A REVIEW OF THE PRESIDENT'S RECOMMENDATION TO DEVELOP A NUCLEAR WASTE REPOSITORY AT YUCCA MOUNTAIN, NEVADA

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND AIR QUALITY

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

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CONTENTS

A REVIEW OF THE PRESIDENT'S RECOMMENDATION TO DEVELOP A NUCLEAR WASTE REPOSITORY AT YUCCA MOUNTAIN, NEVADA

THURSDAY, APRIL 18, 2002

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ENERGY AND COMMERCE,
SUBCOMMITTEE ON ENERGY AND AIR QUALITY,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m., in room 2123, Rayburn House Office Building, Hon. Joe Barton (chairman) presiding.

Members present: Representatives Barton, Burr, Whitfield, Ganske, Norwood, Shimkus, Wilson, Shadegg, Pickering, Bryant, Buyer, Radanovich, Bono, Walden, Tauzin (ex officio), Boucher, Hall, Sawyer, Wynn, Doyle, Waxman, Markey, Rush, McCarthy, Strickland, Barrett, Luther, and Dingell (ex officio).

Staff present: Dwight Cates, majority professional staff; Sue Sheridan, minority counsel; and Rick Kessler, minority professional staff.

Mr. BARTON. The subcommittee will come to order. As soon as our last members of the audience find their seat, we're going to begin the hearing.

Would the gentleman of Louisiana, the full committee chairman, wish to go first with his opening statement?

Chairman TAUZIN. Thank you, Mr. Chairman. Let me thank you for holding this most important hearing. In my opinion, we're going to consider today one of the most important public health and safety issues the committee will consider this year.

Mr. BARTON. Do you have your microphone on?

Chairman TAUZIN. Yes. The development of a centralized and permanent geologic disposal site for the country's nuclear waste.

Today, the high level nuclear waste is spread out at 77 sites in more than 30 States and every region of the country and most of these waste sites are located near nuclear power plants where spent nuclear fuel is carefully stored. Several other nuclear waste sites were created due to weapons production activities of the DOE facilities like the Hanford site where liquid radioactive wastes are stored in tanks. Every one of these waste sites shares one common aspect, they were designed for temporary storage of these dangerous wastes, not for long-term storage.

There are many negative risks posed by the failure to develop a single centralized disposal site for nuclear waste and currently

more than 161 million Americans live within 75 miles of a nuclear waste storage site. These waste sites are located near 20 major waterways which supply household water for more than 30 million Americans, and moreover, although these sites are well protected and secure, they could pose an attractive target, obviously, for terrorist attack.

So for the sake of long-term public health and safety and our national interest and security, it is absolutely necessary and critical that we move to develop Yucca Mountain. The Yucca Mountain site is located 90 miles away from Las Vegas. It is an isolated site on remote Federal land at the Nevada test site, 14 miles away from the closest residents and it is safe and it is secure. The waste there will be stored 1,000 feet underground and 500 feet above the water table. The waste will be placed in steel containers and the containers will be placed under titanium shields. Furthermore, not only is the air space around Yucca already restricted, but an existing security force at the Nevada test site will be available and will be charged with protecting the area. This is a comprehensive defense-in-depth approach.

In its January letter to Congress the Nuclear Waste Technical Review Board underscored this fact, stating "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 the various decisions are made."

On February 15, 2002, the President recommended on the advice of DOE's Secretary Spencer Abraham that Congress approve the Yucca Mountain site even if the State of Nevada objects as we know it has. Based on my review, and the understanding of DOE's extensive scientific work at the Yucca Mountain site, I am prepared to support this important policy decision as I hope this subcommittee and the full Committee on Energy and Commerce are prepared to do and to recommend the site for approval by the full House.

Thank you, Mr. Chairman.

[The prepared statement of Hon. W.J. "Billy" Tauzin follows:]

PREPARED STATEMENT OF HON. W.J. "BILLY" TAUZIN, CHAIRMAN, COMMITTEE ON ENERGY AND COMMERCE

Mr. Chairman, thank you for holding this important hearing. In my opinion, we will consider this morning one of the most important public health and safety issues the Subcommittee will consider this year—the development of a centralized and permanent geologic disposal site for the country's nuclear wastes.

Today, high-level nuclear wastes are spread out at 77 sites in more than 30 states in every region of the country. Most of these waste sites are located near nuclear power plants, where spent nuclear fuel is carefully stored. Several other nuclear waste sites were created due to weapons production activities at DOE facilities like the Hanford site, where liquid radioactive wastes are stored in tanks.

Every one of these waste sites shares one common aspect: They were all designed for *temporary* storage of these dangerous wastes—*not* long-term disposal.

There are many negative risks posed by the failure to develop a single centralized disposal site for nuclear wastes. Currently, more than 161 million Americans live within 75 miles of a nuclear waste storage site. These waste sites are located near 20 major waterways, which supply household water for more than 30 million Americans. Moreover, although these sites are well protected and secure, they could pose an attractive target for terrorist attack.

So for the sake of long-term public health and safety, and our national security interests, it is absolutely critical that we move to develop Yucca Mountain.

The Yucca Mountain site is located 90 miles away from Las Vegas. It is isolated on remote federal land at the Nevada Test Site, 14 miles away from the closest residence—and is safe and secure.

The wastes will be stored 1,000 feet underground, and 500 feet above the water table. The wastes will be held in steel containers, and the containers will be placed under a titanium shield. Furthermore, not only is the airspace around Yucca already restricted, but an existing security force at the Nevada Test Site will protect the area. This is a comprehensive defense-in-depth approach.

In its January letter to Congress, the Nuclear Waste Technical Review Board underscored this fact, stating: "eliminating all uncertainty associated with estimates of repository performance would never be possible at any repository site. Policymakers will decide how much scientific uncertainty is acceptable at the times various decisions are made . . .".

On February 15, 2002, the President recommended—on the advice of DOE Secretary Spencer Abraham—that Congress approve the Yucca Mountain site, even if the State of Nevada disapproves.

Based on my review and understanding of DOE's extensive scientific work at the Yucca Mountain site, I am prepared to support this important policy decision. Thank you Mr. Chairman.

Mr. BARTON. Thank you, Mr. Tauzin. We would now hear from Mr. Sawyer with an opening statement. Oh, you want me to make mine first? Well, then we'll recognize the chairman for an opening statement.

Today the subcommittee will review a Presidential decision that has long been coming, In the 1970's and the 1980's, the Department of Energy studied more than a dozen potential nuclear waste repository sites. In 1987, Congress designated Yucca Mountain as the single site to be studied by the Department of Energy for long-term geological disposal of the Nation's high level radioactive waste. The DOE study of that site has been concluded. The President has agreed with the Secretary of Energy's decision to recommend the site to Congress.

The Nuclear Waste Policy Act has a specific process for making this decision and for its review by Congress and the State of Nevada.

I want to welcome all of the witnesses here today and thank them for coming. I am particularly pleased that the Secretary of Energy, the Honorable Spencer Abraham of Michigan will be representing the Department of Energy. I know that there have been many demands on his time and there continue to be demands including many of the international energy situations of which we're all aware on a daily basis.

I appreciate him being here. Of course, he's not here yet, but when he gets here I will appreciate him being here.

I also want to welcome our newest member of the subcommittee, the Honorable Steve Buyer of Indiana. Not only is he here, he was here on time and that is a very good record to begin with.

We also have a new vice chairman of the subcommittee, the Honorable John Shimkus of Illinois and he is here also. And so I want to welcome him with his new duties.

I want to thank my good friend, Rick Boucher of Virginia who is due very shortly. He is a co-sponsor of this resolution, H.J. 87. I want to thank the full committee chairman, Mr. Tauzin, for his sponsorship; Mr. Dingell, the ranking member on the minority side for his help, establishing a good bipartisan process for the review of this important decision.

I came to Congress in 1985. For my entire career, the Department of Energy has been studying the suitability of Yucca Mountain. I have been surprised and disappointed by the continual delays not related necessarily to site characterization, but to all the various aspects of the project. I have been pleased with what we have begun to hear finally from the scientists. I want to applaud the President and the Secretary of Energy for their decision and the employees of the Department of Energy for the comprehensive statement that serves as the basis of the opinion recommendation before us.

We absolutely have to have a place where spent nuclear fuel can go and be safe for 10,000 years. I strongly believe that for the long-term safety and the security of the American people, we must consolidate nuclear waste in one well-studied, well-protected repository. It should not remain forever at more than 100 facilities scattered throughout the Nation as it is today.

The Nuclear Waste Policy Act gives the Governor of the State where the repository is to be located, in this case, the Governor of the State of Nevada, a chance to object to the President's decision. The Governor of Nevada has exercised his rights under the law and objected. Foreseeing that possibility, the Act gives the Congress an opportunity to review the decision and the objection and make a nationally oriented decision. The Act lays out a fast track process for consideration of the objection as if to say that Congress knew then that we might be in this place that we are today.

That's the purpose of this hearing.

I have scheduled subcommittee consideration next Tuesday of H.J. Res. 87, the specific one sentence resolution called for in the Act that would override the veto of the Governor of Nevada. I expect this hearing will reaffirm my confidence in the suitability of Yucca Mountain and the appropriateness of deciding once and for all that Yucca Mountain is the site that the Department of Energy should attempt to license.

I must point out that the Department still maintains the burden in getting Yucca Mountain ready to accept waste. It must submit a license application to the Nuclear Regulatory Commission. The NRC, an independent body, must review that application and determine whether it meets all of the protections in the law including those that have been recently promulgated by the Environmental Protection Agency. Action today does not mean that high level nuclear waste will go to Yucca Mountain tomorrow. It simply means that DOE is now allowed to take the next step in the NRC licensing process, that DOE can work on a transportation plan to transport the waste and that we can begin to move forward.

I intend to work with the Department of Energy, the Environmental Protection Agency, the State of Nevada and interested stakeholders in making sure that as we go forward all interests are protected and all due process requirements are met.

I want to especially thank Congressman Gibbons for his tremendous work on behalf of his District and his state. He has been a noble and honorable adversary, if that's the correct term and it's probably not adversary, I should say an advocate for his position and his state's position and we're delighted that you're going to be

here to present your case to the subcommittee in a very few minutes.

I look forward to the testimony of yourself, Congressman, and the other witnesses before us. With that, I'd like to welcome Mr. Sawyer for an opening statement.

[The prepared statement of Hon. Joe Barton follows:]

PREPARED STATEMENT OF HON. JOE BARTON, CHAIRMAN, SUBCOMMITTEE ON ENERGY AND AIR QUALITY

Today, the Subcommittee will review a Presidential decision that has been a long time coming. In the 1970s and 1980s, the Department of Energy studied more than a dozen potential nuclear waste repository sites. In 1987, Congress designated Yucca Mountain as the single site to be studied by the Department of Energy (DOE) for long-term geologic disposal of the Nation's high-level radioactive waste.

The DOE study of that site has concluded, and the President agreed with Secretary Abraham's decision to recommend the site to Congress. The Nuclear Waste Policy Act has a specific process for making this decision, and for its review by Congress and the State of Nevada.

I welcome all of the witnesses here today, and thank you for coming. I particularly want to thank Secretary Abraham of the Department of Energy. I know there are many demands on his time, including disrupted international energy supplies, disagreements with the Governor of South Carolina, and floor consideration of the energy bill in the other body. I appreciate you being here.

I also want to welcome the newest Member of the Subcommittee, Congressman Steve Buyer of Indiana. I look forward to working with him and know that he is very capable in dealing with energy and air quality issues.

Before we begin, I want to thank my good friend Rick Boucher, the Subcommittee Ranking Member, for his help on this hearing and his cosponsorship of H.J.Res. 87. I also thank full Committee Chairman Tauzin and Ranking Member Dingell for helping establish a good process for the review of this important decision.

I came to Congress in 1985. For all of my career, the Department of Energy has been studying the suitability of Yucca Mountain. I have been surprised by continual delays not related to site characterization, but I have been pleased with what I have heard from the scientists. I applaud the President and Secretary Abraham for their decision, and the employees of the Department of Energy for the comprehensive statement that serves as the basis of the recommendation.

We need a place where spent nuclear fuel can go and be safe for 10,000 years. I strongly believe that for the long-term safety and security of the American people, we must consolidate nuclear waste in one well-studied repository. It should not remain forever in more than one hundred facilities throughout the Nation.

The Nuclear Waste Policy Act gives the Governor of Nevada a chance to object to the President's decision, and he has. Foreseeing that possibility, the Act also gives Congress the opportunity to review the decision and the objection, and make a Nationally-oriented decision. The Act lays out a fast-track process for consideration of the objection, as if to say that Congress knew then that we would be in exactly this place right now.

I have scheduled subcommittee consideration next Tuesday of H.J.Res. 87, the specific one-sentence resolution called for in the Act. I expect that this hearing will reaffirm my confidence in the suitability of Yucca Mountain, and the appropriateness of deciding once and for all that Yucca Mountain is the site that DOE should try to license.

I must point out that the Department of Energy maintains a burden in getting Yucca Mountain ready to accept waste. The DOE must submit a license application to the Nuclear Regulatory Commission (NRC). The NRC, an independent body, must review the application and determine whether it meets all of the protections in the law, including those recently promulgated by the Environmental Protection Agency (EPA).

Action today does not mean waste gets shipped to Yucca Mountain tomorrow. It means that DOE can take the next step in the NRC process, that DOE can work on a transportation plan to continue our Nation's excellent record of transporting nuclear waste, and that the Federal Government can work with Nevada to make sure the State is ready, and well-compensated for, its hosting of this very necessary site.

I look forward to the testimony of the witnesses.

Mr. SAWYER. Thank you, Mr. Chairman. There are a lot of complex, technical issues involved in the designation of Yucca Mountain. We're going to explore some of those today. But ultimately, in my view, this boils down to a question of how many sites we want to have. I have heard our Chairman talk about 77 sites. I've heard of 103, 104. My staff tells me we're now talking about 131 sites that would be eligible for transportation to Yucca Mountain. It really does boil down to Mark Twain's advice. With a name like Tom Sawyer, I hear about Mark Twain every day of my life, so it's with care that I cite him, but he suggested that you're well served to put all your eggs in one basket and then watch that basket. That may well apply here as well as anything I can think of in terms of risk, danger and management of our long-term safety concerns.

The Nuclear Waste Technical Review Board will be extremely helpful in that task. Since 1987, this Board of independent scientists has been charged with evaluating DOE's work on the Yucca project. In its report of January 24, the Board described important issues that are in need of further evaluation by DOE, especially the advantages of low temperature design. I would urge the Department to continue a rigorous scientific investigation of the site to resolve outstanding questions using scientific approaches recommended by the Board.

I also urge the NRC, the DOT and the Department of Energy to step up their planning process for the transportation of waste. Waste shipments have had a safe record for the last 30 years, but Yucca is a much larger project, much more complex involving many more routes than the government has handled to date. DOE estimates that over the next 40 years if this plan is adopted there will be between 50 and 300 transportation accidents of varying degrees of risk during the lifetime of this undertaking. There are critical decisions that have to be made to make the transportation of waste as safe as possible. Right now, armed guards for the waste are only required in urban centers, but that's clearly not sufficient after what we witnessed in September. In addition, it seems to me that railroad shipments of waste should be made by trains dedicated to that task. The waste itself is not explosive, of course, but we cannot afford the risk of shipping it with other materials and chemicals that if caught on fire could burn hotter than the temperature that the waste casks can withstand.

There have been no full scale tests of the casks that the NRC has approved. Given the large number of shipments we can expect if Yucca is approved it would seem like a wise investment to require full scale tests of the equipment that we will depend upon for our safety.

It also seems to me that population should be a significant factor in determining routes and methods of transportation. It doesn't make any difference whether you live in a rural area or an urban area. Lives are important wherever you are, but when you have dense concentrations of life around transportation routes, it seems to me that's a critical question.

These are the kinds of issues to which I'll be paying attention if the project moves forward. Trying to design a repository that will last longer than human beings have been recording their history is an unprecedented scientific challenge. The fact is, we can never be

absolutely certain. Congress will have to rely on the NRC to resolve important questions in coming years and license the safest repository possible. But right now enough is known, I believe, to move ahead.

With that, Mr. Chairman, I yield back the balance of my time.

Mr. BARTON. I thank the gentleman and would recognize the gentleman from Georgia, Mr. Norwood for an opening statement.

Mr. NORWOOD. Thank you very much, Mr. Chairman and I do appreciate this opportunity to be here today and let me start by commending you for your critical leadership on this issue.

I believe that Yucca Mountain and its selection as a permanent waste repository for this country's spent nuclear fuel is probably one of the most important issues that this Congress can face.

The United States has over 45,000 metric tons of spent nuclear fuel scattered across some 70 plus sites in this country and as a result of passive and ongoing commercial nuclear power plants alone with more spent nuclear fuel waste waiting on a permanent home as a result of the U.S. defense activities.

Now Mr. Chairman, this issue may not be on the radar screen of every single American citizen, but let me assure you it is very important to a great many of my constituents, particularly those who live in Augusta and work at DOE, Savannah River site just across the Savannah River in Aiken, South Carolina.

In addition, Yucca Mountain is important to the folks who live within my District in Burke County, Georgia, home of Plant Vogtle, operated by Georgia Power, which includes two separate reactors at approximately 1200 megawatts each.

Congress, many years before I came here, had the foresight to put into motion a deliberate and meticulous plan for the development of a permanent repository for spent nuclear fuel and high level radioactive waste. This process began with a Nuclear Waste Policy Act of 1982 and was followed in 1987 by the single site characterization of Yucca Mountain.

The Department of Energy has estimated that at roughly $6.7 billion has already been spent on characterization and development activities at Yucca Mountain which much of this money coming from fees collected from currently operating commercial reactors paid into the Nuclear Waste Fund and Georgia ratepayers now have contributed over $460 million alone to this project.

Consequently, having been to Yucca Mountain to see for myself, I believe leveraged dollars and extensive research have yielded sound science that warrants moving to the next step within this carefully crafted process of selecting Yucca Mountain as a permanent repository.

I believe a permanent repository is tantamount to a coherent and comprehensive national energy policy that goal, I feel certain, of everyone on this committee, therefore I look forward to hearing more reasons from the witnesses today on why we should continue our course toward selecting a single permanent home to spent nuclear fuel in this country.

Now I'd like to add, Mr. Chairman, that although I totally agree with the policy, I'm very disappointed with the delay. I feel strongly that you need to urge the Energy Department and others to let's get this job done, primarily for the sake of the Nation, but second

for the sake of the members of this subcommittee. My good friend from Nevada has browbeat us to a considerable extent at this point. I wouldn't call him an adversary, but I'd call him very effective and if we can get this done and get Mr. Gibbons off of us it would be a big help. With that, I yield back.

Mr. BARTON. Well, I would point out if any of you want to go to a golf tournament, Congressman Norwood's got a little tournament has got a little tournament down in his District called the Masters and he tells me he's got lots of tickets for next year's tournament.

Mr. NORWOOD. Mr. Chairman, careful here. I think you have to tell the truth.

Mr. BARTON. I'm not under oath at this time.

The distinguished ranking member of the subcommittee, the gentleman from Virginia is recognized for an opening statement.

Mr. BOUCHER. Thank you very much, Mr. Chairman. I want to extend a welcome to our many witnesses at the hearing today and a special welcome to our colleagues from Nevada, Senator Ensign and Representatives Shelley Berkley and Jim Gibbons. I also want to thank the Secretary of Energy, former Senator Spencer Abraham, for his time and for his participation in our hearing today.

The bill which is pending before the subcommittee takes the next necessary step in the statutorily prescribed process for establishing a site for the permanent disposal of high level nuclear waste and I want to commend Chairman Tauzin of the full committee and Chairman Barton of the subcommittee for their diligence in taking this step. I'm a co-sponsor with them of the legislation which will move this process forward.

A permanent secure site for the disposal of high level nuclear waste must be established. Forty-five thousand metric tons of waste now reside onsite at nuclear reactors in 72 locations around the Nation. This temporary siting of spent fuel at reactor sites poses both a security threat and an environmental threat. In my view, arguments that the permanent disposal of waste in dry cask storage at these 72 dispersed sites as an alternative to the establishment of a secure, central permanent repository holds far less credence after September 11 than before. I think we really have no alternative to the development of a central disposal site.

While arguments will be made that more could be learned about the proposed Yucca Mountain site, I would note that the recommendation of the Secretary of Energy that came forward in February of this year, that Yucca Mountain be chosen for permanent waste disposal is based on 20 years of scientific investigation of the Yucca Mountain site. The site characterization work required in Section 113 of the Nuclear Waste Policy Act has been carried out. The public hearings focusing on the Yucca Mountain site required in Section 114 of the Act have been completed and have been held. If Congress passes the legislation now pending before the subcommittee which overrides the disapproval of the President's site designation issued by Governor Guinn of Nevada on April 8, construction activities could not commence on the site until the Nuclear Regulatory Commission completes a full technical and scientific review of the site and the proposed disposal methods and then issues a license for construction.

No site will ever be found to be perfect for the disposal of high level nuclear waste, but I'm persuaded that these studies and the NRC review which is still to come provides sufficient assurances about the appropriate nature of the Yucca Mountain site to justify approval of the legislation that is now pending before the subcommittee.

Today's hearing provides an opportunity for the subcommittee to review and examine the basis for the Secretary's recommendation followed by the President's designation of the Yucca Mountain site. Those actions follow the consideration of the scientific findings, the national security concerns and the environmental consequences either of designating Yucca Mountain or of declining to do so.

I look forward to the testimony today concerning those various matters.

Finally, Mr. Chairman, I want to note that the Energy and Commerce Committee has a long tradition of addressing many of our Nation's most important and challenging public policy matters in a thoughtful and bipartisan fashion. Nowhere has that bipartisan cooperation been more in evidence than in our efforts to resolve nuclear waste disposal problems and I again commend the committee's leadership for moving expeditiously on this pending matter.

Thank you, Mr. Chairman.

Mr. BARTON. Thank you, Congressman Boucher. At the beginning of the hearing, Congressman Sawyer was kind enough to let Chairman Tauzin and I go consecutively, so I'm going to give Congressman Dingell the opportunity, if he would wish, to go consecutively after Mr. Boucher, if the gentleman from Michigan would like to be recognized for an opening statement.

Mr. DINGELL. Mr. Chairman, first of all, I thank you and commend you for holding this hearing today to examine the basis for the President's recommendation of Yucca Mountain. And I also commend you for holding the hearing. It is a question that needs to be looked into by the Congress to ascertain whether, in fact, it's a scientifically suitable site for the construction of a permanent underground repository for high level nuclear waste.

Many of us have been critical for the Department's slow pace in carrying out the job we first gave them in 1982. Under the 1987 amendments to the Nuclear Waste Policy Act, DOE was directed to narrow its search for a suitable site to Yucca Mountain with the goal of opening a repository in 1998, some 4 years ago.

Meanwhile, waste continues to be stored onsite at nuclear reactors long past the point when shipments to a repository should have begun and defense waste continues to be stored at unlicensed DOE defense facilities in a number of States. These events indicate a certain high level of danger to the public and to the national security. Billions of dollars of ratepayers monies have been expended in characterizing the site, at last count, according to my information, something like $11 or $12 billion. Lawsuits continue to threaten the funds needed to move forward with the project.

I wholeheartedly support the Act's original purpose of constructing a permanent underground repository for nuclear waste and I believe that Secretary Abraham's finding that Yucca Mountain is a scientifically suitable place is good news. It is important, however, to acknowledge that the vast majority of Members of Con-

gress are not qualified to pass judgment on the specifics of the Secretary's findings on which the President's recommendation is based. That is why the Act requires DOE to obtain a license from the Nuclear Regulatory Commission, NRC, not the Congress.

And it is the Commission that must determine whether or not the combination of the site and DOE's repository design will protect the public and the environment. This is a process which will begin in some time and it is not one which the Congress should at this time intrude into or to delay.

The Act provides Nevada the right to object to the President's recommendation. Governor Guinn has done so. This requires the Congress to make a decision as to whether DOE should be permitted to go forward with an application to NRC. I believe it should. I commend the chairman for holding this hearing and particularly for including as witnesses, critics as well as supporters of DOE's findings. That will enable us to get the fairest picture of all of the circumstances associated with this matter. It is important for members to hear Nevada's concerns as well as those such independent entities as the General Accounting Office, the Nuclear Waste Technical Review Board, as well as the Environmental Protection Agency, again, to have the benefit of divergent views.

