if their growing nuclear waste stockpiles are bounded by the availability of Yucca Mountain. More waste is coming to your jurisdictions, not less.

The bottom line is this: Even if Yucca Mountain proceeds, spent fuel will continue to be stored above ground at reactor sites across America for many decades, perhaps centuries, to come. Secretary Abraham's "one safe site" is a figment of DOE's imagination. The Yucca Mountain site is neither "safe" nor will it ever be "one." The solution to the security issue is to shore up existing storage facilities and increase security at the reactor sites - not to magnify the existing storage facility targets with shipments of tens of thousands of mobile, new targets traversing the country on their way to a geologically flawed Yucca Mountain repository. Not to expose tens of millions of additional citizens to the risks posed by spent fuel packages.

Utilities across the nation are now building interim dry storage facilities, where spent fuel will be stored in casks capable of safely containing the fuel for up to hundreds of years. Several such interim storage facilities are already operating at various utility sites. Since, in any event, these casks will be stored on site for many decades, some experts say they should be covered in a concrete containment to shield them from terrorist attack. NRC is studying the use of anti-aircraft guns at nuclear sites. Reactor sites already have armed guards and comprehensive security plans. Given these measures, the casks will continue to be far more secure at reactor sites than they will ever be on the streets of St. Louis, Chicago, or Peoria - or on barges cruising the Hudson River.

What really does implicate national security is the widespread shipment of spent fuel in casks that, we now know, are not impervious to ubiquitous armor-piercing weapons. It was surprising for us to learn recently from NRC that, since 9/11, the only analysis done by industry or the government of the impacts of terrorism on spent fuel shipments involved merely a computer simulation of a Boeing 767 engine (unaccompanied by aircraft and fuel) striking a railcar shipping cask at 350 miles per hour. Not to worry, said the modelers: the virtual train car moved only a virtual tenth of an inch from the virtual impact, and the virtual lethal waste was contained. To anyone who watched in horror as the twin towers of the World Trade Center collapsed, this timid virtual test result seems more than a bit incredible. On the other hand, the possibility of a terrorist shooting at a cask from the back of a pickup truck with a small optically-guided armor-piercing missile has been considered by NRC and the industry as "too remote." We once heard the same about suicide bombers.

Thanks to a secret videotape of an industry-sponsored test done by the Army at the Aberdeen Proving Grounds in 1998, obtained last month by Nevada representatives, we now know such a weapon can blow a hole through even the heartiest of spent fuel

casks. According to credible sources, there are over 500,000 TOW missiles alone in circulation in at least 36 countries, including over 1700 in Iran. These missiles can penetrate up to 30 inches of armor. Smaller, hand-held weapons in widespread use, like the Stinger, can pierce up to 15 inches of steel.

If Yucca Mountain proceeds, just one of these could potentially give a terrorist access to tens of thousands of radioactive "dirty bombs," with free delivery to hundreds of U.S. targets. Clearly, this is an issue warranting careful investigation by Congress, not a cover-up of the facts by DOE. Many in Congress already share my view; hearings on the security of waste transport to Yucca Mountain are scheduled for later this spring. In responding to our legitimate concerns, some have accused Nevada of fearmongering, claiming the Aberdeen test was flawed, that a small missile would "only" blow a six- inch hole in some casks, that few if any people would die in such an event, and that further tests are unnecessary. Since no one has studied the issue in light of current events, however, we don't really know. If DOE will not undertake these stud ies, surely Congress must. If Nevada's mere mention of the potential event is causing fear, imagine the panic if, God forbid, it actually happens.

The "PECO Alternative"

Though the nuclear industry seems to prefer you didn't know it, there is a viable alternative to Yucca Mountain - one that has already been quietly embraced by DOE and at least one utility, PECO Energy, a division of the nation's largest nuclear utility, Exelon Corporation.

In June 2000, PECO signed a deal with DOE that would ultimately have DOE take title to PECO's spent fuel on-site at the Peach Bottom nuclear plant in Pennsylvania. PECO will construct a dry storage facility, ownership of which will also eventually be assumed by DOE. At a date certain, DOE will own, operate, and manage the facility, with the waste stored there in robust, dry casks for the indefinite future. Funds for the deal are provided from the $8 billion Nuclear Waste Fund. At the time, DOE touted the deal as an arrangement all nuclear utilities should follow. And for good reason. If adopted by the industry, the PECO alternative would solve a host of pressing problems.