Mr. Chairman, in dealing with the nuclear waste disposal, we have never found it to be easy. But over the years you have handled it fairly and with thoroughness. In the past years, you and I have labored diligently, if not necessarily successfully, to reform the budget rules so as to ensure that the tax payers and ratepayers funds collected for this project are restored and are fairly treated and properly expended.

DOE acknowledges that this funding problem will begin to pinch by the year 2003 and it will have to be addressed sooner, rather than later or the repository program will grind to a halt. That battle is, however, for another day. I wish to thank you for your attention to it and remind my colleagues that the problem is still unresolved. I also remind them that the inquiry which we make today is in to a question which needs to be addressed to allow the licensing process to go forward and I would note to all that the licensing process and program will consider all questions associated with this matter, not just some narrow portion of the questions.

I want it to be very clearly understood that this is a necessary part of a fair process and I will therefore enthusiastically support the legislation before us today.

I also want to thank one of our witnesses, Laura Chappelle, the Chairman of the Michigan Public Service Commission for her recognition that this is an important funding issue. I thank my colleagues, I thank the witnesses and Mr. Chairman, I thank you. I yield back the balance of my time.

Mr. SHIMKUS [presiding]. The gentleman yields back his time and we thank the ranking member. I will now recognize myself for 5 minutes. I too want to recognize my friend Jim Gibbons, and we fought many battles together. He is a forceful advocate for his state. He also understands that I have to be a forceful advocate for mine. And it's under those circumstances that no one in this room does not know my position and I think this is an important thing that we must do.

As you all know, Illinois has quite a bit interest in this issue, particularly since we receive more electricity from nuclear energy, have more operating and closed nuclear facilities and have more spent nuclear fuel in temporary storage than any other state. So I applaud the President's decision to move on this and hope we can pass legislation quickly.

I would like to address one specific aspect of this debate that tends to get a lot of attention and that is the fear of transporting the spent waste. The truth is concerns over transportation of spent waste are misguided. You can't argue with the fact that almost 3,000 safe shipments of used nuclear fuel have taken place without any release of radioactive material. That's right. On some 3,000 occasions, used fuel has traveled by truck or rail across the country, including almost 500 in my home State of Illinois. And the reason you probably haven't heard about this is because not one of these shipments has threatened the environment or public safety. States like Illinois have gone to great lengths to set up a system that ensures safe transportation of nuclear waste through the State and across State lines. Even opponents of this bill will say that Illinois has set up a safe and reliable system for transporting the waste through the state. Local authorities are contacted and consulted. An emergency plan is in place and State employees track the waste as it moves through the state. And I would be happy to help facilitate State to State conversations on how it is done in Illinois.

Transporting spent nuclear materials is safe. It has been proven to be safe and there is no reason to doubt that it will remain safe even with a large increase in shipments. And with that, I yield back my time and I will recognize the gentlewoman from the State of Missouri, Ms. McCarthy for 5 minutes.

Ms. MCCARTHY. I thank you, Mr. Chairman and I'm happy to hear of the success of my neighboring state, Illinois. That has not been the case in my State of Missouri. The Energy Department has estimated that projected rail and truck shipments of nuclear waste could pass through the Kansas City area as often as twice a day. In past legislation, we have adopted language to address concerns of emergency responders and communities affected and given authority to Governors to weigh in on some of these transportation issues, but let me tell you that last year the first cross country shipment of nuclear waste traveled from South Carolina through Missouri, headed to an Idaho lab via the trucks and Governor Holden of Missouri discussed and agreed upon specific guidelines for the shipment of this waste with the U.S. Department of Energy. Despite these agreements, the Department of Energy failed to give a formal 7-day advance notification. The shipment went through the State of Missouri despite stating in its official notice that the waste would go through Iowa, not Missouri. A number of Missouri officials stated that the DOE's response to this dilemma was that it was simply a typo. This is unacceptable.

The DOE has failed to avoid rush hour traffic in St. Louis and any of you who have visited that community know about the multiple beltways and the rush hour traffic dilemma and also the DOE has failed to address major public events. Recently, in the Kansas City area, the Royals were playing a baseball game. Their stadium is right on I-70 and 40,000 fans attended. Prior notice of special

events was provided to the DOE and yet they failed to avoid this event when transporting a truck shipment of nuclear waste.

The State of Missouri and DOE had agreed to safe parking areas that would be designated along the routes through Missouri in case of delays, accidents of bad weather or other concerns. However, the DOE shipped nuclear waste on trucks without even bothering to set up safe parking areas with the Missouri State officials. Safe parking areas are designed for truck shipments to make stops in case of emergencies in order to protect the public's welfare from any accidents that may occur and we do have incidents of storms and accidents on our highways that occurred during these shipments.

Summer thunderstorms have caused numerous and serious problems arising on I-270 and I-70. At least once a rainstorm was reported during a DOE truck shipment through Missouri. The State of Missouri had previously advised the DOE to identify severe weather before sending out shipments in order to prevent any hazards occurring or having to halt the shipment due to road and weather conditions.

Although DOE agreed to follow all these simple guidelines in order to assure the safety of the public, unfortunately, it failed to meet any of the agreements. I think the DOE needs to reevaluate its practices of shipping spent fuel and other high level radioactive waste through densely populated areas.

I agree we must dispose of our spent nuclear fuel and it's critical we reduce the risk associated with this disposal as much as possible. We must continue to work to find the safest, most environmentally sound and most fiscally responsible solution for our constituents. The future and health of our community depends on this.

I understand that language is not allowed in the measure before us to address these concerns, but I do urge the Commission to assure us that strict safety measures and the cooperation with State emergency response officials and Governors be adhered to for the safety of all concerned.

I thank you, Mr. Chairman, and I yield back the balance of my time.

Mr. BARTON. I thank the gentlelady from Missouri and I'm sure that that typo will not occur again. It's hard to get Missouri out of Iowa, no matter how you type it. It just doesn't work, does it?

The gentleman from Iowa, Mr. Ganske, is recognized for an opening statement.

Mr. GANSKE. Thanks, Mr. Chairman. A year ago, this committee held a hearing on nuclear energy. Much has happened since then, but it is still true that nationwide, nuclear power plants produce approximately 20 percent of the electricity consumed in the United States and I am still acutely aware of the need to establish a permanent repository for spent fuel. The Nuclear Waste Policy Act of 1982 required that a site be established no later than January 31, 1998 and still we wait.

This has caused local facilities to build more onsite storage which has never been the best public policy option. The current goal of the Department of Energy for opening the permanent site is now 2010, 12 years past the original deadline. I believe the President made the right choice on this issue and that Congress should af-

firm his decision regarding a permanent storage facility and move forward with steps for its implementation.

Even long-time opponents of the permanent storage site have come around to see the merits of the President's position. The Des Moines Register, on March 17 this year, ran this editorial with the headline, "Move Ahead on Yucca Mountain". This is after years of opposing Yucca Mountain. The Register said it would be shortsighted to oppose the permanent storage of nuclear waste, calling the risks associated with the permanent storage and the transfer of material overstated and saying that the greater danger from nuclear waste is leaving it where it is currently being stored.

I quote from the Register: "Any concerns about the safety of Yucca Mountain pale in comparison to the risk of letting the waste continue to pile up at scores of sites around the country."

Mr. Chairman, for years I have agreed with that statement. It is long past time to act on this issue. I yield back my time.

Mr. BARTON. We thank the gentleman from Iowa. We would welcome the gentleman from Maryland for an opening statement.

Mr. WYNN. Thank you, Mr. Chairman, and thank you for your leadership on this issue. I believe it is critical that we resolve the issue of finding a suitable site for nuclear waste disposal. Currently spent nuclear fuel and high level radioactive waste are temporarily stored at 131 above-ground facilities in 39 States; 161 million Americans live within 75 miles of these sites. One central site provides more protection for this material than due the existing 131 sites.

We have spent $7 billion studying this issue over 20 years. American consumers have committed $18 billion since 1983 to the Federal Trust Fund to fund the storage of this spent fuel. We need to make a decision. We need to uphold the decision that has been recommended to us and I certainly urge us to do so as quickly as possible.

Let me talk for a moment about my own State, Maryland. The Maryland use of nuclear energy pay a fee for disposal of nuclear waste. As of September, Maryland had paid a total of $257 million into the Nuclear Waste Fund since 1983. We are expecting that this fuel will be stored in a long-term facility. Right now, facilities store this fuel on a temporary basis. They are not designed for permanent storage. The Federal Bureau of Investigation has determined these facilities to be hard targets. We need to minimize this. While the fuel is safe, when it is producing electricity, it represents a serious threat if it remains at 131 sites.

After 45 years of experience and 3,000 shipments of nuclear—used nuclear fuel by rail/truck, no radiation release, fatalities or injuries or environmental damage has occurred. I believe it's time to make a decision and I strongly urge the committee and all of my colleagues to adopt the Yucca Mountain site.

I relinquish the balance of my time.

Mr. BARTON. We thank the gentleman from Maryland. We'd now recognize the gentleman from Kentucky, Mr. Whitfield, for an opening statement.

Mr. WHITFIELD. Mr. Chairman, I note that we have four panels and about 12 witnesses and I really can't think of much else to say, so I'll waive my opening statement.

Mr. BARTON. That's the best opening statement we've heard so far.

I would recognize the gentleman from Mississippi for another excellent opening statement.

Mr. PICKERING. Mr. Chairman, with that fine example, I'll yield back the time, but it's long past due that we solve this problem. Thank you for your leadership.

Mr. BARTON. We're going to recognize the gentleman from Arizona, the man with a heart, Mr. Shadegg, for an opening statement.

Mr. SHADEGG. Mr. Chairman, some of us are slow learners, so I won't give quite as good an opening statement as the preceding two.

Mr. BARTON. Somehow I guessed that.

Mr. SHADEGG. I do want to thank you for your quick action on House Joint Resolution 87 in both scheduling a hearing and a subcommittee markup. Time is, of course, of the essence and since Congress has by statute only 90 legislative days to override the veto issued by Nevada's Governor. Because we do have 13 witnesses I will be brief.

Let me just note that Yucca Mountain has been under study as a site for permanent disposal for nuclear waste for some 24 years. During this time we have spent, according to my numbers, $4 billion, over $4 billion to produce roughly 600 different studies of the site. Indeed, it is without a doubt, this is the most heavily studied piece of ground in the world. Today's action does not end the study process, it simply allows the Nuclear Regulatory Commission to begin the licensing process during which it will evaluate the studies done to date, as well as studies performed during the 4 years that the license process itself will take. Most importantly, it allows the process which has already taken significantly longer than planned to proceed.

Mr. Chairman, I concur wholeheartedly. We need to move forward. I concur in the remarks of my colleague from Maryland. It is time that we conclude this process and I look forward to the testimony to today's witnesses.

Mr. BARTON. I thank the gentleman. Does Mr. Buyer wish to make a brief opening statement?

Mr. BUYER. No.

Mr. BARTON. Okay. All those members not present will have the requisite number of days to put their opening statements in the record. Without objection, so ordered.

[Additional statements submitted for the record follow:]

PREPARED STATEMENT OF HON. HEATHER WILSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW MEXICO

Mr. Chairman, thank you for holding this first hearing in the Congress to receive testimony on the President's decision to recommend the Yucca Mountain site as the geologic repository for spent nuclear fuel and high level nuclear waste and the objections to that recommendation from the State of Nevada.

Nuclear energy is a vital component of our nation's electricity supply; contributing over 20% of electricity generated. Its strong presence diversifies our nation's energy portfolio, reducing our dependence on foreign oil, dirty coal, and natural gas with its volatile prices.

We are obligated to responsibly manage the spent nuclear fuel that remains in interim storage locations throughout the country. Temporary facilities, many near

waterways and major cities, are not the solution for long term storage. Protection of the public's health and safety without harming the environment are the key issues for designing a system, including transportation and containment, for long term storage of this material. Per the National Academy of Sciences—geological disposal remains the only long-term solution available.

Certainly, as with the opening of the Waste Isolation Pilot Plant in New Mexico, sound science must be the foundation for this decision to move forward in developing the Yucca Mountain repository. Science provides the basis for understanding the challenges faced by ensuring long-term safety and engineering provides the solutions based upon the science. The ratepayers for nuclear generated electricity and the federal government have invested several billion dollars in the scientific understanding of the repository site and design, resulting in the DOE issuing a positive Site Suitability Evaluation.

Moving the spent fuel from sites around the country to the repository will be done by truck and rail transport in specially designed containers proven to withstand stringent safety tests. We have a 30-year record demonstrating that we can safely transport nuclear material in this country. In over 2700 shipments of nuclear material that have already occurred in this country, there have been but a handful of accidents with none of those releasing any radioactivity. The same, engineered features that protect shipping casks from accidents limit their vulnerability to potential terrorist strikes. These design features are combined with rules governing physical surveillance and protection during shipment.

While New Mexico does not have any commercial nuclear power plants, we do have research nuclear reactors and high level waste at the laboratories that will require material storage in the future. I mentioned the Waste Isolation Pilot Plant, which is near Carlsbad, New Mexico. This facility went through an arduous site characterization and licensing process filled with scientific and political debate. Today it is safely receiving shipments of transuranic waste from several sites. New Mexico is doing its part. Mr. Chairman, the science shows that Yucca mountain is suitable for long-term spent nuclear fuel storage, experience shows that we can safely transport it, and if we don't move forward on this basis I'm not sure we'll ever be able to responsibly deal with long-term storage for used nuclear fuel.

Thank you Mr. Chairman.

PREPARED STATEMENT OF HON. RALPH M. HALL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. Chairman and Members of the Committee—this is a watershed moment for those of us who have been a part of this siting process for many years. I vividly recall that the decisions on the siting process that this Committee and the Congress made in the enactment of the Nuclear Waste Policy Act of 1987 were painful ones. It was clear from the beginning that some state needed to be the host for the repository, and of course, that turned out to be Nevada.

I believe we know enough now about the site to be confident that the proposed Yucca Mountain repository is safe and secure enough to move to the licensing process. I have the confidence that the Nuclear Regulatory Commission possesses the skills, talent and the wisdom to fairly and impartially review the Department of Energy's licensing application and issue a license for the project and the courage to reject it if it doesn't. As a regulatory agency, the NRC is better equipped and qualified than the Congress to evaluate the complex technical arguments for and against the licensing and operation of the repository.

This is not perfect site. As with any geologic formation there are some risks that that things will not remain the same for the next 25,000 years as they are now. The experts tell us that these risks are extremely low. The NRC licensing process will affirm or refute the DOE's conclusions about the site.

What I do know is that even though Yucca Mountain is not entirely risk free, it is far, far less risky to store the fuel in a single, secure location than to leave it in place where it's now located at hundreds of sites around the country.

I hope that Yucca Mountain proves to be that site, and I will vote to approve the resolution to move the project to the licensing process.

With that, Mr. Chairman, I yield back the balance of my time.

PREPARED STATEMENT OF HON. MIKE DOYLE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF PENNSYLVANIA

Mr. Chairman, thank you for conveneing this hearing to examine the issues informing the recommendation of Yucca Mountain as the site for the nation's long-term repository for the disposal of radio active waste.

During the Subcommittee's first hearing on nuclear energy policy last March and its subsequent consideration of Price Anderson, it was established that not only should we remain mindful of the important near-term and long-term role that nuclear energy plays, but we can not afford to be distracted from making the necessary commitments to ensuring its safety and longevity. I believe we made progress in addressing near-term concerns through the Committee's energy bill. And the passage of Price Anderson enables the Subcommittee to address perhaps the most critical of long-term concerns—the designation of Yucca Mountain as a repository for spent nuclear fuel and high-level radioactive waste.

As we all know, Yucca Mountain has been studied for a significant amount of time by a wide range of scientific experts. The data produced from these studies is, as is evidenced by the array of testimony we will hear today the subject of varied interpretations. And, therefore, I believe it is important that we keep in mind there are disparate objectives and starkly different modes of assessments to be found in the statements we will hear today. What will be discussed during this hearing will not only address nuclear energy policies, the strengths of the Yucca site, and the NRC licensing process, but it will also point out the importance of reliable testing and appropriate assessment. Thus, in many instances the conclusions reached on the different aspects of the Yucca debate are at times no more significant than the degree to which the manner of information gathering may have inadvertantly contributed to a flawed conclusion.

I think we would all agree that the more information the better and that obtaining information from numerous sources is also beneficial to producing an accurate conclusion. In this regard, it would appear that those who would advocate halting the entire process over proceeding to deal with nuclear waste are overly narrow in their approach. If we are to effectively address the concerns posed by nuclear waste, we must provide the process with adequate support and necessary oversight. DOE should be—and must be—responsive to the input from the Nuclear Waste Technical Review Board and the NRC. Only through these interactions will we continue to learn more and ensure the safety of Yucca Mountain.

In Pennsylvania, nuclear power supplies 37.9 percent of its power. This is significant given that nationally nuclear power accounts for 20 percent of electricity production. Since 1983, Pennsylvania consumers have committed well in excess of $1.4 billion into the Nuclear Waste Fund. As you can imagine, I have concerns about the accees to, and affordability of, nuclear energy. Pennsylvania also has 9 nuclear units at 5 sites. There is over 3,000 metric tons of nuclear fuel stored in the state. And according to testimony we will hear later, my congressional district may have waste transported through it on its way to Yucca. Thus, it is no surprise that I am concerned about safety issues and support developing new technologies. But it is my concerns about these nuclear energy issues that lead me to believe that moving forward with the process of establishing Yucca Mountain as a nuclear waste repository is the best option.

Thank you Mr. Chairman

PREPARED STATEMENT OF HON. BOBBY L. RUSH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Thank you Mr Chairman for holding today's hearing on the designation of Yucca Mountain as a repository for nuclear waste. I am hopeful that today's hearing will bring us closer to resolving an issue that has been before the Congress, and the scientific community for over 20 years.

Despite a continuous, 13 year devotion of over 6 billion dollars in resources to the study of Yucca Mountain, some in the public have continued to raise doubts over its suitability as a repository. And while the fears expressed by critics are understandable, I am concerned that no matter how much research is conducted on the subject of Yucca Mountain, there will always be those who object to the movement and storage of nuclear waste at *any* facility.

Armed with the recently released reports by the General Accounting Office and the Nuclear Waste Technical Review Board, opponents to Yucca Mountain, point to the less-than-glowing review of the research yielded on the suitability of the project.

Admittedly, I too had concerns, especially over the Technical Review Board's less than encouraging characterization of the DOE basis for repository assessment as

"weak to moderate." However, after putting this relatively early pre-licensing stage into perspective, I have grown confident that the *simple recommendation* by the Department of Energy, that Yucca Mountain will likely be sufficient for a license application—is warranted.

Still, many oppose Yucca Mountain on the basis of uncertainties in transport and storage. Mr. Chairman, I am convinced that short of waiting ten thousand years to see what happens with regard to the durability of the natural and engineered barriers to environmental contamination, there will be no guarantees. And while some individuals search and debate for that ten thousand year guarantee, our immediate problems stare us all in the face. Short of absolute inaction, nuclear waste must be transported somewhere. Inaction cannot be the solution.

Mr. Chairman, while the debate rages over whether a Yucca Mountain repository could possibly contaminate the water table beneath the desert repository within the next ten thousand years—over 45 thousand metric tons of nuclear fuel sit in 131 facilities nationwide—none of which have seen a fraction of the testing and scrutiny that Yucca Mountain has undergone. Incidentally, these are 131 facilities which threaten the drinking water of 30 million Americans.

While the debate continues to rage over whether transporting nuclear waste to Yucca Mountain will create moving targets for terrorists, there are 131 stationary targets for terror sitting in our back yards.

Mr. Chairman, some would like to turn back the hands of time to a world without nuclear energy or waste, but we must deal with reality. Simply put, the door of nuclear energy has already been opened in this country, and around the world. And the benefits overall, have been tremendous. However, the potentially harmful by-product of our cleanest and arguably most beneficial source of energy MUST be dealt with. And Mr. Chairman, I am convinced that our best chance of doing that is through Yucca Mountain, and the best time is now.

Mr. BARTON. We now want to go to our first panel, our congressional panel. We have two excellent Congresspersons, the gentleman from Nevada, the gentlelady from Nevada.

Before Mr. Gibbons is recognized, I say Nevada, some of these folks say Nevada. Is it Nevada or Nevada?

Mr. GIBBONS. Nevada.

Ms. BERKLEY. Nevada.

Mr. BARTON. Nevada. I hope all my subcommittee will take note of that I pronounced it correctly.

Mr. GIBBONS. I want you to know we have a Ramada Hotel, but it's in Nevada.

Mr. BARTON. A Ramada in Nevada. Okay. Well, the gentleman from Nevada is recognized for an opening statement. Try to keep it less than 7 minutes, if at all possible.

STATEMENTS OF HON. JIM GIBBONS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEVADA; HON. SHELLEY BERKLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEVADA; AND HON. JOHN ENSIGN, A U.S. SENATOR FROM THE STATE OF NEVADA

Mr. GIBBONS. Mr. Chairman and members of the committee, I want to thank you greatly for allowing us to testify on this very important issue. The disposal of the Nation's high level nuclear waste has been and remains and important issue for many Americans. However, for the past 20 years it has been the single most important issue for the State of Nevada. And just as a historical note, Mr. Chairman, the Nuclear Waste Policy Act of 1982, as amended, in 1987, selected Nevada and Yucca Mountain as the sole site to be studied for consideration of nuclear repository.

It's very important to note, Mr. Chairman, 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, and I repeat, would require that the site be determined geologically sound.

Mr. Chairman, as a person who holds a Master of Science degree from the University of Nevada in geology, I'm probably one of the few geologists in Congress, but I can tell you having looked at this Yucca Mountain is not, nor will it ever be, geologically sound. Now whether Americans support a sole permanent repository for high level nuclear waste or whether they don't 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's 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 a great deal of 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 a Nuclear Waste Policy Act and that alone, Mr. Chairman, begs the question if the site is geologically sound, why so much cost on the engineering aspect of this project? The answer is you cannot spend enough money to make a mountain geologically sound.

What will the DOE realize is that they can spend enough to make the man-made engineering barriers sound. The problem is that is not what the law requires.

If you look at the fine print and if you look hard enough you'll see that the DOE has failed to prove Yucca Mountain 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 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 in the Act. And what the DOE found out was this: (1) rates of water infiltration into the mountain are on the order of 100 times higher than previously thought; (2) credible studies indicate a significant presence of balsatic volcanism in and around Yucca Mountain; (3) with Nevada ranking third in the Nation in seismic activity has been determined that there have been nearly 700 cases of earthquake or seismic activity of 2.5 magnitude on the Richter Scale or more near Yucca Mountain since 1976. That's 700 occurrences. In fact, about 10 years ago, a 5.6 level earthquake occurred less than 10 miles from Yucca Mountain and actually caused some damage to nearby DOE facilities. 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. They moved the goal post.

You see, the DOE cannot prove Yucca Mountain's capability of serving as a long-term high level nuclear waste repository that is geologically sound. Their response: adopt new rules permitting the Agency to rely entirely on man-made waste packages.

Mr. Chairman, I ask is this what Congress intended? I don't think so. As Members of Congress, we have an oversight role in this process. We have a responsibility to reign in such administrative abuse. Congress wrote the law clearly to State that the site must be—not shall be, not will be, not should 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 responsibility 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 just happen to be intended for burial 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 that was mandated by Congress.

If this was the intent of Congress some 20 years ago why then has the DOE spent $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'd like to be 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're pushing headlong toward a policy that doesn't come close to even passing the smell test and it is severely outdated by today's scientific standards. The DOE continues to rely on several decades old science to push for deep geologic burial of high level nuclear waste.

Mr. Chairman, bright, innovative minds and scientists all across this Nation and in fact, across the world are proving that there are better ways, cleaner ways and safer ways to dispose of high level waste. Unfortunately, the DOE offers nothing but a 25 year old entrenched and outdated philosophy of geologic burial. 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 waste to a whole in a desert mountain for burial where we expect, and I repeat, we just expect it to remain safe to the next 10,000 years. Mr. Chairman, the State of Nevada, 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've had the opportunity to study. These advancements can provide a more reasonable, less costly, more expedient solution to dealing with the tens of thousands of metric tons of high level waste piling up at our nuclear power plants.

Mr. Chairman, I want to be part of the solution and 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 the Members of this committee and of Congress as a whole take one last look at the law and ask yourself whether you think the DOE has met the standards mandated to them by this body.

I trust you will realize that we as a Nation can do much better in solving the waste disposal problem. Mr. Chairman, and members of the committee, once again thank you for allowing us to testify. I appreciate the opportunity to present Nevada's case to you today.

Thank you.

[The prepared statement of Hon. Jim Gibbons follows:]

PREPARED STATEMENT OF HON. JIM GIBBONS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEVADA

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:

1) Rates of water infiltration into the mountain are on the order of 100 times higher than previously thought.
2) Credible studies indicate a significant presence of basaltic volcanism in and around Yucca Mountain.
3) 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.

Mr. BARTON. I thank the gentleman. Do you remember the old television commercial "is it real or is it"——

Mr. GIBBONS. Memorex.

Mr. BARTON. Memorex. Well, I'm watching you on TV and in real life and of course they're watching you on the camera. It's a pretty close call, but I think you're better real than you are on TV. Or you're good both places.

Mr. GIBBONS. Thank you, Mr. Chairman. Either way I take it as a compliment.

Mr. BARTON. Mr. Boucher and I couldn't remember the commercial though.

Mr. GIBBONS. It's Memorex.

Mr. BARTON. We knew this audience would have it.

We'd now like to hear from the gentlelady from Nevada, the Honorable Congresswoman Shelley Berkley for a statement and try to hold it to 7 minutes.

STATEMENT OF HON. SHELLEY BERKLEY

Ms. BERKLEY. I'd like to thank you, Chairman Barton and Ranking Member Boucher for offering me the opportunity to testify today. I particularly would like to thank my colleague, Mr. Gibbons. He's done an extraordinary job presenting our case and I know the people of the State of Nevada appreciate his efforts. As Mr. Gibbons, I may go over the allotted 7 minutes because I'm sure you understand how important this issue is to the people I represent.

Let me begin by expressing the outrage felt throughout Nevada about this ill-advised project. Over 83 percent of the people that Mr. Gibbons and I represent vehemently oppose Yucca Mountain. We don't want the dump and our country doesn't need this dump. Yucca Mountain is not the solution to what is the problem of disposal of the by-product of nuclear energy, nuclear waste. There is a myth that the approval of Yucca Mountain as a high-level nuclear waste repository will somehow solve the problems of onsite 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 United States currently produces 2,000 tons of nuclear waste a year. By the time a repository opens somewhere between 2010 and 2016, there will be 62,000 tons of nuclear waste stored at onsite reactors around the country. The maximum amount of transport per year will be 3,000 tons. At sites where the 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 the 131 sites in favor of one site is a lie. 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 than 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 the year 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 con-

cern for people living and working in the vicinity of the transportation routes; roughly 16 million Americans who own homes and go to schools and pray at houses of worship in the communities immediately alongside these 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 than 108,000 cross country truck shipments of spent nuclear fuel and high level radioactive waste over the next 38 years. There will be between 957 and 2800 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 casks that would prove disastrous to the environment and human health and cost billions of dollars to try to clean up. The DOE acknowledges in their environmental impact statement that we can expect anywhere from 50 to over 300 accidents. Additionally, two separate tests, one done at Sandia National Laboratory and the other at Aberdeen Proving Ground demonstrates 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's a good policy to ship 108,000 shipments in casks that have never actually be tested?

According to independent studies the risks of transportation could result in massive economic costs to communities along transportation routes. Even without an accident or incident, property values near routes could decline by 3 percent or more and in the event of an accident or terrorist attack, residential property values along shipping routes could decline between 8 percent and 34 percent, 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 more likely oppose this 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 onsite storage problems across the country and creates a tremendous amount of concern for national security. The projected costs of this boondoggle is anywhere from $56 billion to $309 billion. The Nuclear Waste Fund has $11 billion in it. How are we going to pay for this? Raise taxes? Dip into the Social Security Trust Fund? And once Yucca Mountain is full, what do we then do? After spending hundreds of millions of dollars, we will be exactly in the same place we are today.

A recent GAO report concluded that there are 293 unfinished scientific and technical studies that cannot be concluded until the year 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 the 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, the Representative Mo 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 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, we 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 joint the State of Nevada and vote to protect your own constituents by opposing this foolhardy proposal. Oppose Yucca Mountain.

[The prepared statement of Hon. Shelley Berkley follows:]

PREPARED STATEMENT OF HON. SHELLEY BERKLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEVADA

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 Sandia 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.

Mr. BARTON. Thank you, Congresswoman Berkley.

We'd now like to hear from a former House Member, the Honorable John Ensign who is unfortunately gone to the other body

where he is doing an excellent job representing his state, but you are welcome. We would ask that you give your statement in approximately 7 minutes. We're expecting a series of votes in the next 10 minutes or so. But welcome back to the House of Representatives.

STATEMENT OF HON. JOHN ENSIGN

Mr. ENSIGN. Thank you, Mr. Chairman. Somebody said when I first went over there that the intelligence of both bodies went up, so—that's a House joke.

Mr. BARTON. We won't comment on that. But we don't see the humor of it.

Mr. ENSIGN. I am pleased to be with you today and I'm going to summarize my full statement. Without objection, I would ask that it be made part of the record. And I want to summarize my testimony——

Mr. BARTON. Without objection, so ordered.

Mr. ENSIGN. And try to appeal to you based on some common sense, based on if you are a person who supports nuclear power to make nuclear power more viable for the future, based on where the taxpayer have to end up holding the bag here of money that is going to cost to build this boondoggle in the desert and I also want to give you some thoughts on transportation in a post-9-11 era that we really do need to take a fresh look at.

I believe that——

Mr. BARTON. If you could just spend a second, Senator, until we get those bells. We'll let you give your statement and then we will recess the hearing to go vote and then we'll come back with the Secretary.

Please continue.

Mr. ENSIGN. This bill, when it was originally set out by Congress, envisioned a geologic repository. What that meant was that when it was put into the ground, these canisters were put into the ground, over time they would deteriorate. The geology was then to provide the protection. Well, over time that geology has proven to be not so good and so DOE has had to make this a man-made repository. The reason that I bring that up is because that man-made repository has now dramatically increased the cost. If you look at where the costs started to where the cost estimates are today to where they could potentially go, this thing keeps adding billions and billions and billions more in dollars.

For those of you have nuclear power plants or receive nuclear power, your ratepayers are either going to have to increase dramatically their rates for power to pay for Yucca Mountain or it's going to have to come out of general revenues. You have to get the money from some place because the Nuclear Waste Trust Fund is not going to meet the needs of the costs for Yucca Mountain. So for those who claim to be fiscal conservatives, you really need to take a look at this from a cost standpoint.

The other thing, if you believe in nuclear power, one of the reasons nuclear power plants are not being built is because frankly it's very expensive to build them. Part of that is because of the cost of, obviously, of dealing with the waste issue, the uncertainty in li-

censing, that's certainly a factor, but the main issue is whether Wall Street is going to finance these things.

If you believe in nuclear power and you want more nuclear power plants to be built, you need to look at the alternatives that are much cheaper than Yucca Mountain.

If you notice, in my testimony you won't hear anything about Nevada. I'm going to talk about why I think it's bad for the country, why it's bad for your constituents. We know why it's bad for our constituents. We want to talk why it's bad for your constituents.

The cost of doing onsite dry cask storage which most of you are familiar with is significantly, not even close to the cost of doing Yucca Mountain. And yet, according to the DOE, onsite dry cask storage is safe for at least 100 years, probably closer to 200 years. We see the problems with transportation, that transportation has not been studied adequately. And I think post-9/11 it absolutely has not been studied adequately. We used to think that skyscrapers were safe. We didn't think about a plane going into a skyscraper. Now I don't mention that just to scare us, but I mention it that we need to relook at the transportation of nuclear waste which we've heard that the terrorists are looking for "dirty bombs." Well, these are potential "dirty bombs." We know that the canisters can be breached with a TOW missile. We know that, unless they're surrounded by concrete, they can be breached with a TOW missile. Well, when you're transporting them, they can't be surrounded by the adequate protections that you need to protect them from a TOW missile, at least under current technology. I just bring that up to show you that we need to study the transportation issue more.

The other aspect of why I think that this Yucca Mountain issue is bad for your constituents as well is that—and for America as well, is that we're going to be wasting a very valuable resource by burying it in the ground. I believe strongly that we need to look at technology to recycle this waste, to gain a lot of the energy because our current reactors are so inefficient, we need to look at modern technology on recycling. There's all kinds of different things out there. Other countries are reprocessing. We've decided not to do that. But there's modern recycling technology that we are currently investing in and we have time to do it. If dry cask storage onsite is good for 100 years, at least a 100 years—you guys are planning these bells purposely, is that the——

Mr. BARTON. We have 10 minutes.

Mr. ENSIGN. Yes, I know. I remember the bells.

Mr. BARTON. Remember in the House we time the speeches, it's not like the Senate where you can go on forever. So about three more minutes.

Mr. ENSIGN. Okay. The—I completely forgot where I was, but that's okay. It was good, wasn't it.

Mr. BARTON. Let me ask you a question. When you were in the House, I never saw a silk handkerchief in your coat pocket.

Is there a dress code in the Senate?

Mr. ENSIGN. You know I live with six other House Members and I catch this grief every night when I go home, so I'm kind of used to it.

Mr. BARTON. It was just a question.

Mr. ENSIGN. It was just a question. The point I was making was about time. If we know that these onsite dry cask canisters are good for 100 years, what is the rush? Why do we want to spend $58 billion thereabouts to build Yucca Mountain? That's probably a minimum estimate today. Why do we want this kind of a boondoggle?

Recently, you saw that South Carolina is trying to stop transportation of some plutonium. This is a big issue everywhere, stopping transportation. There is State after State after State is going to put up lawsuits trying to stop transportation. It is a political issue. It is also a terrorism issue. We need to look at this thing and the bottom line is we have time to do it.

We are imploring you to take the time, be responsible, fiscally responsible, as well as other ways to do the right policy.

Last, I will tell you because this was a political process, we know realistically we're probably not going to be able to win this vote in the House of Representatives. The battle is going to come down to, and we appreciate our colleagues and the great job they're doing over here trying to make our case and we need a strong enough vote that we can possible get over here, but we realize the battle ground is going to be in the U.S. Senate. This was done on a purely political move when it was stuck, Nevada got stuck with it and we're hoping that we win this and it may be a purely political move that we win this on. We've got some parliamentary tricks up our sleeve that you will that we will pull. That's one thing nice about the U.S. Senate and we plan on winning this battle this year and not just because we think it's bad for the State of Nevada. We think it's bad for the entire country to be building this boondoggle in the desert.

Thank you, Mr. Chairman.

[The prepared statement of Hon. John Ensign follows:]

PREPARED STATEMENT OF HON. JOHN ENSIGN, A U.S. SENATOR FROM THE STATE OF NEVADA

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.

Mr. BARTON. Thank you, Senator. All joking aside, we do appreciate you coming over from the other body and the good work that you're doing with Senator Reid to make sure that all the issues are put on the table.

We're going to recess this hearing and when we reconvene in approximately 25 minutes, we'll have the Secretary of Energy. So we stand in recess.

[Brief recess.]

Mr. BARTON. The hearing will come to order. Our audience will find their respective seats. Before we recessed for the series of votes we had heard from the Nevada delegation, both their Congressmen and one of two of their Senators about their position on the decision to locate the repository at Yucca Mountain.

We're now going to hear from the Secretary of Energy, the Honorable Spencer Abraham, former Senator from the great State of Michigan and doing an outstanding job as Secretary in a very difficult time for energy policy.

Mr. Secretary, we really appreciate you coming today, knowing that what's going on in the other body and what's going on internationally and what's just happened in Venezuela, what's happening as we speak in the Middle East, the Persian Gulf. We'll recognize you for such time as you may consume and then I'm sure we'll have a number of questions for you. So welcome to the subcommittee. Your statement is in the record in its entirety and we would recognize you to elaborate on it as you see fit.

STATEMENT OF HON. SPENCER ABRAHAM, SECRETARY, DEPARTMENT OF ENERGY

Mr. ABRAHAM. Thank you, Mr. Chairman. Thank you for having this hearing, for your interest in moving this resolution forward for consideration and for the work we've done together. I very much appreciate your support of our efforts in the Department of Energy and the great working relationship we have with the subcommittee.

Mr. Chairman, this committee in Congress should vote to override Nevada's veto and allow a full and objective final decision on Yucca Mountain by the Nuclear Regulatory Commission. The history, I think, is very important to note today. In 1982, Congress passed the Nuclear Waste Policy Act and committed to take responsibility for radioactive waste disposal. In 1987, Congress amended that Act to direct the focus of the Department of Energy on consideration of the site at Yucca Mountain. And in 1992 the Congress adjusted the standards for determining site suitability. Subsequently, EPA, the Nuclear Regulatory Commission, and our Department, in turn, adjusted their regulations to conform to those policies outlined by Congress.

During 24 years of research on this project, at a cost of about $4 billion, the Department of Energy has studied Yucca Mountain. Let me just put that in perspective. That's five times longer than it took to build the Hoover Dam. That is six times longer than the entire duration of the Manhattan Project. It's twice as long as it took to plan and complete the first moon landing. The science on this issue has been well studied.

My responsibility as Secretary was to evaluate that research and to make some decisions. I reached two major conclusions in determining to recommend Yucca Mountain. First, that the site is suitable for the development of a repository based on an evaluation of the extensive body of sound science. That determination was my principal responsibility.

Let me talk about that decision. In reaching it, we had to consider two things. First, we conducted a preclosure safety evaluation. Based on the extensive body of research that has been done, I have concluded the repository at Yucca Mountain can be operated safely for what's called the preclosure period, that's a span of 50 to 300 years. To my knowledge, virtually no scientific organization disputes this conclusion that during that preclosure period, this

site can be operated safely, because the task is very similar in many ways to the operation of current nuclear facilities.

In that period, Yucca will be a controlled, secure, operating environment, and it is, of course, proximate to Nellis Air Force Range, near its protected air space.

Let me just focus on that 300 year period for a moment. The way this project will proceed is that after a decision is made, and if one is made to move forward with this project, and if the Nuclear Regulatory Commission licenses Yucca Mountain, after it is constructed and after it is filled, we will continue to monitor what is happening there for as much as 300 years—or longer than the United States has existed, and we will be in a position to adjust in any ways necessary during that timeframe.

And, I would just say to the committee that it's sometimes the case when we throw around large numbers like 10,000 years, the period after closure that we had to assess, that a number like 300 years seems small. But as I said, if one were just to look backward and consider the scientific progress that's been made since the year 1700, one gets a feel, I think, for the opportunities that we have as we move forward. Once the facility, in fact, is constructed, we can, in any way we might need to, perfect its performance.

In addition to deciding whether or not the facility would be safe for that 50 to 300 year preclosure period, we also conducted extensive analysis of what we call the post-closure period. That is a period, as I already indicated, that ranges 10,000 years into the future. The scientific observations obtained during our 24 years of research were fed into extremely sophisticated computer models. State-of-the-art approaches were taken. These models considered hundreds of thousands of factors and events and simulated combinations of factors and events.

Let me tell you what we were required to do. We were required to determine whether in 10,000 years Yucca Mountain could meet radiation standards that would limit the exposure annually to people within an 18 kilometer radius of the mountain, limit, in terms of the groundwater, to a standard equivalent to drinking water standards of today; and in terms of radiation exposure, limit to no more than 15 millirems annually of radiation. To put it in perspective, and I don't mean here to compare elective versus unelective exposure, but a round-trip cross country plane trip from Washington to San Francisco exposes people on that aircraft to about 6 millirems. So our job was to determine whether or not in 10,000 years someone living in the vicinity of Yucca Mountain would be exposed to no more than 15 millirems anually. Twenty-four years and $4 billion later, the answer is yes.

And let me say, Mr. Chairman, we can guarantee, based on our analysis, that we can protect people from being exposed to that level of radiation. We not only tested normal circumstances, but we also looked at factors that were very difficult to approximate but which constituted a set of uncertainties that we wanted to evaluate. For instance, in addition to determining whether or not water might seep down from the top of the mountain to the underground area, in which we would store the waste, we considered whether or not 10,000 years from now human intrusion in the form of somebody drilling for oil at the top of the mountain might somehow pen-

etrate the casks down at 1,000 feet below the surface and emit radiation. We took into consideration whether or not if a glacier, as part of a subsequent ice age on the planet, were to envelop the western United States and then recede to produce more water flow into the underground storage area would produce an outcome that would force a situation in which the radiation standard that we have to meet could be exceeded. And after $4 billion of research into these sorts of circumstances, we have accounted for these things and concluded that the site is suitable and that it will meet even those very difficult tests.

And so I am convinced, Mr. Chairman, of the soundness of the scientific basis for this recommendation. I visited the site. I've talked to the scientists who conducted these experiments. I've obviously poured through a lot of documents that have been collected over the years and reviewed the results of 116 hearings that have been conducted, producing somewhere in the vicinity of 37,000 public comments. We have summarized those comments and we have responded to them.

In addition to the fact that this project meets the scientific test for safety, I believe it is also quite clear that Yucca Mountain is important because of the national interest it serves. Energy security is an important national priority. A site designation here will encourage investment and continuing production of nuclear energy in this country which I think the committee is well aware, produces currently approximately 20 percent of our electricity mix. Building this repository will allow the nuclear energy share of the energy production in this country to continue. It will allow existing facilities to operate through their life expectancies, including possible license renewals. I think it also will have the potential to bring about investment in new facilities as well.

Yucca Mountain is also important to our national security. The most strategic vessels in our Navy, the largest ships and submarines, are dependent on nuclear power for propulsion. Naval spent fuel is temporarily stored in Idaho. That was never intended to be the permanent place for the waste to be left and I have to say it's occurring under an agreement with the State that is, at best, tense. We have, of course, told people we would build this facility years ago, and that spent fuel will go to a repository. To do otherwise, will place this agreement, in an uncertain condition.

The repository is important for homeland security. We believe that consolidating the storage of nuclear waste in an isolated repository, 1,000 feet below the desert is a better way to protect that waste from any possible vulnerability.

It's also important that we build Yucca Mountain for environmental purposes. A repository is necessary to complete the environmental cleanup of the World War II and cold war defense complex which contributed to our national defense. Nearly 100 million gallons of liquid waste in Washington and South Carolina awaits solidification and ultimate disposal in a repository. In addition, nuclear material that currently sits at sites in Colorado, New York and Idaho will eventually find its way to the repository.

This program is important for nonproliferation reasons as well. As I think the committee is well aware, our agreement to move forward with the disposition of weapons grade plutonium with Russia

is, in part, dependent on the United States moving ahead with a program to dispose of our plutonium in an ultimate resting place. The MOX fuel, which would be our means of disposition, would eventually have to be disposed of in a repository. So, there are an overwhelming number of very compelling national interest reasons for us to move ahead.

Now the choice is for Congress to make. Obviously, Nevada's decision to veto our recommendation to move ahead places this issue squarely before you to override that veto. I want to talk about what this means. An override of Nevada's veto does not mean that tomorrow trucks will begin moving to Nevada. What it means is that all of the issues that relate to whether or not we can safely proceed with this facility will be brought before the NRC for an objective and neutral decision by experts. That is all that we are asking for. The chance to have this research, which we believe is accurate, be ultimately tested by the authorities who are best able to make a decision during the licensing process.

Failure to override, however, ends the Yucca Mountain project. Yet it still leaves Congress and the United States with the statutory responsibility for the waste, as well as creating the various problems in terms of energy security, national security, homeland security, environmental cleanup. I believe a decision to oppose the override is a decision clearly to abandon the repository program and subject the country to the negative consequences that I mentioned without even letting the neutral experts at the Nuclear Regulatory Commission decide whether it's, in fact, possible for us to do this. In my judgment, nothing that has been advanced in terms of criticism of the project comes close to meeting what I think would be a very high burden of proof that would have to be required at this point to simply abandon the project without subjecting it to a final determination by the Nuclear Regulatory Commission, failue to overide would leave waste stranded at 131 sites in 39 States.

Opposition, in my judgment, to the joint resolution, to at least submitting this question to the NRC, seems warranted only if one is convinced beyond a reasonable doubt that there is such overwhelming evidence that a repository at Yucca Mountain cannot meet the EPA and NRC standards, that it would be a waste of time and money to allow the Nuclear Regulatory Commission processes to reach a final decision. And in my judgment, there is overwhelming scientific support for the project and for our capacity to obtain a license. So I urge Congress to act promptly and favorably on the proposed Joint Resolution, so the next stage of addressing the merits of all remaining issues, by applying the independent expertise of the Nuclear Regulatory Commission, can begin.

Mr. Chairman, I appreciate the chance to be here today and of course, would be glad to try to answer questions of the committee.

[The prepared statement of Hon. Spencer Abraham follows:]

PREPARED STATEMENT OF HON. SPENCER ABRAHAM, SECRETARY OF ENERGY

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. 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.

I am encouraged that Congress is considering this Joint Resolution without delay, and ask that you continue your hard work to see this Resolution through to its final passage, so 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.

The significance of 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, the 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 airborne pollution or 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.

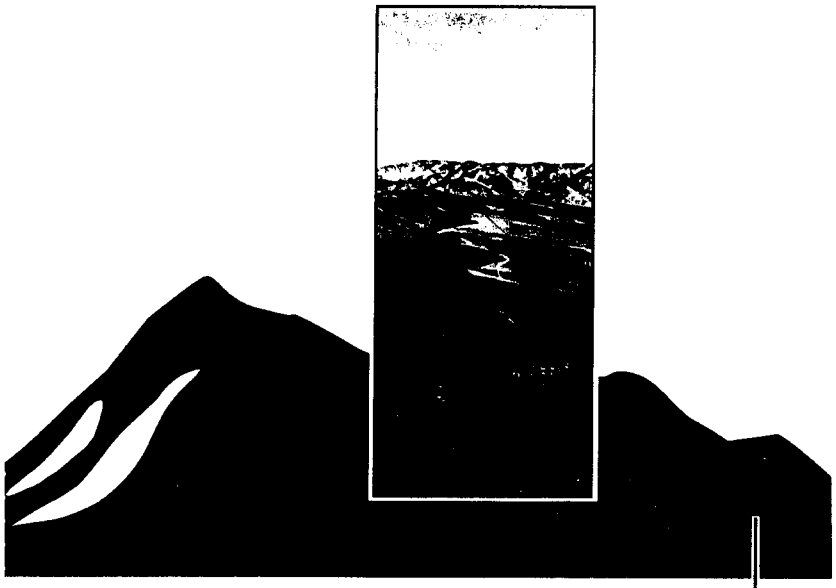
Support for the proposed resolution, on the other hand, does not require being convinced that the Department of Energy is right in believing that a repository at Yucca Mountain will meet the applicable standards or that the NRC will decide it should be licensed—although in my judgment the scientific 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 Congress to act promptly and favorably on the proposed joint resolution so that the next stage of addressing the merits of all remaining issues, by applying the independent expertise of the Nuclear Regulatory Commission, can begin in earnest.

Mr. BARTON. We thank you, Mr. Secretary, before I recognize myself to ask questions, the Chair would ask unanimous consent that three different documents be put in the record. The first is a

copy of the DOE document entitled "Yucca Mountain Project Site Recommendation Material" which includes the Secretary's recommendation to the President, the President's recommendation to the Congress. The second document is a copy of the State of Nevada's Formal Disapproval on Yucca Mountain which was submitted to the House of Representatives Speaker, Mr. Hastert, on April 8, 2002. The third is the written testimony of the Governor of Nevada, Governor Kenny Guinn, who could not be here today. These have been precleared by staff on the Minority side. Is there objection to these documents being put into the record? Hearing none, so ordered.