First, it would end all utility spent fuel lawsuits against DOE - now estimated to pose up to a $58 billion contingent liability. Second, it would allow utilities to remove spent fuel liabilities from their books and decommission their retired nuclear plants on schedule. Third, it would remove the fuel from utility rate bases and the jurisdiction of state utility commissions, ending their numerous lawsuits against DOE as well. Fourth, it would buy the government time to find a viable new repository or develop new technologies to vastly reduce the dangers of nuclear waste. (Many of these technologies, under development at our national laboratories, already look promising.) Fifth, as Senator Domenici has long indicated, it would preserve the substantial energy content of spent fuel for later use if necessary to supplement the nation's energy needs. Finally, implementing the PECO alternative would cost ratepayers and taxpayers merely pennies on the dollar to the estimated $60 billion (and growing) price tag of Yucca Mountain.

Far from embracing the deal, however, a group of competing utilities sued last year to

block it, claiming, ironically, that it gives PECO an unfair economic advantage over utilities who choose to sue the government and place their bets on Yucca Mountain. A ruling is expected from the Eleventh Circuit Court of Appeals soon. Rather than await this key decision, DOE pressed forward with its Yucca Mountain site recommendation as if its own PECO deal were nonexistent. The PECO alternative is not even mentioned in the 67 pounds of Yucca Mountain documents DOE recently sent to the President. It is not even mentioned in the so-called "no action" alternative to Yucca Mountain in DOE's voluminous Final Environmental Impact Statement. Yet, when the deal was signed less than two years ago, DOE endorsed it as "a precedent for additional settlement negotiations with other utilities."

I urge Congress to explore DOE's arrangement with PECO in detail. I applaud the deal made by the nation's leading nuclear utility in the state of our new Homeland Security Director, Tom Ridge, while he was a fellow Governor in Pennsylvania. The PECO arrangement is a convincing and practical alternative to a diseased and utopian Yucca Mountain project. It is a real contributor to national security, not a mythical one.

Conclusion

The State of Nevada will redouble its efforts to bring science and the law back to the nation's high- level waste program, and to restore sanity to America's nuclear energy security policy. But we are not alone.

A growing chorus of scientists and independent technical reviewers has voiced grave reservations about the project. These include the NRC's Advisory Committee on Nuclear Waste, the General Accounting Office, the Congressionally-created Nuclear Waste Technical Review Board, the National Academy of Sciences, Physics Today, the International Atomic Energy Agency, and the OECD's Nuclear Energy Agency, among others. A recent national poll concludes that those Americans opposed to Yucca Mountain now equal in number those in favor.

I urge each and every one of you to look carefully at the facts. Yes, Yucca Mountain is the most studied piece of real estate in the world. What the studies starkly concluded, however, has been overshadowed by the mere fact they occurred. A hundred more years of study will not change the fatally poor geology of Yucca Mountain, or remove the site from an earthquake fault zone. Nor will decades of moving waste across the countryside to Yucca Mountain even dent the amount of spent nuclear fuel stored above ground at nuclear sites throughout America.

We are well beyond the days when Yucca Mountain was simply Nevada's problem. If the project proceeds, high- level nuclear waste shipments will impact as many as 44 states, 703 counties, and 109 cities with populations of 100,000 or greater, including several major metropolitan areas. Nearly 50 million American citizens reside within three miles of a proposed shipping route. There will be more spent fuel shipments in the first year of Yucca Mountain operations than occurred in the entire history of such shipments in this country. We are in this together.

In short order, Congress will have the prerogative to consider my Notice of Disapproval

and, under procedures in the Nuclear Waste Policy Act, override it by simple majority vote in both houses, with a signature by the President. I respectfully urge Congress not to take such action. With the proliferation of safe, economical dry storage facilities at reactor sites, we face no spent fuel emergency. Nuclear power plants face no risk of shutdown. We have the time to do this right. And Yucca Mountain is not right. Nevada deserves better, and so does this nation.

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