[The material referred to follows:]



Yucca Mountain Project
Site Recommendation Material

CONTENTS

Volume II: Appendices
Volume III: Comment Response Document Part 1 - Introduction, Index Tables, and Key Agency Comments and Responses
Volume III: Comment Response Document, Part 2 - Chapters1 through 6
Volume III: Comment Response Document, Part 3 - Chapter 7
Volume III: Comment Response Document, Part 4 – Chapters 8 through 13

FEIS Public Comment Documents Compact Disk

Public Comment Documents – Images of Hearing Transcripts and Public Comments

White House Statement by the Press Secretary:

http://www.whitehouse.gov/news/releases/2002/02/20020215-11.html

Letter to Congress: President George W. Bush:

http://www.whitehouse.gov/news/releases/2002/02/20020215-10.html

Letter to the President: Secretary Spencer Abraham:

http://www.ymp.gov/new/salp.pdf

Recommendation to the President: Secretary Spencer Abraham:

http://www.ymp.gov/new/sar.pdf

National Map of Waste Locations:

http://www.ymp.gov/map/index.htm

Frequently Asked Questions:

http://www.ymp.gov/new/faq.pdf

Yucca Mountain Science and Engineering Report, Revision 1:

http://www.ymp.gov/documents/ser_b/index.htm

Yucca Mountain Site Suitability Evaluation:

http://www.ymp.gov/documents/sse_a/index.htm

Comment Summary Documents (initial and supplemental comment periods):

http://www.ymp.gov/documents/csd_a/index.htm

http://www.ymp.gov/documents/scsd_a/index.htm

Additional State Comments (received after close of the public comment periods) and Responses under Section 114(a)(1) of the NWPA:

http://www.ymp.gov/new/addcomments.pdf

State of Nevada Impact Reports:

http://www.ymp.gov/documents/impact/index.htm

Nevada County Impact Reports:

http://www.ymp.gov/new/official/reports/counties.htm

NRC Preliminary Comments on Sufficiency of DOE Information:

http://www.ymp.gov/new/nrc_sufficny_ltr.pdf

Summary of the Environmental Impact Statement:

http://yucca-web1.ymp.gov/documents/feis_a/rgd_summ/rgsum_bm.pdf

Agency Comments on Final Environmental Impact Statement:

http://www.ymp.gov/new/sr_agency.htm

Why Yucca Mountain? Yucca Mountain Project Brochure:

http://www.ymp.gov/new/brochure.pdf

Final Environmental Impact Statement (FEIS):

http://yucca-web1.ymp.gov/documents/feis_a/web_pdf

FEIS Public Comment Documents:

http://yucca-web1.ymp.gov/documents/feis_a/web_pdf

the White House
President George W. Bush

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For Immediate Release
Office of the Press Secretary
February 15, 2002

Yucca Mountain Statement

Statement by the Press Secretary

The President today notified the Congress that he considers Yucca Mountain qualified for a construction permit application, taking the next in a series of steps required for approving the site as a nuclear materials repository.

The President's decision to recommend Yucca Mountain is based on sound science. It follows decades of scientific study and a determination by the Secretary of Energy that the site can be safely used to store these materials.

In the course of making his decision, the President listened to the Governor, the State's Senators, and representatives of the people of Nevada and gave careful consideration to their views.

He also consulted extensively with his science and environmental advisers to ensure that they concurred with the science, safety, and environmental conclusions of the Secretary's recommendation.

Finding a safe and central repository is not only mandated by law, but it is in America's national security and homeland security interests. Forty percent of our Navy's fleet depends on nuclear power.

Currently, nuclear materials are stored in 131 above-ground facilities in 39 states, and 161 million Americans live within 75 miles of these sites. One central site provides more protection for this material than do the existing 131 sites.

One out of every five times someone turns on a light switch, it's thanks to the fact that nuclear power produces 20 percent of our Nation's electricity. Given the environmental benefits of nuclear power, a safe repository for nuclear materials will help us pursue our energy and environmental security goals.

Since the Congress passed a law requiring a repository in 1982, this has been a serious issue for the American people. The President recognizes that the law now gives Nevada the opportunity to disapprove the recommendation and, if they do, then the Congress will have an opportunity to act. After two decades, the time has come to resolve this issue once and for all.

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The White House
President George W. Bush

For Immediate Release
Office of the Press Secretary
February 15, 2002

Presidential Letter to Congress
Text of a Letter from the President to the Speaker of the House of Representatives and the President of the Senate
February 15, 2002

Dear Mr. Speaker: (Dear Mr. President:)

In accordance with section 114 of the Nuclear Waste Policy Act of 1982, 42 U.S.C. 10134 (the "Act"), the Secretary of Energy has recommended approval of the Yucca Mountain site for the development at that site of a repository for the geologic disposal of spent nuclear fuel and high level nuclear waste from the Nation's defense activities. As is required by the Act, the Secretary has also submitted to me a comprehensive statement of the basis of his recommendation.

Having received the Secretary's recommendation and the comprehensive statement of the basis of it, I consider the Yucca Mountain site qualified for application for a construc-tion authorization for a repository. Therefore, I now recommend the Yucca Mountain site for this purpose. In accordance with section 114 of the Act, I am transmitting with this recommenda-tion to the Congress a copy of the comprehensive statement of the basis of the Secretary's recommendation prepared pursuant to the Act. The transmission of this document triggers an expedited process described in the Act. I urge the Congress to undertake any necessary legislative action on this recommendation in an expedited and bipartisan fashion.

Proceeding with the repository program is necessary to protect public safety, health, and the Nation's security because successful completion of this project would isolate in a geologic repository at a remote location highly radioactive materials now scattered throughout the Nation. In addition, the geologic repository would support our national security through disposal of nuclear waste from our defense facilities.

A deep geologic repository, such as Yucca Mountain, is important for our national security and our energy future. Nuclear energy is the second largest source of U.S. electricity generation and must remain a major component of our national energy policy in the years to come. The cost of nuclear power compares favorably with the costs of electricity generation by other sources, and nuclear power has none of the emissions associated with coal and gas power plants.

This recommendation, if it becomes effective, will permit commencement of the next rigorous stage of scientific and technical review of the repository program through formal licensing proceedings before the Nuclear Regulatory Commission. Successful completion of this program also will redeem the clear Federal legal obligation safely to dispose of commercial spent nuclear fuel that the Congress passed in 1982.

more

(OVER)

This recommendation is the culmination of two decades of intense scientific scrutiny involving application of an array of scientific and technical disciplines necessary and appropriate for this challenging undertaking. It is an undertaking that was mandated twice by the Congress when it legislated the obligations that would be redeemed by successful pursuit of the repository program. Allowing this recommendation to come into effect will enable the beginning of the next phase of intense scrutiny of the project necessary to assure the public health, safety, and security in the area of Yucca Mountain, and also to enhance the safety and security of the Nation as a whole.

Sincerely,

GEORGE W. BUSH

# # #

The Secretary of Energy
Washington, DC 20585

February 14, 2002

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

I am transmitting herewith, in accordance with section 114(a)(1) of the Nuclear Waste Policy Act of 1982 (the "Act"), 42 U.S.C. 10134, my recommendation for your approval of the Yucca Mountain site for the development of a nuclear waste repository, along with a comprehensive statement of the basis of my recommendation. In making this recommendation, I have examined three considerations.

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. This suitability determination provides the indispensable foundation for my recommendation. 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 long into the future.

The Department has engaged in over 20 years of scientific and technical investigation of the suitability of the Yucca Mountain site. As part of this investigation, some of the world's best scientists have been examining every aspect of the natural processes – past, present and future – that could affect the ability of a repository beneath Yucca Mountain to isolate radionuclides emitted from any spent fuel and radioactive waste disposed there. They have been conducting equally searching investigations into the processes that could affect the behavior of the engineered barriers that are expected to contribute to successful isolation of radionuclides. These investigations have run the gamut, from mapping the geologic features of the site, to studying the repository rock, to investigating whether and how water moves through the Yucca Mountain site.

To give just a few examples, Yucca Mountain scientists have: mapped geologic structures, including rock units, faults, fractures, and volcanic features; excavated more than 200 pits and trenches to remove rocks and other material for direct observation; drilled more than 450 boreholes; collected over 75,000 feet of core, and some 18,000 geologic and water samples; constructed six and one-half miles of tunnels to provide access to the rocks that would be used for the repository; mapped the geologic features exposed by the underground openings in the tunnels; conducted the largest known test in history to simulate heat effects of a repository, heating some seven million cubic feet of rock over its ambient temperature; tested mechanical,

chemical, and hydrologic properties of rock samples; and examined over 13,000 engineered material samples to determine their corrosion resistance in a variety of environments.

The findings from these and numerous other studies have been used to expand our knowledge of the rocks beneath Yucca Mountain and the flow of water through these rocks, including amounts, pathways, and rates. Yucca Mountain scientists have used this vast reservoir of information to develop computer simulations that describe the natural features, events and processes that exist at Yucca Mountain and, in turn, have used these descriptions to develop the models to forecast how a repository will perform far into the future. Yucca Mountain scientists have followed a deliberately cautious approach to enhance confidence in any prediction of future performance.

The results of this investigation have been openly and thoroughly reviewed by the Department and oversight entities such as the Nuclear Regulatory Commission (NRC), the Nuclear Waste Technical Review Board, and the U.S. Geological Survey, as well as having been subjected to scientific peer reviews, including a review undertaken by the International Atomic Energy Agency. The Department also has made available the scientific materials and analyses used to prepare the technical evaluations of site suitability for public review by all interested parties. The results of this extensive investigation and the external technical reviews of this body of scientific work give me confidence for the conclusion, based on sound scientific principles, that a repository at Yucca Mountain will be able to protect the health and safety of the public when evaluated against the radiological protection standards adopted by the Environmental Protection Agency and implemented by the NRC in accordance with Congressional direction in the Energy Policy Act of 1992.

Second, having found the site technically suitable, I am also convinced that there are compelling national interests that require development of a repository. In brief, the reasons are these:

- A repository is important to our national security. About 40% of our fleet's principal combat vessels, including submarines and aircraft carriers, are nuclear-powered. They must periodically be refueled and the spent fuel removed. This spent fuel is currently stored at surface facilities under temporary arrangements. A repository is necessary to assure a permanent disposition pathway for this material and thereby enhance the certainty of future naval operational capability.

- A repository is important to promote our non-proliferation objectives. The end of the Cold War has brought with it the welcome challenge of disposing of surplus weapons-grade plutonium as part of the process of decommissioning weapons we no longer need. A geological repository is an integral part of our disposition plans. Without it, our ability to meet our pledge to decommission our weapons could be placed in jeopardy, thereby jeopardizing the commitment of other nations, such as Russia, to decommission its own.

- A repository is important to our energy security. We must ensure that nuclear power, which provides 20% of the nation's electric power, remains

an important part of our domestic energy production. Without the stabilizing effects of nuclear power, energy markets will become increasingly more exposed to price spikes and supply uncertainties, as we are forced to replace it with other energy sources to substitute for the almost five hours of electricity that nuclear power currently provides each day, on average, to each home, farm, factory and business in America. Nuclear power is also important to sustainable growth because it produces no controlled air pollutants, such as sulfur and particulates, or greenhouse gases. A repository at Yucca Mountain is indispensable to the maintenance and potential growth of this environmentally efficient source of energy.

- A repository is important to our homeland security. Spent nuclear fuel, high-level radioactive waste, and excess plutonium for which there is no complete disposal pathway without a repository are currently stored at over 131 sites in 39 States. More than 161 million Americans live within 75 miles of one or more of these sites. The facilities housing these materials were intended to do so on a temporary basis. They should be able to withstand current terrorist threats, but that may not remain the case in the future. These materials would be far better secured in a deep underground repository at Yucca Mountain, on federal land, far from population centers, that can withstand an attack well beyond any that is reasonably conceivable.

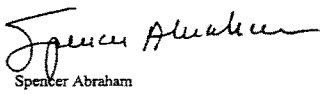
- And a repository is important to our efforts to protect the environment. It is past time for the federal government to implement an environmentally sound disposition plan for our defense wastes, which are located in Tennessee, Colorado, South Carolina, New Mexico, New York, Washington and Idaho. Among the wastes currently at these sites, approximately 100,000,000 gallons of high-level liquid waste are stored in, and in some instances have leaked from, temporary holding tanks. About 2,500 metric tons of solid un-reprocessed fuel from production and other reactors also are stored at these sites. It is also past time for the federal government to begin disposition of commercial spent fuel, a program that was to have begun in 1998. A repository is necessary for accomplishment of either of these objectives.

Third, I have considered carefully the primary arguments against locating a repository at Yucca Mountain. None of these arguments rises to a level that would outweigh the case for going forward. This is not to say that there have not been important concerns identified. I am confident, however, these concerns have been and will continue to be addressed in an appropriate manner.

In short, after months of study based on scientific and technical research unique in its scope and depth, and after reviewing the results of a public review process that went well beyond the requirements of the Act, I reached the conclusions described in the preceding paragraphs – namely, that technically and scientifically the Yucca Mountain site is fully suitable; that development of a repository at the Yucca Mountain site serves the national interest in numerous important ways; and that the arguments against its designation do not rise to a level that would outweigh the case for going forward. Not completing the site designation process and moving forward to licensing the development of a repository, as Congress mandated almost 20 years ago, would be an irresponsible dereliction of duty.

Accordingly, I recommend the Yucca Mountain site for the development of a nuclear waste repository.

Respectfully,



Spencer Abraham

Recommendation by the Secretary of Energy
Regarding the Suitability of the Yucca Mountain Site
for a Repository Under the Nuclear Waste Policy Act of 1982

February 2002

I. Introduction

For more than half a century, since nuclear science helped us win World War II and ring in the Atomic Age, scientists have known that the Nation would need a secure, permanent facility in which to dispose of radioactive wastes. Twenty years ago, when Congress adopted the Nuclear Waste Policy Act of 1982 (NWPA or "the Act"), it recognized the overwhelming consensus in the scientific community that the best option for such a facility would be a deep underground repository. Fifteen years ago, Congress directed the Secretary of Energy to investigate and recommend to the President whether such a repository could be located safely at Yucca Mountain, Nevada. Since then, our country has spent billions of dollars and millions of hours of research endeavoring to answer this question. I have carefully reviewed the product of this study. In my judgment, it constitutes sound science and shows that a safe repository can be sited there. I also believe that compelling national interests counsel in favor of proceeding with this project. Accordingly, consistent with my responsibilities under the NWPA, today I am recommending that Yucca Mountain be developed as the site for an underground repository for spent fuel and other radioactive wastes.[1]

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. Yucca Mountain is far and away the most thoroughly researched site of its kind in the world. It is a geologically stable site, in a closed groundwater basin, isolated on thousands of acres of Federal land, and farther from any metropolitan area than the great majority of less secure, temporary nuclear waste storage sites that exist in the country today.

This point bears emphasis. We are not confronting a hypothetical problem. We have a staggering amount of radioactive waste in this country – nearly 100,000,000 gallons of high-level nuclear waste and more than 40,000 metric tons of spent nuclear fuel with more created every day. Our choice is not between, on the one hand, a disposal site with costs and risks held to a minimum, and, on the other, a magic disposal system with no costs or risks at all. Instead, the real choice is between a single secure site, deep under the ground at Yucca Mountain, or making do with what we have now or some variant of it – 131 aging surface sites, scattered across 39 states. Every one of those sites was built on the assumption that it would be temporary. As time goes by, every one is closer to the limit of its safe life span. And every one is at least a potential security risk – safe for today, but a question mark in decades to come.

The Yucca Mountain facility is important to achieving a number of our national goals. It will promote our energy security, our national security, and safety in our homeland. It will help strengthen our economy and help us clean up the environment.

The benefits of nuclear power are with us every day. Twenty percent of our country's electricity comes from nuclear energy. To put it another way, the "average" home operates on nuclear-generated electricity for almost five hours a day. A government with a complacent, kick-the-

[1] For purposes of this Recommendation, the terms "radioactive waste" and "waste" are used to cover high-level radioactive waste and spent nuclear fuel, as those terms are used in the Nuclear Waste Policy Act.

can-down-the-road nuclear waste disposal policy will sooner or later have to ask its citizens which five hours of electricity they would care to do without.

Regions that produce steel, automobiles, and durable goods rely in particular on nuclear power, which reduces the air pollution associated with fossil fuels – greenhouse gases, solid particulate matter, smog, and acid rain. But environmental concerns extend further. Most commercial spent fuel storage facilities are near large populations centers; in fact, more than 161 million Americans live within 75 miles of these facilities. These storage sites also tend to be near rivers, lakes, and seacoasts. Should a radioactive release occur from one of these older, less robust facilities, it could contaminate any of 20 major waterways, including the Mississippi River. Over 30 million Americans are served by these potentially at-risk water sources.

Our national security interests are likewise at stake. Forty percent of our warships, including many of the most strategic vessels in our Navy, are powered by nuclear fuel, which eventually becomes spent fuel. At the same time, the end of the Cold War has brought the welcome challenge to our Nation of disposing of surplus weapons-grade plutonium as part of the process of decommissioning our nuclear weapons. Regardless of whether this material is turned into reactor fuel or otherwise treated, an underground repository is an indispensable component in any plan for its complete disposition. An affirmative decision on Yucca Mountain is also likely to affect other nations' weapons decommissioning, since their willingness to proceed will depend on being satisfied that we are doing so. Moving forward with the repository will contribute to our global efforts to stem the proliferation of nuclear weapons in other ways, since it will encourage nations with weaker controls over their own materials to follow a similar path of permanent, underground disposal, thereby making it more difficult for these materials to fall into the wrong hands. By moving forward with Yucca Mountain, we will show leadership, set out a roadmap, and encourage other nations to follow it.

There will be those who say the problem of nuclear waste disposal generally, and Yucca Mountain in particular, needs more study. In fact, both issues have been studied for more than twice the amount of time it took to plan and complete the moon landing. My Recommendation today is consistent with the conclusion of the National Research Council of the National Academy of Sciences – a conclusion reached, not last week or last month, but 12 years ago. The Council noted "a worldwide scientific consensus that deep geological disposal, the approach being followed by the United States, is the best option for disposing of high-level radioactive waste."[2] Likewise, a broad spectrum of experts agrees that we now have enough information, including more than 20 years of researching Yucca Mountain specifically, to support a conclusion that such a repository can be safely located there.[3]

Nonetheless, should this site designation ultimately become effective, considerable additional study lies ahead. Before an ounce of spent fuel or radioactive waste could be sent to Yucca

[2] *Rethinking High-Level Radioactive Waste Disposal: A Position Statement of the Board on Radioactive Waste Management*, Washington, D.C., National Academy Press, 1990.

[3] Letter and attached report, Charles G. Groat, Director, U.S. Geologic Survey, to Robert G. Card, October 4, 2001 (hereafter *USGS Letter & Report*); Letter and attached report, Hans Riotte, NEA-IAEA Joint Secretariat, to Lake H. Barrett, November 2, 2001 (hereafter *NEA-IAEA Letter & Report*); Letter, Charles V. Shank, Director, Lawrence Berkeley National Laboratory, to Spencer Abraham, September 6, 200 (hereafter *Lawrence Berkeley National Laboratory Letter*).

Mountain, indeed even before construction of the permanent facilities for emplacement of waste could begin there, the Department of Energy (DOE or "the Department") will be required to submit an application to the independent Nuclear Regulatory Commission (NRC). There, DOE would be required to make its case through a formal review process that will include public hearings and is expected to last at least three years. Only after that, if the license were granted, could construction begin. The DOE would also have to obtain an additional operating license, supported by evidence that public health and safety will be preserved, before any waste could actually be received.

In short, even if the Yucca Mountain Recommendation were accepted today, an estimated minimum of eight more years lies ahead before the site would become operational.

We have seen decades of study, and properly so for a decision of this importance, one with significant consequences for so many of our citizens. As necessary, many more years of study will be undertaken. But it is past time to stop sacrificing that which is forward-looking and prudent on the altar of a *status quo* we know ultimately will fail us. The *status quo* is not the best we can do for our energy future, our national security, our economy, our environment, and safety – and we are less safe every day as the clock runs down on dozens of older, temporary sites.

I recommend the deep underground site at Yucca Mountain, Nevada, for development as our Nation's first permanent facility for disposing of high-level nuclear waste.

2. Background

2.1. History of the Yucca Mountain Project and the Nuclear Waste Policy Act

The need for a secure facility in which to dispose of radioactive wastes has been known in this country at least since World War II. As early as 1957, a National Academy of Sciences report to the Atomic Energy Commission suggested burying radioactive waste in geologic formations. Beginning in the 1970s, the United States and other countries evaluated many options for the safe and permanent disposal of radioactive waste, including deep seabed disposal, remote island siting, dry cask storage, disposal in the polar ice sheets, transmutation, and rocketing waste into orbit around the sun. After analyzing these options, disposal in a mined geologic repository emerged as the preferred long-term environmental solution for the management of these wastes.[4] Congress recognized this consensus 20 years ago when it passed the Nuclear Waste Policy Act of 1982.

In the Act, Congress created a Federal obligation to accept civilian spent nuclear fuel and dispose of it in a geologic facility. Congress also designated the agencies responsible for implementing this policy and specified their roles. The Department of Energy must characterize, site, design, build, and manage a Federal waste repository. The Environmental Protection Agency (EPA) must set the public health standards for it. The Nuclear Regulatory Commission must license its construction, operation, and closure.

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[4] *Final Environmental Impact Statement for Management of Commercially Generated Radioactive Waste*, DOE/EIS-0046, 1980.

The Department of Energy began studying Yucca Mountain almost a quarter century ago. Even before Congress adopted the NWPA, the Department had begun national site screening research as part of the National Waste Terminal Storage program, which included examination of Federal sites that had previously been used for defense-related activities and were already potentially contaminated. Yucca Mountain was one such location, on and adjacent to the Nevada Test Site, which was then under consideration. Work began on the Yucca Mountain site in 1978. When the NWPA was passed, the Department was studying more than 25 sites around the country as potential repositories. The Act provided for the siting and development of two; Yucca Mountain was one of nine sites under consideration for the first repository program.

Following the provisions of the Act and the Department's siting Guidelines,[5] the Department prepared draft environmental assessments for the nine sites. Final environmental assessments were prepared for five of these, including Yucca Mountain. In 1986, the Department compared and ranked the sites under consideration for characterization. It did this by using a multi-attribute methodology – an accepted, formal scientific method used to help decision makers compare, on an equivalent basis, the many components that make up a complex decision. When all the components of the ranking decision were considered together, taking account of both pre-closure and post-closure concerns, Yucca Mountain was the top-ranked site.[6] The Department examined a variety of ways of combining the components of the ranking scheme; this only confirmed the conclusion that Yucca Mountain came out in first place. The EPA also looked at the performance of a repository in unsaturated tuff. The EPA noted that in its modeling in support of development of the standards, unsaturated tuff was one of the two geologic media that appeared most capable of limiting releases of radionuclides in a manner that keeps expected doses to individuals low.[7]

In 1986, Secretary of Energy Herrington found three sites to be suitable for site characterization, and recommended the three, including Yucca Mountain, to President Reagan for detailed site characterization.[8] The Secretary also made a preliminary finding, based on Guidelines that did not require site characterization, that the three sites were suitable for development as repositories.[9]

The next year, Congress amended the NWPA, and selected Yucca Mountain as the single site to be characterized. It simultaneously directed the Department to cease activities at all other potential sites. Although it has been suggested that Congress's decision was made for purely political reasons, the record described above reveals that the Yucca Mountain site consistently ranked at or near the top of the sites evaluated well before Congress's action.

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[5] The Guidelines then in force were promulgated at 10 CFR part 960, General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories, 1984.

[6] *Recommendation by the Secretary of Energy of Candidate Sites for Site Characterization for the First Radioactive Waste Repository,* DOE/S-0048, May 1986.

[7] Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, Final Rule, 40 CFR Part 191, December 20, 1993.

[8] Letter, John S. Herrington, Secretary of Energy, to President Ronald Reagan, May 27, 1986, with attached report, *Recommendation by the Secretary of Energy of Candidate Sites for Site Characterization for the First Radioactive Waste Repository,* DOE/S-0048, May 1986.

[9] *Ibid.*

As previously noted, the National Research Council of the National Academy of Sciences concluded in 1990 (and reiterated last year) that there is "a worldwide scientific consensus that deep geological disposal, the approach being followed by the United States, is the best option for disposing of high-level radioactive waste."[10] Today, many national and international scientific experts and nuclear waste management professionals agree with DOE that there exists sufficient information to support a national decision on designation of the Yucca Mountain site.[11]

2.2. The Nuclear Waste Policy Act and the Responsibilities of the Department of Energy and the Secretary

Congress assigned to the Secretary of Energy the primary responsibility for implementing the national policy of developing a deep underground repository. The Secretary must determine whether to initiate the next step laid out in the NWPA – a recommendation to designate Yucca Mountain as the site for development as a permanent disposal facility. The criteria for this determination are described more fully in section 5. Briefly, I first must determine whether Yucca Mountain is in fact technically and scientifically suitable to be a repository. A favorable suitability determination is indispensable for a positive recommendation of the site to the President. Under additional criteria I have adopted above and beyond the statutory requirements, I have also sought to determine whether, when other relevant considerations are taken into account, recommending it is in the overall national interest and, if so, whether there are countervailing arguments so strong that I should nonetheless decline to make the Recommendation.

The Act contemplates several important stages in evaluating the site before a Secretarial recommendation is in order. It directs the Secretary to develop a site characterization plan, one that will help guide test programs for the collection of data to be used in evaluating the site. It directs the Secretary to conduct such characterization studies as may be necessary to evaluate the site's suitability. And it directs the Secretary to hold hearings in the vicinity of the prospective site to inform the residents and receive their comments. It is at the completion of these stages that the Act directs the Secretary, if he finds the site suitable, to determine whether to recommend it to the President for development as a permanent repository.

If the Secretary recommends to the President that Yucca Mountain be developed, he must include with the Recommendation, and make available to the public, a comprehensive statement of the basis for his determination.[12] If at any time the Secretary determines that Yucca Mountain is not a suitable site, he must report to Congress within six months his recommendations for further action to assure safe, permanent disposal of spent nuclear fuel and high-level radioactive waste.

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[10] *Rethinking High-Level Radioactive Waste Disposal: A Position Statement of the Board on Radioactive Waste Management*, Washington, D.C., National Academy Press, 1990. And: *Disposition of High-Level Waste and Spent Nuclear Fuel: The Continuing Societal and Technical Challenges*, Board on Radioactive Waste Management, Washington, D.C., National Academy Press, 2001.

[11] *USGS Letter & Report, supra; NEA-IAEA Letter & Report, supra; Lawrence Berkeley National Laboratory Letter, supra.*

[12] This document together with accompanying materials comprises the recommendation and the comprehensive statement. The accompanying materials are described in footnote 26.

Following a Recommendation by the Secretary, the President may recommend the Yucca Mountain site to Congress "if... [he] considers [it] qualified for application for a construction authorization...."[13] If the President submits a recommendation to Congress, he must also submit a copy of the statement setting forth the basis for the Secretary's Recommendation.

A Presidential recommendation takes effect 60 days after submission unless Nevada forwards a notice of disapproval to the Congress. If Nevada submits such a notice, Congress has a limited time during which it may nevertheless give effect to the President's recommendation by passing, under expedited procedures, a joint resolution of siting approval. If the President's recommendation takes effect, the Act directs the Secretary to submit to the NRC a construction license application.

The NWPA by its terms contemplated that the entire process of siting, licensing, and constructing a repository would have been completed more than four years ago, by January 31, 1998. Accordingly, it required the Department to enter into contracts to begin accepting waste for disposal by that date.

3. Decision

3.1. The Recommendation

After over 20 years of research and billions of dollars of carefully planned and reviewed scientific field work, the Department has found that a repository at Yucca Mountain brings together the location, natural barriers, and design elements most likely to protect the health and safety of the public, including those Americans living in the immediate vicinity, now and long into the future. It is therefore suitable, within the meaning of the NWPA, for development as a permanent nuclear waste and spent fuel repository.

After reviewing the extensive, indeed unprecedented, analysis the Department has undertaken, and in discharging the responsibilities made incumbent on the Secretary under the Act, I am recommending to the President that Yucca Mountain be developed as the Nation's first permanent, deep underground repository for high-level radioactive waste. A decision to develop Yucca Mountain will be a critical step forward in addressing our Nation's energy future, our national defense, our safety at home, and protection for our economy and environment.

3.2. What This Recommendation Means, and What It Does Not Mean

Even after so many years of research, this Recommendation is a preliminary step. It does no more than start the formal safety evaluation process. Before a license is granted, much less before repository construction or waste emplacement may begin, many steps and many years still lie ahead. The DOE must submit an application for a construction license; defend it through formal review, including public hearings; and receive authorization from the NRC, which has the statutory responsibility to ensure that any repository built at Yucca Mountain meets stringent

[13] NWPA section 114(a)(2)(A).

tests of health and safety. The NRC licensing process is expected to take a minimum of three years. Opposing viewpoints will have every opportunity to be heard. If the NRC grants this first license, it will only authorize initial construction. The DOE would then have to seek and obtain a second operating license from the NRC before any wastes could be received. The process altogether is expected to take a minimum of eight years.

The DOE would also be subject to NRC oversight as a condition of the operating license. Construction, licensing, and operation of the repository would also be subject to ongoing Congressional oversight.

At some future point, the repository is expected to close. EPA and NRC regulations require monitoring after the DOE receives a license amendment authorizing the closure, which would be from 50 to about 300 years after waste emplacement begins, or possibly longer.
The repository would also be designed, however, to be able to adapt to methods future generations might develop to manage high-level radioactive waste. Thus, even after completion of waste emplacement, the waste could be retrieved to take advantage of its economic value or usefulness to as yet undeveloped technologies.

Permanently closing the repository would require sealing all shafts, ramps, exploratory boreholes, and other underground openings connected to the surface. Such sealing would discourage human intrusion and prevent water from entering through these openings. DOE's site stewardship would include maintaining control of the area, monitoring and testing, and implementing security measures against vandalism and theft. In addition, a network of permanent monuments and markers would be erected around the site to alert future generations to the presence and nature of the buried waste.[14] Detailed public records held in multiple places would identify the location and layout of the repository and the nature and potential hazard of the waste it contains. The Federal Government would maintain control of the site for the indefinite future. Active security systems would prevent deliberate or inadvertent human intrusion and any other human activity that could adversely affect the performance of the repository.

4. Decision Determination Methodology and the Decision-Making Process

I have considered many kinds of information in making my determination today. I have put on a hard hat, gone down into the Mountain, and spoken with many of the scientists and engineers working there. Of course my decision-making included a great deal more than that. I have also personally reviewed detailed summaries of the science and research undertaken by the Yucca Mountain Project since 1978. I relied upon review materials, program evaluations, and face-to-face briefings given by many individuals familiar with the Project, such as the acting program manager and program senior staff.

My consideration included: (a) the general background of the program, including the relevant legislative history; (b) the types, sources, and amounts of radioactive waste that would be disposed of at the site and their risk; (c) the extent of Federal responsibilities; (d) the criteria for a

[14]During characterization of the Yucca Mountain site, Nye County began to develop its Early Warning Monitoring program and boreholes. These boreholes not only provide information about water movement in the area of the site, but also can serve as monitoring points should a repository be built at Yucca Mountain.

suitability decision, including the NWPA's provisions bearing on the basis for the Secretary's consideration; the regulatory structure, its substance, history, and issues; DOE's Yucca Mountain Suitability Guidelines promulgated under the NWPA;[15] the NRC licensing regulations,[16] and EPA radiation protection standards[17] as referenced in the Suitability Guidelines; (e) assessments of repository performance, including technical data and descriptions of how those data were gathered and evaluated; assessments of the effectiveness of natural and engineered barriers in meeting applicable radiation protection standards, and adjustments for uncertainties associated with each of these; (f) the Yucca Mountain Site Suitability Evaluation; (g) the views of members of the public, including those expressed at hearings and through written comments; (h) environmental, socioeconomic, and transportation issues; (i) program oversight history, technical issues, and responses, including the role and views of the NRC, the Nuclear Waste Technical Review Board, the General Accounting Office, the Inspector General, and the State of Nevada; and the role and views of the National Laboratories, the United States Geological Survey, and peer reviews; and (j) public policy impact.

I also requested an external review of program briefing materials. It was conducted by Dr. Chris Whipple, a member of the National Academy of Engineering and an experienced independent peer reviewer of programs for both the Waste Isolation Pilot Plant and the Yucca Mountain Project. Dr. Whipple previously had led a peer review team that critically analyzed Total System Performance Assessment (TSPA) work of the Yucca Mountain Project.

I also reviewed the comment summary documents from both the Environmental Impact Statement (EIS) and NWPA Section 114 site recommendation hearing process in order fully to take into account public views concerning a possible recommendation of the Yucca Mountain site. This review enabled me to evaluate scientific and research results in the context of both strongly held local concerns and issues of national importance. I took particular note of comments and concerns raised by the Governor of Nevada, governors of other states, state agencies, Native American tribes, and members of the public at large.

5. Decision Criteria

My charge to make a recommendation to the President on this matter stems from the Nuclear Waste Policy Act of 1982. That statute directs the Secretary of Energy to determine "whether to recommend to the President that he approve [the Yucca Mountain] site for development of a repository."[18] The NWPA establishes certain guideposts along the way to making this determination, but it also gives the Secretary significant responsibility for deciding what the relevant considerations are to be.

Pursuant to that responsibility, I concluded that I should use three criteria in determining whether to recommend approval of the Yucca Mountain Project. First, is Yucca Mountain a scientifically

[15] 10 CFR Part 963, Yucca Mountain Site Suitability Guidelines, November 14, 2001.
[16] 10 CFR Part 63, Disposal of High-Level Radioactive Waste in a Geologic Repository at Yucca Mountain, Nevada, November 2, 2001.
[17] 40 CFR Part 197, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada, June 13, 2001.
[18] NWPA section 114(a)(1).

and technically suitable site for a repository, *i.e.*, a site that promises a reasonable expectation of public health and safety for disposal of spent nuclear fuel and high-level radioactive waste for the next 10,000 years? Second, are there compelling national interests that favor proceeding with the decision to site a repository there? And third, are there countervailing considerations that outweigh those interests?

The first of these criteria is expressly contemplated by the NWPA, although the NWPA also confers considerable discretion and responsibility on the Secretary in defining how to determine scientific and technical suitability and in making a judgment on the question. The two other criteria are not specified by the NWPA, but I am convinced that they are appropriate checks on a pure suitability-based decision.

5.1. Scientific and Technical Suitability

Under the NWPA, the first step in a Secretarial determination regarding Yucca Mountain is deciding whether it is scientifically and technically suitable as a repository site. Although the NWPA does not state explicitly that this is the initial step, the language and structure of the Act strongly suggest that this is so. Most significantly, section 114(a)(1) of the NWPA states that the Secretary's recommendation is to be made at the conclusion of site characterization.[19] Section 113, in turn, makes clear that the function of site characterization is to provide enough site-specific information to allow a decision on Yucca Mountain's scientific suitability.[20]

As to what a determination of site suitability entails, the only real guidance the Act provides is that in several places it equates a favorable suitability judgment with a judgment that a repository could (1) be built at that site and (2) receive a construction authorization from the NRC.[21] This suggests that a determination that the site is suitable entails a judgment on my part that a repository at Yucca Mountain would likely be licensable by the NRC.

Beyond that, the NWPA largely leaves the question to the Secretary of Energy by charging him with establishing "criteria to be used to determine the suitability of ... candidate site[s] for the location of a repository."[22] On November 14, 2001, following NRC's concurrence, the Department issued its final version of these criteria in a rule entitled, "Yucca Mountain Site Suitability Guidelines." I shall describe these in detail in the next section of this Recommendation, but outline them here. In brief, DOE's Guidelines envision that I may find the Yucca Mountain site suitable if I conclude that a repository constructed there is "likely" to meet

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[19] Ibid.

[20] This is apparent from two related provisions of section 113: section 113(c)(1), which states that, "The Secretary may conduct at the Yucca Mountain site only such site characterization activities as the Secretary considers necessary to provide the data required for evaluation of the suitability of such site for an application to be submitted to the Commission for a construction authorization for a repository at such site" (as well as for NEPA purposes); and its companion provision, section 113(c)(3), which states that, "If the Secretary at any time determines the Yucca Mountain site to be unsuitable for development as a repository, the Secretary shall ... terminate all site characterization activities [there]."

[21] NWPA section 112(b)(1)(D)(ii); NWPA section 113(c)(1); NWPA section 113(c)(3).

[22] NWPA section 113(b)(1)(A)(iv). That section contemplates that these criteria are to be included in the first instance in the site characterization plan for each site and thereafter may be modified using the procedures of section 112(a).

extremely stringent radiation protection standards designed to protect public health and safety.[23] The EPA originally established these standards.[24] They are now also set out in NRC licensing rules.[25]

The EPA and NRC adopted the standards so as to assure that while the repository is receiving nuclear materials, any radiation doses to workers and members of the public in the vicinity of the site would be at safe levels, and that after the repository is sealed, radiation doses to those in the vicinity would be at safe levels for 10,000 years. These radiation protection levels are identical to those with which the DOE will have to demonstrate compliance to the satisfaction of the NRC in order to obtain a license to build the repository.

Using the Department's suitability Guidelines, I have concluded that Yucca Mountain is in fact suitable for a repository. The reasons for this conclusion are set out in section 7 of this Recommendation. However, I want to pause to make one thing clear at the outset. If for any reason I found that the site were not suitable or licensable, then, irrespective of any other consideration, I would not recommend it. Specifically, however much as I might believe that proceeding toward a repository would advance the national interest in other ways, those additional considerations could not properly influence, and have not influenced, my determination of suitability.

5.2. National Interest Considerations

Beyond scientific suitability, the NWPA is virtually silent on what other standard or standards the Secretary should apply in making a recommendation. It does direct me to consider certain matters. It requires that I consider the record of hearings conducted in the vicinity of Yucca Mountain, the site characterization record, and various other information I am directed to transmit to the President with my Recommendation.[26] The Act does not, however, specify how I

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[23] 10 CFR part 963.
[24] 40 CFR part 197.
[25] 10 CFR part 63.
[26] The statutorily required information is set out in Section 114(a)(1) of the NWPA, which states:
Together with any recommendation of a site under this paragraph, the Secretary shall make available to the public, and submit to the President, a comprehensive statement of the basis of such recommendation, including the following:
(A) a description of the proposed repository, including preliminary engineering specifications for the facility;
(B) a description of the waste form or packaging proposed for use at such repository, and an explanation of the relationship between such waste form or packaging and the geologic medium of such site;
(C) a discussion of data, obtained in site characterization activities, relating to the safety of such site;
(D) a final environmental impact statement prepared for the Yucca Mountain site pursuant to subsection (f) and the National Environmental Policy Act of 1969 [42 U.S.C. 4321 et seq.], together with comments made concerning such environmental impact statement by the Secretary of the Interior, the Council on Environmental Quality, the Administrator, and the Commission, except that the Secretary shall not be required in any such environmental impact statement to consider the need for a repository, the alternatives to geological disposal, or alternative sites to the Yucca Mountain site;
(E) preliminary comments of the Commission concerning the extent to which the at-depth site characterization analysis and the waste form proposal for such site seem to be sufficient for inclusion in any application to be submitted by the Secretary for licensing of such site as a repository;
(F) the views and comments of the Governor and legislature of any State, or the governing body of any affected Indian tribe, as determined by the Secretary, together with the response of the Secretary to such views;

am to consider these various items or what standard I am to use in weighing them. And finally among the items it directs me to take into account is, "such other information as the Secretary considers appropriate."

The approach taken in the Act led me to conclude that, after completing the first step of reaching a judgment as to the scientific suitability of Yucca Mountain, if I concluded the site was scientifically suitable, I should also address a second matter: whether it is in the overall national interest to build a repository there. In considering that issue, I have addressed two further questions: are there compelling national interests favoring development of the site, and if so, are there countervailing considerations weighty enough to overcome the arguments for proceeding with development? Sections 8 and 9 of this Recommendation set forth my conclusions on these questions.

In my view, the statute's silence on the factors that go into the recommendation process makes it at a minimum ambiguous on whether I should conduct any inquiry beyond the question of scientific suitability. In light of that ambiguity, I have elected to construe the statute as allowing me, if I make a favorable suitability determination based on science, also to consider whether development of a repository at Yucca Mountain is in the national interest. For several reasons, I believe this is the better way to interpret the NWPA. First, given the significance of a siting

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(G) such other information as the Secretary considers appropriate; and
(H) any impact report submitted under section 116(c)(2)(B) [42 U.S.C. 10136(c)(2)(B)] by the State of Nevada.
This material is attached to this Recommendation, as follows:

- The description of the repository called for by section 114(a)(1)(A) is contained in Chapter 2 of the Yucca Mountain Science and Engineering Report (YMS&ER), Revision 1.
- The material relating to the waste form called for by section 114(a)(1)(B) is contained in Chapters 3 and 4 of the YMS&ER, Revision 1.
- The discussion of site characterization data called for by section 114(a)(1)(C) is contained in Chapter 4 of the YMS&ER, Revision 1.
- The EIS-related material called for by section 114(a)(1)(D) is contained in the *Final Environmental Impact Statement (EIS) for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*, along with letters received from the Secretary of the Interior, the Chair of the Council on Environmental Quality, the Administrator of the Environmental Protection Agency, and the Chairman of the Nuclear Regulatory Commission (NRC), transmitting their respective comments on the final EIS.
- The information called for by section 114(a)(1)(E) is contained in a letter from NRC Chairman Meserve to Under Secretary Card, dated November 13, 2001.
- The information called for by section 114(a)(1)(F) is contained in Section 2 of two separate reports, the *Comment Summary Document* and the *Supplemental Comment Summary Document*, and in a separate document providing responses to comments from the Governor of Nevada sent to the Department after the public comment periods on a possible site recommendation closed.
- Section 114(a)(1)(G) provides for the inclusion of other information as the Secretary considers appropriate. The report, *Yucca Mountain Site Suitability Evaluation* (DOE/RW-0549, February 2002), has been included as other information. This report provides an evaluation of the suitability of the Yucca Mountain site against Departmental Guidelines setting forth the criteria and methodology to be used in determining the suitability of the Yucca Mountain site, pursuant to section 113(b)(1)(A)(iv). In addition, impact reports submitted by the various Nevada counties have been included as other information to be forwarded to the President. In transmitting these reports to the President, the Department is neither deciding on, nor endorsing, any specific impact assistance requested by the governmental entities in those reports.
- The State of Nevada submitted an impact report pursuant to section 114(a)(1)(H). In transmitting this report to the President, the Department is likewise neither deciding on, nor endorsing this report.

decision and the nature of the officers involved, one would expect that even if a Cabinet Secretary were to find a site technically suitable for a repository, he should be able to take broader considerations into account in determining what recommendation to make to the President. A pure suitability-based decision risks taking insufficient heed of the views of the people, particularly in Nevada but in other parts of the country as well. Second, it is difficult to envision a Cabinet Secretary's making a recommendation without taking into account these broader considerations. Finally, it is plain that any conclusion on whether to recommend this site is likely to be reviewed by Congress. Since that review will inevitably focus on broader questions than the scientific and technical suitability of the site, it seems useful in the first instance for the Executive Branch to factor such considerations into its recommendation as well. I note, however, that if my interpretation of the statute in this regard is incorrect, and Congress has made a finding of suitability the sole determinant of whether to recommend Yucca Mountain, my Recommendation would be the same.

6. Is Yucca Mountain Scientifically and Technically Suitable for Development of a Repository?

The Department of Energy has spent over two decades and billions of dollars on carefully planned and reviewed scientific fieldwork designed to help determine whether Yucca Mountain is a suitable site for a repository. The results of that work are summarized in the *Yucca Mountain Science and Engineering Report, Revision 1*, and evaluated in the Yucca Mountain Site Suitability Evaluation (YMSSE), which concludes, as set out in 10 CFR part 963, that Yucca Mountain is "likely" to meet the applicable radiation standards and thus to protect the health and safety of the public, including those living in the immediate vicinity now and thousands of years from now. I have carefully studied that evaluation and much of the material underlying it, and I believe it to be correct.

6.1. Framework for Suitability Determination

6.1.1. General Outline

The general outline of the analytic framework I have used to evaluate the scientific suitability of the site is set out in the Department's Yucca Mountain Site Suitability Guidelines, found at 10 CFR part 963.

The framework has three key features. First, the Guidelines divide the suitability inquiry into sub-inquiries concerning a "pre-closure" safety evaluation and a "post-closure" performance evaluation. The "pre-closure" evaluation involves assessing whether a repository at the site is likely to be able to operate safely while it is open and receiving wastes. The "post-closure" evaluation involves assessing whether the repository is likely to continue to isolate the materials for 10,000 years after it has been sealed, so as to prevent harmful releases of radionuclides.

Second, the Guidelines set out a method and criteria for conducting the pre-closure safety evaluation. The method is essentially the same as that used to evaluate the safety of other proposed nuclear facilities; it is not particularly novel and should be recognized by those familiar with safety assessments of existing facilities. This is because, while it is open and receiving

nuclear materials, a repository at Yucca Mountain will not be very different, in terms of its functions and the activities expected to take place there, from many other modern facilities built to handle such materials. A pre-closure evaluation to assess the probable safety of such a facility entails considering its design, the nature of the substances it handles, and the kinds of activities and external events that might occur while it is receiving waste. It then uses known data to forecast the level of radioactivity to which workers and members of the public would be likely to be exposed as a result.

Third, the Guidelines set out a method and criteria for evaluating the post-closure performance of the repository. This is the most challenging aspect of evaluating Yucca Mountain's suitability, since it entails assessing the ability of the repository to isolate radioactive materials far into the future. The scientific consensus is, and the Guidelines specify, that this should be done using a "Total System Performance Assessment." This approach, which is similar to other efforts to forecast the behavior of complex systems over long periods of time, takes information derived from a multitude of experiments and known facts. It feeds that information into a series of models. These in turn are used to develop one overarching model of how well a repository at Yucca Mountain would be likely to perform in preventing the escape of radioactivity and radioactive materials. The model can then be used to forecast the levels of radioactivity to which people near the repository might be exposed 10,000 years or more after the repository is sealed.[27]

6.1.2. Radiation Protection Standards

A key question to be answered, as part of any suitability determination is, "What level of radiation exposure is acceptable?"

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[27] The selection of the 10,000-year compliance period for the individual-protection standard involves both technical and policy considerations. EPA weighed both during the rulemaking for 40 CFR Part 197. EPA considered policy and technical factors, as well as the experience of other EPA and international programs. First, EPA evaluated the policies for managing risks from the disposal of both long lived, hazardous, nonradioactive materials and radioactive materials. Second, EPA evaluated consistency with both 40 CFR Part 191 and the issue of consistent time periods for the protection of groundwater resources and public health. Third, EPA considered the issue of uncertainty in predicting dose over the very long periods contemplated in the alternative of peak dose within the period of geologic stability. Finally, EPA reviewed the feasibility of implementing the alternative of peak risk within the period of geologic stability.

As a result of these considerations, EPA established a 10,000-year compliance period with a quantitative limit and a requirement to calculate the peak dose, using performance assessments, if the peak dose occurs after 10,000 years. Under this approach, DOE must make the performance assessment results for the post-10,000-year period part of the public record by including them in the EIS for Yucca Mountain.

The relevance of a 10,000-year compliance period can also be understood by examining hazard indices that compare the potential risk of released radionuclides to other risks. One such analysis, presented in the *Final Environmental Impact Statement for the Management of Commercially Generated Radioactive Waste*, DOE/EIS-0046F, examined the relative amounts of water required to bring the concentration of a substance to allowable drinking water standards. The relative hazard for spent fuel compared to the toxicity of the ore used to produce the reactor fuel at one year after removal of the spent fuel from the reactor is about the same hazard as a rich mercury ore. The hazard index is about the same as average mercury ores at about 80 years. By 200 years the hazard index is about the same as average lead ore; by 1,000 years it is comparable to a silver ore. The relative hazard index is about the same as the uranium ore that it came from at 10,000 years. This is not to suggest that the wastes from spent fuel are not toxic. However, it is suggested that where concern for the toxicity of the ore bodies is not great, the spent fuel should cause no greater concern, particularly if placed within multiple engineered barriers in geologic formations, at least as, if not more, remote from the biosphere than these common ores.

DOE's Site Suitability Guidelines use as their benchmark the levels the NRC has specified for purposes of deciding whether to license a repository at Yucca Mountain. The NRC, in turn, established these levels on the basis of radiation protection standards set by the EPA. The standards generally require that during pre-closure, the repository facilities, operations, and controls restrict radiation doses to less than 15 millirem a year[28] to a member of the public in its vicinity.[29] During post-closure, they generally require that the maximum radiation dose allowed to someone living in the vicinity of Yucca Mountain be no more than 15 millirem per year, and no more than four millirem per year from certain radionuclides in the groundwater.[30]

This level of radiation exposure is comparable to, or less than, ordinary variations in natural background radiation that people typically experience each year. It is also less than radiation levels to which Americans are exposed in the course of their everyday lives -- in other words, radiation "doses" to which people generally give no thought at all.

To understand this, it is important to remember that radiation is part of the natural world and that we are exposed to it all the time. Every day we encounter radiation from space in the form of cosmic rays. Every day we are also exposed to terrestrial radiation, emitted from naturally radioactive substances in the earth's surface.

In addition to natural background radiation from these sources, people are exposed to radiation from other everyday sources. These include X-rays and other medical procedures, and consumer goods (*e.g.*, television sets and smoke detectors).

Americans, on average, receive an annual radiation exposure of 360 millirem from their surroundings. The 15 millirem dose the EPA standard set as the acceptable annual exposure from the repository is thus slightly over four percent of what we receive every year right now.

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[28]Risk to human beings from radiation is due to its ionizing effects. Radionuclides found in nature, commercial products, and nuclear waste emit ionizing radiation. The forms of ionizing radiation differ in their penetrating power or energy and in the manner in which they affect human tissue. Some ionizing radiation, known as alpha radiation, can be stopped by a sheet of paper, but may be very harmful if inhaled, ingested or otherwise admitted into the body. Long-lived radioactive elements, with atomic numbers higher than 92, such as plutonium, emit alpha radiation. Other ionizing radiation, known as beta radiation, can penetrate the skin and can cause serious effects if emitted from an inhaled or ingested radionuclide. The ionizing radiation with the greatest penetrating power is gamma radiation; it can penetrate and damage critical organs in the body. Fission products can emit both gamma and beta radiation depending on the radionuclides present. In high-level nuclear waste, beta and gamma radiation emitters, such as cesium and strontium, present the greatest hazard for the first 300 to 1,000 years, by which time they have decayed. After that time, the alpha-emitting radionuclides present the greatest hazard.
Radiation doses can be correlated to potential biologic effects and are measured in a unit called a rem. Doses are often expressed in terms of thousandths of a rem, or millirem (mrem); the internationally used unit is the Sievert (S), which is equivalent to 100 rem.

[29] The NRC regulations also require that the annual dose to workers there be less than 5 rem. See 10 CFR part 63, referencing 10 CFR part 20. This is the general standard for occupational exposure that applies in numerous other settings, such as operating nuclear facilities.

[30] During both pre- and post-closure, the NRC licensing rules, 10 CFR part 63, also contain a number of more particularized standards for specific situations. These are referenced in the results tables contained in the following sections. Pursuant to EPA's groundwater standard, 40 CFR part 197, they also contain concentration limits on certain kinds of radionuclides that may be present in the water, whether or not their presence is attributable to a potential repository. These are also referenced in the results tables.

Moreover, background radiation varies from one location to another due to many natural and man-made factors. At higher elevations, the atmosphere provides less protection from cosmic rays, so background radiation is higher. In the United States, this variation can be 50 or more millirem. Thus, if the repository generates radiation doses set as the benchmark in the Guidelines, the incremental radiation dose a person living in the vicinity of Yucca Mountain would receive from it would be about the same level of increase in radiation exposure as a person would experience as a result of moving from Philadelphia to Denver.

Ordinary air travel is another example. Flying at typical cross-country altitudes results in increased exposure of about one-half millirem per hour. If the Yucca Mountain repository generates radiation at the 15 millirem benchmark, it would increase the exposure of those living near it to about the same extent as if they took three round trip flights between the East Coast and Las Vegas.

Rocks and soil also affect natural background radiation, particularly if the rocks are igneous or the soils derived from igneous rock, which can contain radioactive potassium, thorium, or uranium. In these cases, the variation in the background radiation is frequently in the tens of millirem or higher. Wood contains virtually no naturally occurring radioactive substances that contribute to radiation exposures, but bricks and concrete made from crushed rock and soils often do. Living or working in structures made from these materials can also result in tens of millirem of increased exposure to radiation. Thus, if the repository generates radiation at the levels in the Guidelines' benchmark, it is likely to result in less additional exposure to a person living in its vicinity than if he moved from a wood house to a brick house.

Finally, it is noteworthy that the radiation protection standards referenced by the Guidelines are based on those selected by the NRC for licensing the repository. They in turn relied on the EPA rule establishing these as the appropriate standards for the site. The NRC and EPA acted pursuant to specific directives in the NWPA, in which Congress first assigned to the EPA the responsibility to set these standards, and later in the Energy Policy Act of 1992, which directed the EPA to act in conjunction with the National Academy of Sciences and develop a standard specifically for Yucca Mountain. The EPA carefully considered the question of how to do so. The 15 millirem per year standard is the same it has applied to the Waste Isolation Pilot Plant in New Mexico.[31] And it is well within the National Academy of Sciences-recommended range, a range developed in part by referring to guidelines from national and international advisory bodies and regulations in other developed countries.[32]

For all these reasons, there is every cause to believe that a repository that can meet the 15 millirem radiation protection standard will be fully protective of the health and safety of residents living in the vicinity of the repository.[33]

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[31] 40 CFR part 191.

[32] *Technical Bases for Yucca Mountain Standards*, National Academy of Sciences, National Research Council, 1995.

[33] As noted above, the EPA, in 40 CFR part 197, also established groundwater protection standards in the Yucca Mountain rule; these are compatible with drinking water standards applied elsewhere in the United States, and apply maximum contaminant levels, as well as a 4 mrem/yr dose standard.

6.1.3. Underlying Hard Science

As explained in section 6.1.1, the Guidelines contemplate the use of models and analyses to project whether the repository will meet the 15 millirem dose standard.[34] To have confidence in the model results, however, it is important to understand the kind of science that went into constructing them.

For over 20 years, scientists have been investigating every aspect of the natural processes – past, present and future – that could affect the ability of a repository beneath Yucca Mountain to isolate radionuclides emitted from nuclear materials emplaced there. They have been conducting equally searching investigations into the processes that would allow them to understand the behavior of the engineered barriers – principally the waste "packages" (more nearly akin to vaults) – that are expected to contribute to successful waste isolation. These investigations have run the gamut, from mapping the geological features of the site, to studying the repository rock, to investigating whether and how water moves through the Mountain. To give just a few examples:

At the surface of the repository:

- Yucca Mountain scientists have mapped geologic structures, including rock units, faults, fractures, and volcanic features. To do this, they have excavated more than 200 pits and trenches to remove alluvial material or weathered rock to be able to observe surface and near-surface features directly, as well as to understand what events and processes have occurred or might occur at the Mountain.

- They have drilled more than 450 surface boreholes and collected over 75,000 feet of geologic core samples and some 18,000 geologic and water samples. They used the information obtained to identify rock and other formations beneath the surface, monitor infiltration of moisture, measure the depth of the water table and properties of the hydrologic system, observe the rate at which water moves from the surface into subsurface rock, and determine air and water movement properties above the water table.

- They have conducted aquifer testing at sets of wells to determine the transport and other properties of the saturated zone below Yucca Mountain. These tests included injecting easily identified groundwater tracers in one well, which were then detected in another; this helped scientists understand how fast water moves.

- They have conducted tectonic field studies to evaluate extensions of the earth's crust and the probability of seismic events near Yucca Mountain.

[34] As well, of course, as the other radiation protection standards such as the groundwater standard.

Underground:

The Department's scientists have conducted a massive project to probe the area under the Mountain's surface where the repository will be built.

- They constructed a five mile-long main underground tunnel, the Exploratory Studies Facility, to provide access to the specific rock type that would be used for the repository. This main tunnel is adjacent to the proposed repository block, about 800 feet underground. After completing the main tunnel, they excavated a second tunnel, 1.6-miles long and 16.5 feet in diameter. This tunnel, referred to as the Cross-Drift tunnel, runs about 45 feet above and across the repository block.

- They then mapped the geologic features such as faults, fractures, stratigraphic units, mineral compositions, etc., exposed by the underground openings in the tunnels.

- They collected rock samples to determine geotechnical properties.

- They conducted a drift-scale thermal test to observe the effects of heat on the hydrologic, mechanical, and chemical properties of the rock, and chemical properties of the water and gas liberated as a result of heating. The four yearlong heating cycle of the drift-scale test was the largest known heater test in history, heating some seven million cubic feet of rock over its ambient temperature. This test also included samples of engineered materials to determine corrosion resistance in simulated repository conditions.

In various laboratory-based studies:

Yucca Mountain scientists have supplemented with laboratory work the surface and underground tests previously described.

- They have tested mechanical, chemical, and hydrologic properties of rock samples in support of repository design and development of natural process models.

- They have tested radionuclides to determine solubility and colloid formation that affect their transport if released.

- They have tested over 13,000 engineered material samples to determine their corrosion resistance in a variety of environments.

- They have determined the chemical properties of water samples and the effects of heat on the behavior and properties of water in the host rock.

The findings from these numerous studies were used to develop computer simulations that describe the natural features, events, and processes that exist at Yucca Mountain or that could be changed as the result of waste disposal. The descriptions in turn were used to develop the models discussed in the next section to project the likely radiation doses from the repository.

7. Results of Suitability Evaluations and Conclusions

As explained above, the Guidelines contemplate that the Secretary will evaluate the suitability of the Yucca Mountain site for a repository on two separate bases.

The Guidelines first contemplate that I will determine whether the site is suitable for a repository during the entire pre-closure or operational period, assumed to be from 50 to 300 years after emplacement of nuclear materials begins. To answer this question, the Guidelines ask me to determine whether, while it is operating, the repository is likely to result in annual radiation doses to people in the vicinity and those working there that will fall below the dosage levels set in the radiation protection standards.[35] The Guidelines contemplate that I will use a pre-closure safety evaluation to guide my response.[36]

Second, the Guidelines contemplate that I will determine whether the repository is suitable – in other words, may reasonably be expected to be safe – after it has been sealed. To answer that question, the Guidelines ask me to determine whether it is likely that the repository will continue to isolate radionuclides for 10,000 years after it is sealed, so that an individual living 18 kilometers (11 miles) from the repository is not exposed to annual radiation doses above those set in the radiation protection standards.[37] The Guidelines contemplate that I will use a Total System Performance Assessment to guide my response to this question.[38]

The Department has completed both the Pre-Closure Safety Evaluation and TSPA called for by the Guidelines. These project that a repository at Yucca Mountain will result in radioactive doses well below the applicable radiation protection standards. As I explain below, I have reviewed these projections and the bases for them, and I believe them to be well founded. I also believe both the Pre-Closure Safety Evaluation and the Total System Performance Assessment have properly considered the criteria set out in the Guidelines for each period. Using these evaluations as set out in the Guidelines,[39] I believe it is likely that a repository at Yucca Mountain will result in radiation doses below the radiation protection standards for both periods. Accordingly, I believe Yucca Mountain is suitable for the development of a repository.

7.1. Results of Pre-Closure Evaluations

As explained in section 6.1.1, the Pre-Closure Safety Evaluation method I have employed is commonly used to assess the likely performance of planned or prospective nuclear facilities. Essentially what it involves is evaluating whether the contemplated facility is designed to prevent or mitigate the effects of possible accidents. The facility will be considered safe if its design is likely to result in radioactive releases below those set in the radiation protection standards.

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[35] 10 CFR part 963.
[36] Ibid.
[37] Ibid.
[38] Ibid.
[39] Ibid.

The Department has conducted such a Pre-Closure Safety Evaluation, which is summarized in the *Yucca Mountain Science and Engineering Report, Revision 1.*[40] In conducting this evaluation, the Department considered descriptions of how the site will be laid out, the surface facilities, and the underground facilities and their operations. It also considered a series of potential hazards, including, for example, seismic activity, flooding, and severe winds, and their consequences. Finally, it considered preliminary descriptions of how components of the facilities' design would prevent or mitigate the effects of accidents.

The Pre-Closure Safety Evaluation concluded that the preliminary design would prevent or dramatically mitigate the effects of accidents, and that the repository would therefore not result in radioactive releases that would lead to exposure levels above those set by the radiation protection standards. It considered the pre-closure criteria of 10 CFR 963.14 in reaching this conclusion. In particular, it found that the preliminary design has the ability to contain and limit releases of radioactive materials; the ability to implement control and emergency systems to limit exposures to radiation; the ability to maintain a system and components that perform their intended safety functions; and the ability to preserve the option to retrieve wastes during the pre-closure period. The annual doses of radiation to which the Pre-Closure Safety Evaluation projected individuals in the vicinity of the repository and workers would be exposed are set out in the following table. These doses fall well below the levels that the radiation protection standards establish.

I have carefully reviewed the Pre-Closure Safety Evaluation and find its conclusions persuasive. I am therefore convinced that a repository can be built at Yucca Mountain that will operate safely without harming those in the repository's vicinity during the pre-closure period. Finally, I would note that although many aspects of this project are controversial, there is no controversy of which I am aware concerning this aspect of the Department's conclusions. This stands to reason. The kinds of activities that would take place at the repository during the pre-closure period – essentially, the management and handling of nuclear materials including packaging and emplacement in the repository – are similar to the kinds of activities that at present go on every day, and have gone on for years, at temporary storage sites around the country. These activities are conducted safely at those sites, and no one has advanced a plausible reason why they could not be conducted equally if not more safely during pre-closure operations at a new, state-of-the-art facility at Yucca Mountain.

That is not an insignificant point, since the pre-closure period will last at least 50 years after the start of emplacement, which will begin at the earliest eight years from today. Moreover, the Department's Pre-Closure Safety Evaluation also assumed a possible alternative pre-closure period of 300 years from the beginning of emplacement, and its conclusions remained unchanged. Thus, the Department's conclusion that the repository can operate safely for the next 300 years – or for about three generations longer than the United States has existed – has not been seriously questioned.

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[40] *Yucca Mountain Science and Engineering Report, Revision 1.*

Table 1. Summary Pre-Closure Dose Performance Criteria and Evaluation Results[41]

Standard	Limits	Results
Public Exposures[a]		
Pre-closure standard: 10 CFR 63.204, referenced in 10 CFR 963.2; Pre-Closure Performance Objective for normal operations and Category 1 event sequences per 10 CFR 63.111(a)(2), referenced in 10 CFR 963.2	15 mrem/yr[b]	0.06 mrem/yr[b]
Constraint specified for air emissions of radioactive material to the environment (not a dose limitation): 10 CFR 20.1101 (d)[c]	10 mrem/yr[b,d]	0.06 mrem/yr[b]
Dose limits for individual member of the public for normal operations and Category 1 event sequences: 10 CFR 20.1301[e]	100 mrem/yr[b,d]	0.06 mrem/yr[b]
	2 mrem/hr in any unrestricted area from external sources	<<2 mrem/hr
Pre-Closure Performance Objective for any Category 2 event sequence 10 CFR 63.111(b)(2), referenced in 10 CFR 963.2	5 rem[b]	0.02 rem[b]
	50 rem organ or tissue dose (other than the lens of the eye)	0.10 rem
	15 rem lens of the eye dose	0.06 rem
	50 rem skin dose	0.04 rem
Workers' Exposures		
Occupational Dose Limits for Adults from normal operational emissions and Category 1 event sequences: 10 CFR 20.1201[e]	5 rem/yr[b]	0.01 rem/yr[b]
	50 rem/yr organ or tissue dose (other than the lens of the eye)	0.10 rem/yr
	15 rem/yr lens of the eye dose	0.15 rem/yr
	50 rem/yr skin dose	0.13 rem/yr
Routine Occupational Dose Limits for Adults: 10 CFR 20.1201[e]	5 rem/yr[b]	0.06 to 0.79 rem/yr[b]

NOTES:
[a] Results for public exposures are calculated at the site boundary.
[b] Total effective dose equivalent.
[c] 10 CFR 63.111(a)(1), which is referenced in 10 CFR 963.2, would require repository operations area to meet the requirements of 10 CFR part 20.
[d] 10 CFR 20.1301(a)(1), which is cross-referenced through 10 CFR 963.2; dose limit to extent applicable.
[e] 10 CFR 63.111(b)(1), which referenced in 10 CFR 963.2, would require repository design objectives for Category 1 and normal operations to meet 10 CFR 63.111(a)(1) requirements (10 CFR part 20).

7.2. Results of Post-Closure Evaluations

The most challenging aspect of evaluating Yucca Mountain is assessing the likely post-closure performance of a repository 10,000 years into the future. As previously explained, the Department's Guidelines contemplate that this will be done using a Total System Performance Assessment. That assessment involves using data compiled from scientific investigation into the natural processes that affect the site, the behavior of the waste, and the behavior of the

[41] *Yucca Mountain Site Suitability Evaluation.*

engineered barriers such as the waste packages; developing models from these data; then developing a single model of how, as a whole, a repository at Yucca Mountain is likely to behave during the post-closure period. The model is then used to project radiation doses to which people in the vicinity of the Mountain are likely to be exposed as a result of the repository. Finally, the assessment compares the projected doses with the radiation protection standards to determine whether the repository is likely to comply with them.

The challenge, obviously, is that this involves making a prediction a very long time into the future concerning the behavior of a very complex system. To place 10,000 years into perspective, consider that the Roman Empire flourished nearly 2,000 years ago. The pyramids were built as long as 5,000 years ago, and plants were domesticated some 10,000 years ago. Accordingly, as the NRC explained, "Proof that the geologic repository will conform with the objectives for post-closure performance is not to be had in the ordinary sense of the word because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system"[42] over 10,000 years. The judgment that the NRC envisions making is therefore not a certainty that the repository will conform to the standard, certainty being unattainable in this or virtually any other important matter where choices must be made. Rather, as it goes on to explain, "For such long-term performance, what is required is reasonable expectation, making allowance for the time period, hazards, and uncertainties involved, that the outcome will conform with the objectives for post-closure performance for the geologic repository."[43] The Nuclear Waste Technical Review Board recently summarized much the same thought (emphasis added): "Eliminating all uncertainty associated with estimates of repository performance would never be possible at <u>any</u> repository site."[44]

These views, in turn, inform my understanding of the judgment I am expected to make at this stage of the proceeding in evaluating the likely post-closure performance of a repository at Yucca Mountain. To conclude that it is suitable for post-closure, I do not need to know that we have answered all questions about the way each aspect of the repository will behave 10,000 years from now; that would be an impossible task. Rather, what I need to decide is whether, using the TSPA results, and fully bearing in mind the inevitable uncertainties connected with such an enterprise, I can responsibly conclude that we know enough to warrant a predictive judgment on my part that, during the post-closure period, a repository at Yucca Mountain is likely to meet the radiation protection standards.

I believe I can. Essentially, the reason for this is the system of multiple and redundant safeguards that will be created by the combination of the site's natural barriers and the engineered ones we will add. Even given many uncertainties, this calculated redundancy makes it likely that very little, if any, radiation will find its way to the accessible environment.

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[42] Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, Final Rule, 66 Fed. Reg. 55731, 55804, November 2, 2001.
[43] Ibid.
[44] Nuclear Waste Technical Review Board Letter Report from all Board members to Speaker Hastert, Senator Byrd, and Secretary Abraham, January 24, 2002.

Before I describe in broad terms how the TSPA results and the criteria used in the regulations lead to this conclusion, I would like to give an illustration of how this works. The illustration draws on the TSPA analyses, but also explains what these analyses mean in the real world.

An Example

The most studied issue relating to Yucca Mountain, and the single most pressing concern many have felt about the post-closure phase of a repository there, is whether there might be a way for radionuclides from the emplaced nuclear materials to contaminate the water supply. This is not a problem unique to Yucca Mountain. Rather, besides disruptive events discussed later, water is the primary mechanism to transport radionuclides to people and is also the most likely mechanism for radionuclides to escape from the storage facilities we have now.

In the case of Yucca Mountain, the concern has been that rainwater seeping into the Mountain might contact disposal casks and carry radionuclides down to the water table in sufficient amounts to endanger sources of groundwater. In my judgment, when one considers everything we have learned about the multiple natural and engineered barriers that lie at the core of the Department's planning for this Project, this concern turns out to have virtually no realistic foundation.

Yucca Mountain is in the middle of a desert. Like any desert, it has an arid climate, receiving less than eight inches of rain in an average year. Most of that runs off the Mountain or evaporates. Only about five percent, less than four-tenths of an inch per year, ever reaches repository depth.

In order to reach the tunnels where the waste casks would be housed, this water must travel through about 800 feet of densely welded and bedded tuffs,[45] a trip that will typically require more than 1,000 years. The amount of water that eventually reaches the repository level at any point in time is very small, so small that capillary forces tend to retain it in small pores and fractures in the rock. It is noteworthy that all our observations so far indicate that no water actually drips into the tunnels at this level and all of the water is retained within the rock.

In spite of this finding, our TSPA ran calculations based on the assumption that water does drip into the tunnels. At that point, even just to reach radionuclides in the waste, the water would still have to breach the engineered barriers. These include waste packages composed of an outer barrier of highly corrosion-resistant alloy and a thick inner barrier of high quality stainless steel.

[45]Yucca Mountain consists of alternating layers of welded and nonwelded volcanic material known as welded and non-welded tuff: welded tuff at the surface, welded tuff at the level of the repository, and an intervening layer of nonwelded tuffs. These nonwelded units contain few fractures; thus, they delay the downward flow of moisture into the welded tuff layer below, where the repository would be located. At the repository level, water in small fractures has a tendency to remain in the fractures rather than flow into larger openings, such as tunnels. Thus, the small amount of water traveling through small fractures near any emplacement tunnel would tend to flow around the tunnel, rather than seeping, forming a drip, and falling onto the drip shields below. Non-welded tuffs below the repository also provide a significant barrier to radionuclide transport. Deposits of minerals in the fractures demonstrate that for the last several million years the repository host rock has been under unsaturated conditions, even when higher precipitation, owing to the continent's overall glacial conditions, prevailed at the Mountain's surface.

The waste package is designed to prevent contact between the waste pellets and water that might seep into the tunnels unexpectedly, and thus to prevent release of radionuclides.[46] In addition, anchored above each waste package is a titanium drip shield that provides yet more protection against seepage. But even assuming the water defeats both the titanium shield and the metal waste package, the waste form itself is a barrier to the release of radionuclides. Specifically, the spent fuel is in the form of ceramic pellets, resistant to degradation and covered with a corrosion-resistant metal cladding.

Nevertheless, DOE scientists ran a set of calculations assuming that water penetrated the titanium shield and made small holes in three waste packages, due to manufacturing defects (even though the manufacturing process will be tightly controlled). The scientists further assumed that the water dissolves some of the ceramic waste. Even so, the analyses showed that only small quantities of radionuclides would diffuse and escape from the solid waste form. In order to reach the water table from the repository, the water, now assumed to be carrying radionuclides, must travel another 800 feet through layers of rock, some of which are nearly impenetrable. During this trip, many of the radionuclides are adsorbed by the rock because of its chemical properties.

The result of all this is instructive. Even under these adverse conditions, all assumed in the teeth of a high probability that not one of them will come to pass, the amount of radionuclides reaching the water table is so low that annual doses to people who could drink the water are well below the applicable radiation standards, and less than a millionth of the annual dose people receive from natural background radiation. Extrapolating from these calculations shows that even if all of the waste packages were breached in the fashion I have described above, the resulting contribution to annual dose would still be below the radiation safety standards, and less than one percent of the natural background.[47]

Total System Performance More Generally

It is important to understand that there is nothing unique about the kind of planning illustrated in the water seepage scenario described above. Rather, the scenario is characteristic of the studies DOE has undertaken and the solutions it has devised: deliberately pessimistic assumptions incorporated sometimes to the point of extravagance, met with multiple redundancies to assure safety. For example, one of our scenarios for Nevada postulates the return of ice ages, and examines Yucca Mountain assuming that it would receive about twice as much rain as it does today with four times as much infiltration into the Mountain.

As in the example above, the Department evaluated physical and historical information used to develop models of repository components, and then employed those models to forecast how the repository would perform in the post-closure period. These results are described at length in the

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[46] These engineered barriers will protect the waste under a wide range of conditions. For example, the barriers are protected by their underground location from the daily variations in temperature and moisture that occur above ground. As a result, the Mountain provides favorable conditions for the performance of these barriers. Indeed, the battery of tests we have conducted suggests that the waste packages are extremely resistant to corrosion.

[47] *Yucca Mountain Science and Engineering Report, Revision 1.*

TPSA analyses and summarized in Chapter 4 of the *Yucca Mountain Science and Engineering Report.*[48]

The Department used the suitability criteria set forth in 10 CFR 963.17 in the TSPA analyses. It carefully evaluated and modeled the behavior of characteristics of the site, such as its geologic, hydrologic, geophysical, and geochemical properties. Likewise it evaluated what are called unsaturated zone flow characteristics, such as precipitation entering the Mountain and water movement through the pores of the rock – in other words, natural processes which affect the amount of water entering the unsaturated zone above the repository and potentially coming in contact with wastes inside. DOE also evaluated and modeled near-field environment characteristics, such as effects of heat from the waste on waterflow through the site, the temperature and humidity at the engineered barriers, and chemical reactions and products that could result from water contacting the engineered barriers.

The Department carefully studied and modeled the characteristics of the engineered barriers as they aged. DOE emphasized specifically those processes important to determining waste package lifetimes and the potential for corroding the package. It examined waste form degradation characteristics, including potential corrosion or break-down of the cladding on the spent fuel pellets and the ability of individual radionuclides to resist dissolving in water that might penetrate breached waste packages. It examined ways in which radionuclides could begin to move outward once the engineered barrier system has been degraded – for example, whether colloidal particles might form and whether radionuclides could adhere to these particles as they were assumed to wash through the remaining barriers. Finally, the Department evaluated and modeled saturated and unsaturated zone flow characteristics, such as how water with dissolved radionuclides or colloidal particles might move through the unsaturated zone below the repository, how heat from the waste would affect waterflow through the site, and how water with dissolved radionuclides would move in the saturated zone 800 feet beneath the repository (assuming it could reach that depth).

Consistent with 10 CFR 963.17, the Department also evaluated the lifestyle and habits of individuals who potentially could be exposed to radioactive material at a future time, based, as would be required by NRC licensing regulations,[49] on representative current conditions. Currently, there are about 3,500 people who live in Amargosa Valley, the closest town to Yucca Mountain. They consume ground or surface water from the immediate area through direct extraction or by eating plants that have grown in the soil. The Department therefore assumed that the "reasonably maximally exposed individual" – that is, the hypothetical person envisioned to test whether the repository is likely to meet required radiation protection standards – likewise would drink water and eat agricultural products grown with water from the area, and built that assumption into its models.

Using the models described above, as well as a host of others it generated taking account of other relevant features, events and processes that could affect the repository's performance, the Department developed a representative simulation of the behavior of the proposed Yucca Mountain site. It then considered thousands of possibilities about what might happen there. For

[48] Ibid.
[49] 10 CFR part 63.

example, it considered the possibility that waste packages might be manufactured defectively. It considered the possibility that the climate would change. It considered earthquakes. Our studies show that earthquakes probably will occur at Yucca Mountain sometime in the future. Because the occurrence of earthquakes is difficult to predict, our models conservatively treat earthquakes by assuming that they will occur over the next 10,000 years.

Essentially, if the Department believed that there was close to a 1 in 10,000 per year probability of some potentially adverse occurrence in the course of the 10,000 year post-closure period (which comes to a probability close to one during the entire period) the Department considered that possibility, unless it concluded the occurrence would not affect the repository's performance. It then used the simulation model to calculate what the resulting dose would be based on each such possibility. Finally, it used the mean peak values of the results of these calculations to project the resulting dose.

The Department then proceeded to consider the impact of disruptive events, such as volcanism, with a lower probability of occurrence, on the order of one in 10,000 over the entire 10,000 year period (meaning roughly a one in a 100 million per year of occurring during that time). This led it to analyze, for example, the effects that a volcano might have on the repository's waste containment capabilities. Scientists started with a careful analysis of the entire geologic setting of Yucca Mountain. Then, with substantial data on regional volcanoes, they used computer modeling to understand each volcanic center's controlling structures. Experts then estimated the likelihood of magma intruding into one of the repository's emplacement tunnels. The DOE estimates the likelihood of such an event's occurring during the first 10,000 years after repository closure to be one chance in about 70 million per year, or one chance in 7,000 over the entire period.

Including volcanoes in its analyses, the TSPA results still indicate that the site meets the EPA standards.[50] What the calculations showed is that the projected, probability-weighted maximum mean annual dose to an individual from the repository for the next 10,000 years is one-tenth of a millirem. That is less than one-fifth of the dose an individual gets from a one-hour airplane flight. And it is less than one one-hundredth of the dose that DOE's Guidelines, using the EPA standards, specify as acceptable for assessing suitability.

Finally, in a separate assessment, analysts studied a hypothetical scenario under which people inadvertently intruded into the repository while drilling for water. The Guidelines' radiation protection standards, based on EPA and NRC rules, specify that as part of its Total System Performance Assessment, DOE should determine when a human-caused penetration of a waste package could first occur via drilling, assuming the drillers were using current technology and practices and did not recognize that they had hit anything unusual. If such an intrusion could occur within 10,000 years, the 15 millirem dose limit would apply.

DOE's analyses, however, indicate that unrecognized contact through drilling would not happen within 10,000 years. Under conditions that DOE believes can realistically be expected to exist at

[50] The results produced under volcanic scenarios are weighted by probability under the NRC method specified for how to treat low probability events. 10 CFR Part 63.

the repository, the waste packages are extremely corrosion-resistant for tens of thousands of years. Even under pessimistic assumptions, the earliest time DOE could even devise a scenario under which a waste package would be unnoticeable to a driller is approximately 30,000 years. Before then, the waste package structure would be readily apparent to a driller who hit it.

Table 2 presents the summary results of the Total System Performance Assessment analyses and how they compare to the radiation protection standards.[51]

In Summary

Using the methods and criteria set out in DOE's Yucca Mountain Site Suitability Guidelines, I am convinced that the Yucca Mountain site is scientifically suitable -- in a word, safe -- for development of a repository. Specifically, on the basis of the safety evaluation DOE has conducted pursuant to 10 CFR 963.13, it is my judgment that a repository at the site is likely to meet applicable radiation protection standards for the pre-closure period. And on the basis of the Total System Performance Assessment DOE has conducted pursuant to 10 CFR 963.16, it is my judgment that a repository at the site is likely to meet applicable radiation protection standards for the post-closure period as well. Additionally, I have evaluated the pre-closure suitability criteria of 10 CFR 963.14 and the post-closure suitability criteria of 10 CFR 963.17, and am convinced that the safety evaluations were done under the stringent standards required. Accordingly, I find the Yucca Mountain site suitable for development of a repository.

8. The National Interest

Having determined that the site is scientifically suitable, I now turn to the remaining factors I outlined above as bearing on my Recommendation. Are there compelling national interests favoring going forward with a repository at Yucca Mountain? If so, are there countervailing considerations of sufficient weight to overcome those interests? In this section I set out my conclusions on the first question. In section 9 I set out my views on the second.

8.1. Nuclear Science and the National Interest

Our country depends in many ways on the benefits of nuclear science: in the generation of twenty percent of the Nation's electricity; in the operation of many of the Navy's most strategic vessels; in the maintenance of the Nation's nuclear weapons arsenal; and in numerous research and development projects, both medical and scientific. All these activities produce radioactive wastes that have been accumulating since the mid-1940s. They are currently scattered among 131 sites in 39 states, residing in temporary surface storage facilities and awaiting final disposal. In exchange for the many benefits of nuclear power, we assume the cost of managing its byproducts in a responsible, safe, and secure fashion. And there is a near-universal consensus that a deep geologic facility is the only scientifically credible, long-term solution to a problem that will only grow more difficult the longer it is ignored.

[51] *Yucca Mountain Site Suitability Evaluation.*

Table 2. Summary Post-Closure Dose and Activity Concentration Limits and Evaluation Results

Standard	Limits	Results[c]
Individual protection standard: 10 CFR 63.311, referenced in 10 CFR 963.2	15 mrem/yr TEDE	0.1 mrem/yr[a] (HTOM) 0.1 mrem/yr[a] (LTOM)
Human intrusion standard: 10 CFR 63.321, referenced in 10 CFR 963.2	15 mrem/yr TEDE	NA[b]
Groundwater protection standard: 10 CFR 63.331, referenced in 10 CFR 963.2	5 pCi/L combined radium-226 and radium-228, including natural background	1.04 pCi/L[c] (HTOM) 1.04 pCi/L[c] (LTOM)
	15 pCi/L gross alpha activity (including radium-226 but excluding radon and uranium), including natural background	1.1 pCi/L[c,d] (HTOM) 1.1 pCi/L[c,d] (LTOM)
	4 mrem/yr to the whole body or any organ from combined beta-and photon-emitting radionuclides	.000023 mrem/yr (HTOM) .000013mrem/yr (LTOM)

NOTES: [a] Probability-weighted peak mean dose equivalent for the nominal and disruptive scenarios, which include igneous activity; results are based on an average annual water demand of approximately 2,000 acre-ft; the mean dose for groundwater-pathway-dominated scenarios would be reduced by approximately one-third by using 3,000 acre-ft.

[b] Human-intrusion-related releases are not expected during the period of regulatory compliance; the DOE has determined that the earliest time after disposal that the waste package would degrade sufficiently that a human intrusion could occur without recognition by the driller is at least 30,000 years, so the dose limits do not apply for purposes of the site suitability evaluation.

[c] These values represent measured natural background radiation concentrations; calculated activity concentrations from repository releases are well below minimum detection levels, background radiation concentrations, and regulatory limits.

[d] Gross alpha background concentrations are 0.4 pCi/L ± 0.7 (for maximum of 1.1 pCi/L).

[e] Peak value of the mean probability-weighted results within the regulatory timeframe.

TEDE= total effective dose equivalent; HTOM= higher temperature operating mode; LTOM= lower-temperature operating mode; NA= not applicable. Source: Williams 2001a, Section 6, Tables 6-1, 6-2, 6-3, and 6-4.

8.2. Energy Security

Roughly 20 percent of our country's electricity is generated from nuclear power. This means that, on average, each home, farm, factory, and business in America runs on nuclear fuel for a little less than five hours a day.

A balanced energy policy – one that makes use of multiple sources of energy, rather than becoming dependent entirely on generating electricity from a single source, such as natural gas – is important to economic growth. Our vulnerability to shortages and price spikes rises in direct proportion to our failure to maintain diverse sources of power. To assure that we will continue to have reliable and affordable sources of energy, we need to preserve our access to nuclear power.

Yet the Federal government's failure to meet its obligation to dispose of spent nuclear fuel under the NWPA – as it has been supposed to do starting in 1998 – is placing our access to this source

of energy in jeopardy. Nuclear power plants have been storing their spent fuel on site, but many are running out of space to do so. Unless a better solution is found, a growing number of these plants will not be able to find additional storage space and will be forced to shut down prematurely. Nor are we likely to see any new plants built.

Already we are facing a growing imbalance between our projected energy needs and our projected supplies. The loss of existing electric generating capacity that we will experience if nuclear plants start going off-line would significantly exacerbate this problem, leading to price spikes and increased electricity rates as relatively cheap power is taken off the market. A permanent repository for spent nuclear fuel is essential to our continuing to count on nuclear energy to help us meet our energy demands.

8.3. National Security

8.3.1. Powering the Navy Nuclear Fleet

A strong Navy is a vital part of national security. Many of the most strategically important vessels in our fleet, including submarines and aircraft carriers, are nuclear powered. They have played a major role in every significant military action in which the United States has been involved for some 40 years, including our current operations in Afghanistan. They are also essential to our nuclear deterrent. In short, our nuclear-powered Navy is indispensable to our status as a world power.

For the nuclear Navy to function, nuclear ships must be refueled periodically and the spent fuel removed. The spent fuel must go someplace. Currently, as part of a consent decree entered into between the State of Idaho and the Federal Government, this material goes to temporary surface storage facilities at the Idaho National Environmental and Engineering Laboratory. But this cannot continue indefinitely, and indeed the agreement specifies that the spent fuel must be removed. Failure to establish a permanent disposition pathway is not only irresponsible, but could also create serious future uncertainties potentially affecting the continued capability of our Naval operations.

8.3.2. Allowing the Nation to Decommission Its Surplus Nuclear Weapons and Support Nuclear Non-Proliferation Efforts

A decision now on the Yucca Mountain repository is also important in several ways to our efforts to prevent the proliferation of nuclear weapons. First, the end of the Cold War has brought the welcome challenge to our country of disposing of surplus weapons-grade plutonium as part of the process of decommissioning weapons we no longer need. Current plans call for turning the plutonium into "mixed-oxide" or "MOX" fuel. But creating MOX fuel as well as burning the fuel in a nuclear reactor will generate spent nuclear fuel, and other byproducts which themselves will require somewhere to go. A geological repository is critical to completing disposal of these materials. Such complete disposal is important if we are to expect other nations to decommission their own weapons, which they are unlikely to do unless persuaded that we are truly decommissioning our own.

A repository is important to non-proliferation for other reasons as well. Unauthorized removal of nuclear materials from a repository will be difficult even in the absence of strong institutional controls. Therefore, in countries that lack such controls, and even in our own, a safe repository is essential in preventing these materials from falling into the hands of rogue nations. By permanently disposing of nuclear weapons materials in a facility of this kind, the United States would encourage other nations to do the same.

8.4. Protecting the Environment

An underground repository at Yucca Mountain is important to our efforts to protect our environment and achieve sustainable growth in two ways. First, it will allow us to dispose of the radioactive waste that has been building up in our country for over fifty years in a safe and environmentally sound manner. Second, it will facilitate continued use and potential expansion of nuclear power, one of the few sources of electricity currently available to us that emits no carbon dioxide or other greenhouse gases.

As to the first point: While the Federal government has long promised that it would assume responsibility for nuclear waste, it has yet to start implementing an environmentally sound approach for disposing of this material. It is past time for us to do so. The production of nuclear weapons at the end of the Second World War and for many years thereafter has resulted in a legacy of high-level radioactive waste and spent fuel, currently located in Tennessee, Colorado, South Carolina, New Mexico, New York, Washington, and Idaho. Among these wastes, approximately 100,000,000 gallons of high-level liquid waste are stored in, and in some instances have leaked from, temporary holding tanks. In addition to this high-level radioactive waste, about 2,100 metric tons of solid, unreprocessed fuel from a plutonium-production reactor are stored at the Hanford Nuclear Reservation, with another 400 metric tons stored at other DOE sites.

In addition, under the NWPA, the Federal government is also responsible for disposing of spent commercial fuel, a program that was to have begun in 1998, four years ago. More than 161 million Americans, well more than half the population, reside within 75 miles of a major nuclear facility – and, thus, within 75 miles of that facility's aging and temporary capacity for storing this material. Moreover, because nuclear reactors require abundant water for cooling, on-site storage tends to be located near rivers, lakes, and seacoasts. Ten closed facilities, such as Big Rock Point, on the banks of Lake Michigan, also house spent fuel and incur significant annual costs without providing any ongoing benefit. Over the long-term, without active management and monitoring, degrading surface storage facilities may pose a risk to any of 20 major U.S. lakes and waterways, including the Mississippi River. Millions of Americans are served by municipal water systems with intakes along these waterways. In recent letters, Governors Bob Taft of Ohio[52] and John Engler of Michigan[53] raised concerns about the advisability of long-term storage of spent fuel in temporary systems so close to major bodies of water. The scientific consensus is that disposal of this material in a deep underground repository is not merely the safe answer and the right answer for protecting our environment but the only answer that has any degree of realism.

[52] Letter, Governor Bob Taft to Secretary Spencer Abraham, July 30, 2001.
[53] Letter, Governor John Engler to Secretary Spencer Abraham, September 5, 2001.

In addition, nuclear power is one of only a few sources of power available to us now in a potentially plentiful and economical manner that could drastically reduce air pollution and greenhouse gas emissions caused by the generation of electricity. It produces no controlled air pollutants, such as sulfur and particulates, or greenhouse gases. Therefore, it can help keep our air clean, avoid generation of ground-level ozone, and prevent acid rain. A repository at Yucca Mountain is indispensable to the maintenance and potential expansion of the use of this environmentally efficient source of energy.

8.5. Facilitating Continuation of Research, Medical, and Humanitarian Programs

The Department has provided fuel for use in research reactors in domestic and foreign universities and laboratories. Research reactors provide a wide range of benefits including the production of radioisotopes for medical use – *e.g.*, in body-scan imaging and the treatment of cancer. To limit the risk to the public, and to support nuclear non-proliferation objectives, these laboratories are required to return the DOE-origin spent fuel from domestic research reactors and from foreign research reactors. These spent fuels are temporarily stored at Savannah River, South Carolina, and at the Idaho National Engineering and Environmental Laboratory while awaiting disposal in a permanent repository.

Again, we can either implement a permanent solution – Yucca Mountain – or risk eroding our capacity to conduct this kind of research. The chances of a person becoming sick from the nuclear materials to be stored at the Yucca Mountain site are, as shown above, all but non-existent. Responsible critics must balance that against the chance of a person becoming sick as a result of the research that may not be undertaken, remaining sick for want of the drug that may not be found, or dying for lack of the cure that may not be developed – all because the nuclear fuel-dependent science that could produce these things was never done, our country having run out of places to dispose of the waste.

8.6. Assisting Anti-Terrorism at Home

As I have noted previously, spent fuel and other high level radioactive waste is presently stored at temporary storage facilities at 131 locations in 39 states. Ten of these are at shutdown reactor sites for which security would not otherwise be required. Moreover, many reactors are approaching their storage capacity and are likely to seek some form of off-site storage, thereby creating potential new targets.

Storage by reactor-owners was intended to be a temporary arrangement. The design of the storage facilities reflects that fact. They tend to be less secured than the reactors themselves, and the structures surrounding the fuel stored in aboveground containers are also less robust.

These storage facilities should be able to withstand current threats. But as the determination and sophistication of terrorists increases, that may well change. That means we will have to choose one of two courses. We can continue to endeavor to secure each of these sites, many of which, as noted above, are close to major metropolitan areas and waterways. Or we can consolidate this

fuel in one remote, secure, arid underground location and continue to develop state-of-the-art security arrangements to protect it there.

To me the choice is clear. The proposed geologic repository in the desert at Yucca Mountain offers unique features that make it far easier to secure against terrorist threats. These include: 1) disposal 800 feet below ground; 2) remote location; 3) restricted access afforded by Federal land ownership of the Nevada Test Site; 4) proximity to Nellis Air Force Range; 5) restricted airspace above the site; 6) far from any major waterways. The design and operation of a geologic repository, including surface operations, can also incorporate from the beginning appropriate features to protect against a terrorist threat and can be changed, if necessary, to respond to future changes in the terrorist threat.

An operational repository will also be an important signal to other nuclear countries, none of which have opened a repository. Inadequately protected nuclear waste in any country is a potential danger to us, and we can't expect them to site a facility if we, with more resources, won't. A fresh look at nuclear material security should involve new concepts such as those inherent in a geologic repository, and should set the standard for the manner in which the international community manages its own nuclear materials.

To understand Yucca Mountain's relative advantage in frustrating potential terrorist attacks compared to the *status quo*, one need only ask the following: If nuclear materials were already emplaced there, would anyone even suggest that we should spread them to 131 sites in 39 states, at locations typically closer to major cities and waterways than Yucca Mountain is, as a means of discouraging a terrorist attack?

8.7. Summary

In short, there are important reasons to move forward with a repository at Yucca Mountain. Doing so will advance our energy security by helping us to maintain diverse sources of energy supply. It will advance our national security by helping to provide operational certainty to our nuclear Navy and by facilitating the decomissioning of nuclear weapons and the secure disposition of nuclear materials. It will help us clean up our environment by allowing us to close the nuclear fuel cycle and giving us greater access to a form of energy that does not emit greenhouse gases. And it will help us in our efforts to secure ourselves against terrorist threats by allowing us to remove nuclear materials from scattered above-ground locations to a single, secure underground facility. Given the site's scientific and technical suitability, I find that compelling national interests counsel in favor of taking the next step toward siting a repository at Yucca Mountain.

9. None of the Arguments Against Yucca Mountain Withstands Analysis

As explained above, after months of study based on research unique in its scope and depth, I have concluded that the Yucca Mountain site is fully suitable under the most cautious standards that reasonably might be applied. I have also concluded that it serves the national interest in numerous important ways. The final question I shall examine is whether the arguments against its designation not rise to a level that outweighs the case for going forward. I believe they do

not, as I shall explain. I do so by briefly describing these principle arguments made by opponents of the Project, and then responding to them.

9.1. Assertion 1: The Citizens of Nevada Were Denied an Adequate Opportunity to Be Heard

Critics have claimed that the decision-making process under the NWPA was unfair because it allowed insufficient opportunity for public input, particularly from the citizens of Nevada. That is not so. There was ample opportunity for public discussion and debate; the Department in fact went well beyond the Act's requirements in providing notice and the opportunity to be heard.

My predecessors and I invited and encouraged public, governmental, and tribal participation at all levels. The Department also made numerous Yucca Mountain documents available to the public. These included several specifically prepared to inform any who might be interested of the technical information and analyses that I would have before me as I considered the suitability of the site. There was no statutory requirement for producing these documents; I considered it important to make them available, and thus to provide a timely sharing of information that would form the basis of my consideration and, ultimately, decision.

To assist in discharging part of the Secretarial responsibilities created by the Act, the Department conducted official public meetings before starting the Environmental Impact Statement. Subsequently, the Department held a total of 24 public hearings on the draft and the supplemental draft Environmental Impact Statements. With the release of the *Yucca Mountain Science and Engineering Report* in May 2001, the DOE opened a public comment period lasting approximately six months; the period continued through the release of the *Preliminary Site Suitability Evaluation* in July 2001 and closed on October 19, 2001. After publishing DOE's final rule, "Yucca Mountain Site Suitability Guidelines," on November 14, 2001, I announced an additional 30-day supplemental comment period with a closing date of December 14, 2001. During these combined public comment periods, the DOE held 66 additional public hearings across Nevada and in Inyo County, California, to receive comments on my consideration of a possible recommendation of the Yucca Mountain site. More than 17,000 comments were received.[54]

The lengths to which the Department went to solicit public comment can be seen in the details: from 1995 through 2001, there were 126 official hearings with a court reporter present. The Nevada cities where these hearings were held included: Amargosa Valley, Battle Mountain, Caliente, Carson City, Crescent Valley, Elko, Ely, Fallon, Gardnerville, Goldfield, Hawthorne, Las Vegas, Lovelock, Pahrump, Reno, Tonopah, Virginia City, Winnemucca, and Yerington. Elsewhere, meetings were held in Independence, Lone Pine, Sacramento, and San Bernardino in California; Washington, DC; Boise, ID; Chicago, IL; Denver, CO; Dallas/Ft. Worth, TX; Salt Lake City, UT; Baltimore, MD; Albany, NY; Atlanta, GA; Kansas City, MO.; Cleveland, OH; and St. Louis, MO.

There were 600 hours of public meetings for the 2001 hearings alone. All in all, there were a total of 528 comment days, or about a year and a half. Additionally, the science centers were

[54] *Comment Summary Document* and *Supplemental Comment Summary Document*, February 2002.

open for 340 hours (both with and without court reporter) to receive comments. Since 1991, there have been 2,062 tours of Yucca Mountain, and 49,073 visitors have been to the site.

In light of the extensive opportunities DOE has provided for public input, it is my judgment that the opportunities for hearing and consideration of comments were abundant and met any procedural measure of fairness.

9.2. Assertion 2: The Project Has Received Inadequate Study

Critics have said that there has been inadequate study to determine Yucca Mountain's suitability. To the contrary, and as I believe section 6 of this Recommendation makes clear at length, the characterization process at Yucca Mountain is unprecedented for any even remotely comparable undertaking. Indeed, Yucca Mountain studies have now been under way for nearly five times as long as it took to build the Hoover Dam and more than six times the entire duration of the Manhattan Project. Yucca Mountain is, by any measure, the most exhaustively studied project of its kind the world has ever known.

Beginning in 1978 and continuing to the present day, the Department has spent billions of dollars on characterization studies. There has been ongoing dialogue between the Department and the NRC over the goals, content and results of the test programs. As noted, there have been ample opportunities for public involvement. At this still early stage, and with many more years before the Yucca Mountain site could become operational, the request for yet more preliminary study, even before seeking a license from the NRC, is unsupportable. Additional study will be undertaken at stages to come as an appropriate part of the licensing process.

For these reasons, I have concluded that the current body of accumulated scientific and technical knowledge provides a more than adequate technical basis to designate the Yucca Mountain site, thereby beginning the licensing phase of the project. For convenience, a listing of the types of tests that have been performed is provided in Table 3.

9.3. Assertion 3: The Rules Were Changed in the Middle of the Game

The State of Nevada claims that at some point the Department concluded that Yucca Mountain was not suitable under earlier regulations, and then changed the rules to fit the site. That is not true. Even the most elementary knowledge of the history of the program shows this claim is baseless.

The Guidelines did change, but not in a way that disadvantaged critics from making their case, and certainly not to suit any pre-existing agenda at the Department. Rather, they were changed to conform to changes in the statutory and regulatory framework governing the siting process and in the scientific consensus regarding the best approach for assessing the likely performance of a repository over long periods of time.

Table 3: Types of Tests Performed to Collect Data for Site Characterization of Yucca Mountain [55]

Process Models	Types of Tests and Studies
Unsaturated Zone (the rocks above the water table containing little water that limit the amount of water that can contact waste packages)	Future climate studies
	Infiltration model studies
	Unsaturated zone flow model studies
	Seepage model studies
	Unsaturated zone transport studies
Near-Field Environment (moisture, temperature, and chemistry conditions surrounding and affecting the waste packages)	Drift scale test
	Single heater test
	Large block test
	Field tests on coupled processes
	Laboratory coupled processes tests
Engineered Barrier System (EBS) (man-made features comprising the repository that influence how radionuclides might move)	Cementicious materials tests
	EBS design tests
	In-drift gas composition tests
	In-drift water chemistry, precipitates and salts tests
	Microbial communities tests
	Radionuclide transport tests
	Drift degradation analysis tests
	Rock mass mechanical properties tests
Waste Package (metal container that the wastes would be placed in)	Waste package environment tests
	Materials selection studies
	General corrosion tests
	Localized corrosion tests
	Stress corrosion cracking tests
	Hydrogen-induced cracking tests
	Metallurgical stability/phases tests
	Manufacturing defects tests
	Filler material tests
	Welding tests
Waste Form (high-level wastes and spent fuel that are the source of radionuclides)	Radioisotope inventory study
	In-package chemistry tests
	Commercial spent nuclear fuel cladding degradation tests
	Defense spent nuclear fuel degradation tests
	High level waste glass degradation tests
	Dissolved radioisotope concentration tests
	Colloid radioisotope concentration tests
Saturated Zone (movement of water in rocks below the water table)	Saturated zone characterization studies
	Saturated zone flow studies
	Saturated zone transport studies

[55] Summary information about progress in testing is provided to the NRC twice each year. There are 23 Semiannual Progress Reports available, covering all testing for the Yucca Mountain site. These documents include references to numerous technical reports of the Program, which number in the thousands.

Table 3: Types of Tests Performed to Collect Data for Site Characterization of Yucca Mountain, continued

Integrated Site Model (computer models of the geology)	Geologic framework model studies
	Rock properties model studies
	Mineralogical model studies
Site Description (description of the repository)	Geologic mapping studies
	Fracture data collection studies
	Natural resources assessment studies
	Erosion studies
	Natural and man-made analog studies
Disruptive Events (unlikely disruptions to the repository)	Probability of igneous activity studies
	Characteristics of igneous activity studies
	Seismic hazards studies

The DOE's original siting Guidelines were promulgated in 1984. At the time, the Nuclear Waste Policy Act called on the Department to evaluate and characterize multiple sites and to recommend one or more among them. Also at the time, consistent with the scientific and regulatory consensus of the late 1970's, the Nuclear Regulatory Commission had in place regulations for licensing repositories that sought to protect against radioactive releases by focusing on the performance of individual subparts, or subsystems, that were part of the repository. Finally, the EPA had proposed rules for repositories that also focused on limiting the amount and type of radionuclides released from a repository. Consistent with this framework, DOE's Guidelines focused on making comparative judgments among sites and emphasized mechanisms for evaluating the performance of potential repository subsystems against the NRC subsystem performance requirements and the EPA release limits.

Starting in 1987, however, both the regulatory framework and scientific consensus began to change. To begin with, Congress changed the law governing evaluation and selection of a repository site. In 1987, it amended the Nuclear Waste Policy Act to eliminate any authority or responsibility on the part of the Department for comparing sites, directed the Department to cease all evaluation of any potential repository sites other than Yucca Mountain, and directed it to focus its efforts exclusively on determining whether or not to recommend the Yucca Mountain site. This change was important, as it eliminated a central purpose of the Guidelines – to compare and contrast multiple fully characterized sites for ultimate selection of one among several for recommendation.

Next, Congress reinforced its directive to focus on Yucca Mountain in section 801 of the Energy Policy Act of 1992. This provision also gave three new directives to EPA. First, it directed EPA, within 90 days of enactment, to contract with the National Academy of Sciences for a study regarding, among other topics, whether a specific kind of radiation protection standard for repositories would be protective of public health and safety. The question posed was whether standards prescribing a maximum annual effective dose individuals could receive from the repository – as opposed to the then-current standards EPA had in place focusing on releases –

would be reasonable standards for protecting health and safety at the Yucca Mountain site. Second, Congress directed EPA, consistent with the findings and recommendations of the Academy, to promulgate such standards no later than one year after completion of the Academy's study. Finally, it directed that such standards, when promulgated, would be the exclusive public health and safety standards applicable to the Yucca Mountain site. Section 801 also contained a directive to the NRC that, within a year after EPA's promulgation of the new standards, NRC modify its licensing criteria for repositories under the NWPA as necessary to be consistent with the EPA standards.

Pursuant to the section 801 directive, in 1995 the National Academy of Sciences published a report entitled "Technical Bases for Yucca Mountain Standards."[56] This report concluded that dose standards would be protective of public health and safety.[57] It also concluded that if EPA adopted this kind of standard, it would be appropriate for the NRC to revise its licensing rules, which currently focused on subsystem performance, to focus instead on the performance of the total repository system, including both its engineered and natural barriers. It noted that this would be a preferable approach because it was the performance of the entire repository, not the different subsystems, that was crucial, and that imposition of separate subsystem performance requirements might result in suboptimal performance of the repository as a whole.[58] Finally, National Academy of Sciences noted that its recommendations, if adopted, "*impl[ied] the development of regulatory and analytical approaches for Yucca Mountain that are different from those employed in the past*" whose promulgation would likely require more than the one-year timeframe specified in the Energy Policy Act of 1992.

Along with these changes in regulatory thinking, the scientific and technical understanding of repository performance at Yucca Mountain was advancing. The DOE's use of Total System Performance Assessment to evaluate repository performance became more sophisticated, and helped focus DOE's research work on those areas important to maximizing the safety of the repository and minimizing public exposure to radionuclide releases from the repository.

In 1999, the culmination of years of scientific and technical advancements and careful regulatory review resulted in EPA and NRC proposals for new regulations specific to a repository at Yucca Mountain based on state-of-the-art science and regulatory standards.[59] Since section 113(c) of the NWPA directed DOE to focus its site characterization activities on those necessary to evaluate the suitability of the site for a license application to the NRC, the proposed changes to the EPA and NRC rules in turn required DOE to propose modifications to its criteria and methodology for determining the suitability of the Yucca Mountain site. Accordingly, DOE proposed new state-of-the-art Yucca-Mountain-specific site suitability Guidelines consistent with NRC licensing regulations.[60] After EPA and NRC finalized their revisions,[61] DOE promptly

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[56] *Technical Bases for Yucca Mountain Standards,* National Academy of Sciences, National Research Council, 1995.
[57] *Ibid.*
[58] *Ibid.*
[59] Disposal of High-Level Radioactive Wastes in a Proposed Geological Repository at Yucca Mountain, Nevada, Proposed Rule, 64 Fed. Reg. 8640, February 22, 1999; Environmental Radiation Protection Standards for Yucca Mountain, Nevada, Proposed Rule, 64 Fed. Reg. 46975, August 27, 1999.
[60] General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories, Yucca Mountain Site Suitability Guidelines, 64 Fed. Reg. 67054, November 30, 1999.

finalized its own.[62] For the reasons explained in the National Academy of Sciences study, the revised Guidelines' focus on the performance of the total repository system also makes them a better tool for protection of public safety than the old Guidelines, since the old subsystem approach might have resulted in a repository whose subsystems performed better in one or another respect but whose total performance in protecting human health was inferior.

In short, far from seeking to manipulate its siting Guidelines to fit the site, DOE had no choice but to amend its Guidelines to conform with the new regulatory framework established at Congress's direction by the National Academy of Sciences, the EPA, and the NRC. Moreover, this framework represents the culmination of a carefully considered set of regulatory decisions initiated at the direction of the Congress of the United States and completed nine years later, in which top scientists in the country have participated, and in which expert regulatory authorities, the NRC and the EPA, have played the leading role. These authorities likewise agree that the new regulatory framework, of which the Department's revised Guidelines are a necessary part, forms a coherent whole well designed to protect the health and safety of the public.

9.4. Assertion 4: The Process Tramples States' Rights

Some have argued that a Federal selection of siting disrespects states' rights. That is incorrect. Indeed, Nevada's interests have been accorded a place in Federal law to an extent seldom, if ever, seen before.

As provided by the NWPA, the State of Nevada has the right to veto any Presidential site recommendation. It may do so by submitting a notice of disapproval to Congress within 60 days of the President's action.

If Nevada submits a notice of disapproval, Congress has 90 calendar days of continuous session to override the notice by passing a resolution of siting designation. If it does not do so, the State's disapproval becomes effective.

The respect due Nevada has not stopped with grudging obedience to the statutory commands. Instead, as noted previously, the Department has held hearings over a range of dates and places well in excess of what reasonably could have been viewed as a statutory mandate. And I have taken full account of Governor Guinn's comment and those of Nevada's other elected officials who oppose this Project. Although they reflect a view I do not share, I will continue to accord them the highest degree of respect.

Finally, the Federal Government has appropriated more funds to Nevada to conduct its own Yucca Mountain studies than any other State has ever been given for any remotely similar purpose. Since the start of the Program in 1983, the State of Nevada has received over $78 million in oversight funding. Since 1989, when the affected units of local government requested

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[61] Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada, Final Rule, 66 FR 32073, June 13, 2001; Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada; Final Rule, 66 FR 55732, November 2, 2001.

[62] General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories, Yucca Mountain Site Suitability Guidelines, Final Rule, 66 Fed. Reg. 57303, November 14, 2001.

oversight funding, they have received over $67 million. In total, the State of Nevada and the affected units of local government have received over $145 million over that timeframe; with Nye County, home to Yucca Mountain, receiving over $22 million and Clark County, home to Las Vegas, receiving about $25 million. In addition, over the last 10 years, the State of Nevada and the affected units of local government have been given over $73 million to compensate for taxes they would have collected on the site characterization and the development and operation of a repository if they were legally authorized to tax activities of the Federal Government. Nye County has also conducted its own oversight drilling program since 1996, for which over that time Nye has received almost $21 million. Thus, the grand total that has been awarded to the state and its local governments simply on account of Yucca Mountain research has been nearly $240 million.

Given the extensive evidence that the state has been, and will be, accorded a degree of involvement and authority seldom if ever accorded under similar circumstances, it is my judgment that the assertion of an infringement on state's rights is incorrect.

9.5. Assertion 5: Transportation of Nuclear Materials is Disruptive and Dangerous

Critics have argued that transporting wastes to Yucca Mountain is simply too dangerous, given the amount involved and the distances that will need to be traversed, sometimes near population centers.

These concerns are not substantiated for three principal reasons. First, they take no account of the dangers of not transporting the wastes and leaving them to degrade and/or accumulate in their present, temporary facilities. Second, they pay no heed to the fact that, if the Yucca Mountain repository is not built, some wastes that would have been bound for that location will have to be transported elsewhere, meaning that our real choice is not between transporting or not transporting, but between transporting with as much planning and safety as possible, or transporting with such organization as the moment might invite. And third, they ignore the remarkable record of safe transportation of nuclear materials that our country has achieved over more than three decades.

The first point is not difficult to understand. The potential hazards of transporting wastes are made to appear menacing only by ignoring the potential hazards of leaving the material where it is – at 131 aging surface facilities in 39 states. Every ton of waste not transported for five or ten minutes near a town on the route to Yucca Mountain is a ton of waste left sitting in or near someone else's town – and not for five or ten minutes but indefinitely. Most of the wastes left where they are in or near dozens of towns (and cities) continue to accumulate day-by-day in temporary facilities not intended for long-term storage or disposal.

The second point is also fairly simple. Many of these older sites have reached or will soon reach pool storage limits. Over 40 are projected to need some form of dry storage by 2010. Additional facilities will therefore be required. There are real limits, however, to how many of these can realistically be expected to be built on site. Many utilities do not have the space available to build them, and are likely to face major regulatory hurdles in attempting to acquire it.

Therefore one way or another, unless all these reactors shut down, off-site storage facilities will need to be built, substantial amounts of waste will have to be transported there, and this will happen not in the distant future but quite soon. For example, today nuclear utilities and a Native American tribe in Utah are working toward construction of an "interim" storage facility on tribal land. Whether or not this effort ultimately succeeds, it is likely that some similar effort will. Thus, if we are merely to keep our present supply of nuclear energy, at some fast-approaching point there will be transportation of nuclear wastes. The only question is whether we will have (a) numerous supplemental storage sites springing up, with transportation to them arranged *ad hoc*, or (b) one permanent repository, with transportation to it arranged systematically and with years of advance planning. The second alternative is plainly preferable, making the Yucca Mountain plan superior on this ground alone.

Finally, transportation of nuclear waste is not remotely the risky venture Yucca's critics seek to make it out to be. Over the last 30 years, there have been over 2,700 shipments of spent nuclear fuel. Occasional traffic accidents have occurred, but there has not been one identifiable injury related to radiation exposure because of them. In addition, since 1975, or since the last stages of the war in Vietnam, national security shipments have traveled over 100 million miles – more than the distance from here to the sun – with no accidents causing a fatality or harmful release of radioactive material.[63]

Our safety record is comparable to that in Europe, where nuclear fuel has been transported extensively since 1966.[64] Over the last 25 years, more than 70,000 MTU (an amount roughly equal to what is expected to be shipped over the entire active life of the Yucca Mountain Project) has been shipped in approximately 20,000 casks. France and Britain average 650 shipments per year, even though the population density in each of those countries grossly exceeds that of the United States.

Even so, we need not, and should not, be content to rest upon the record of the past no matter how good. For transportation to Yucca Mountain, the Department of Transportation has established a process that DOE and the states must use for evaluating potential routes. Consistent with Federal regulations, the NRC would approve all routes and security plans and would certify transportation casks prior to shipment.

In short, for all these reasons, I have concluded that the stated concerns about transportation are ill-founded and should not stand in the way of taking the next step toward designation of the Yucca Mountain site.

9.6. Assertion 6: Transportation of Wastes to the Site Will Have a Dramatically Negative Economic Impact on Las Vegas

There have been repeated assertions that shipments of radioactive waste through the Las Vegas valley could have effects on the local, entertainment-based, economy. Such effects could include, for example, discouraging tourism and lowering property values. These assertions are

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[63] *About the Transportation Safeguards System*, Office of Transportation Safeguards Fact Sheet.
[64] Presentation by Ronald Pope, Head of Transport Safety Unit for the Internal Atomic Energy Agency, at 13th International Symposium for Packing of Radioactive Materials 2001, Chicago, IL, September 2001.

largely unsupportable by any evidence and are addressed in the Final Environmental Impact Statement.

Much of what has been said in the preceding section applies here as well. The record speaks for itself. In addition to the history of safe shipment on interstate highways through relatively open spaces, five metric tons of spent nuclear fuel from 27 countries have, over the last 16 years, been transported without incident through Concord, California, and Charleston, South Carolina (the latter, like Las Vegas, a tourist destination). There is no reason to believe that a similar safe record will not be achieved in Nevada.

The truth of it is that many tourists coming to Las Vegas will be farther from nuclear sites when they get there than when they left home. All major nuclear power generation facilities in the United States are located near large metropolitan centers in order to minimize the amount of power lost during transmission. It is thus not surprising that more than 161 million Americans are closer to a commercial nuclear facility than anyone in Las Vegas is to Yucca Mountain, as shown in Table 4. Indeed there are few large metropolitan centers that do not have a major nuclear facility located within 75 miles.[65]

Table 4. U.S. Population in Contiguous United States Living Within Various Distances of Commercial Nuclear Facilities

State	Zone (miles from facilities)				
	0 - 25	*25 - 50*	*50 - 75*	*0 - 50*	*0 - 75*
AL	327,488	617,283	452,817	944,771	1,397,588
AR	91,993	159,544	859,399	251,537	1,110,936
AZ	25,803	1,550,878	1,608,816	1,576,682	3,185,497
CA	2,488,467	8,666,094	11,962,159	11,154,561	23,116,719
CO	*	*	*	*	*
CT	962,725	2,394,573	55,292	3,357,298	3,412,590
DC		153,634	418,425	153,634	572,059
DE	457,523	184,324	123,438	641,847	765,285
FL	1,135,427	2,865,538	3,550,098	4,000,965	7,551,063
GA	186,028	886,879	1,145,585	1,072,907	2,218,491
IA	512,517	566,867	474,723	1,079,384	1,554,107
ID	*	*	*	*	*
IL	2,068,321	7,970,381	835,971	10,038,701	10,874,673
IN	34,431	945,514	468,802	979,945	1,448,747
KS	19,797	161,268	686,554	181,065	867,619
KY					
LA	786,052	1,592,771	772,888	2,378,823	3,151,710
MA	740,668	4,346,548	1,275,039	5,087,217	6,362,255
MD	438,958	2,528,095	2,007,566	2,967,053	4,974,619

[65] It is noteworthy that Atlantic City has three reactor sites closer than 75 miles at the same time its tourism-based economy has been expanding. Yucca Mountain, by contrast, would be one of the few nuclear facilities in the country in a remote area with no metropolitan center within 75 miles.

Table 4. U.S. Population in Contiguous United States Living Within Various Distances of Commercial Nuclear Facilities, continued

ME	151,828	521,691	280,266	673,520	953,785
MI	898,433	3,815,786	2,491,128	4,714,219	7,205,346
MN	450,935	2,999,162	330,754	3,450,097	3,780,850
MO	72,929	393,186	952,824	466,115	1,418,939
MS	36,411	169,211	561,585	205,622	767,207
MT					
NC	1,864,567	2,265,107	2,577,799	4,129,674	6,747,239
ND					
NE	564,594	181,950	379,944	746,544	1,126,488
NH	278,528	649,119	188,301	927,646	1,115,947
NJ	795,512	5,628,139	2,023,890	6,423,650	8,447,540
NM	*	*	*	*	*
NV					
NY	1,866,267	9,017,732	5,435,801	10,883,999	16,319,800
OH	656,156	2,790,959	2,074,628	3,447,115	5,521,743
OK			5,479		5,479
OR	45,053	1,381,995	432,829	1,427,047	1,859,876
PA	3,206,819	6,437,719	1,564,624	9,644,538	11,209,162
RI	19,252	284,282	744,786	303,534	1,048,320
SC	705,470	1,760,435	747,457	2,465,906	3,213,363
SD			569		569
TN	532,368	456,157	927,261	988,525	1,915,786
TX	136,390	1,337,035	3,766,243	1,473,425	5,239,668
UT	*	*	*	*	*
VA	597,715	2,377,308	2,221,770	2,975,024	5,196,794
VT	54,257	43,739	77,319	97,996	175,315
WA	331,397	500,577	585,734	831,974	1,417,708
WI	542,083	2,065,518	1,646,584	2,607,601	4,254,185
WV	43,813	65,183	37,095	108,996	146,090
WY					
Grand Total	24,126,975	80,732,181	56,752,239	104,859,156	161,651,160
Proposed Repository at Yucca Mountain					
Population around Yucca Mountain	1,678	13,084	19,069	14,762	33,831

*State with no commercial facilities but with other nuclear facilities depending on a repository for waste disposition.

As shown in Table 5, 22 of the 30 most populous metropolitan areas in the United States have 36 operating nuclear reactors closer to them than a waste repository at Yucca Mountain would be to Las Vegas, some 90 miles distant.

Table 5. Top 30 Metropolitan Areas in Contiguous U.S. by Population - Distance to Nearest Commercial Power Reactor (does not include other nuclear facilities that are dependent on a high-level repository for waste disposition)

Rank	Area Name	Population 2000 Census (Note 1)	Major Population Centers	State	Nearest Commercial Nuclear Reactor	Distance (Miles) (Note 4)
1	New York—Northern New Jersey—Long Island, NY—NJ—CT—PA CMSA (Note 2)	21,199,865	New York	NY	INDIAN POINT	45.0
			Jersey City	NJ	INDIAN POINT	44.4
2	Los Angeles—Riverside—Orange County, CA CMSA	16,373,645	Los Angeles	CA	SAN ONOFRE	61.5
			Riverside	CA	SAN ONOFRE	41.2
3	Chicago—Gary—Kenosha, IL—IN—WI CMSA	9,157,540	Chicago	IL	ZION	44.9
			Rockford	IL	BYRON	17.7
4	Washington—Baltimore, DC—MD—VA—WV CMSA	7,608,070	Baltimore	MD	PEACH BOTTOM	43.0
			Washington D.C.	DC	CALVERT CLIFFS	51.2
5	San Francisco—Oakland—San Jose, CA CMSA	7,039,362	San Francisco	CA	RANCHO SECO	81.3
			Oakland	CA	RANCHO SECO	73.3
			San Jose	CA	RANCHO SECO	81.8
6	Philadelphia—Wilmington—Atlantic City, PA—NJ—DE—MD CMSA	6,188,463	Philadelphia	PA	LIMERICK	34.1
7	Boston—Worcester—Lawrence, MA—NH—ME—CT CMSA	5,819,100	Boston	MA	PILGRIM	45.2
			Worcester	MA	VERMONT YANKEE	60.3
8	Detroit—Ann Arbor—Flint, MI CMSA	5,456,428	Detroit	MI	FERMI	30.4
9	Dallas—Fort Worth, TX CMSA	5,221,801	Dallas	TX	COMANCHE PEAK	69.3
			Fort Worth	TX	COMANCHE PEAK	41.7
10	Houston—Galveston—Brazoria, TX CMSA	4,669,571	Houston	TX	SOUTH TEXAS PROJECT	82.7
11	Atlanta, GA MSA (Note 3)	4,112,198	Atlanta	GA	SEQUOYAH	121.7
12	Miami—Fort Lauderdale, FL CMSA	3,876,380	Fort Lauderdale	FL	TURKEY POINT	57.9
			Miami	FL	TURKEY POINT	29.6
13	Seattle—Tacoma—Bremerton, WA CMSA	3,554,760	Seattle	WA	TROJAN	111.4
			Tacoma	WA	TROJAN	86.4
14	Phoenix—Mesa, AZ MSA	3,251,876	Glendale	AZ	PALO VERDE	40.4
			Scottsdale	AZ	PALO VERDE	56.3
			Phoenix	AZ	PALO VERDE	45.8
			Tempe	AZ	PALO VERDE	55.2
			Mesa	AZ	PALO VERDE	60.2
			Chandler	AZ	PALO VERDE	59.4
15	Minneapolis—St. Paul, MN—WI MSA	2,968,806	Minneapolis	MN	MONTICELLO	39.1
			Saint Paul	MN	PRAIRIE ISLAND STATION	34.2
16	Cleveland—Akron, OH CMSA	2,945,831	Cleveland	OH	PERRY	39.3
			Akron	OH	PERRY	59.3
17	San Diego, CA MSA	2,813,833	San Diego	CA	SAN ONOFRE	50.7
18	St. Louis, MO—IL MSA	2,603,607	Saint Louis	MO	CALLAWAY	91.7
19	Denver—Boulder—Greeley, CO CMSA	2,581,506	Denver	CO	FORT CALHOUN	495.6
20	Tampa—St. Petersburg—Clearwater, FL MSA	2,395,997	Tampa	FL	CRYSTAL RIVER	81.9
21	Pittsburgh, PA MSA	2,358,695	Pittsburgh	PA	BEAVER VALLEY	29.6

Table 5. Top 30 Metropolitan Areas in Contiguous U.S. by Population - Distance to Nearest Commercial Power Reactor, continued

22	Portland—Salem, OR—WA CMSA	2,265,223	Portland	OR	TROJAN	37.2
23	Cincinnati—Hamilton, OH—KY—IN CMSA	1,979,202	Cincinnati	OH	DAVIS BESSE	206.8
24	Sacramento—Yolo, CA CMSA	1,796,857	Sacramento	CA	RANCHO SECO	26.1
25	Kansas City, MO—KS MSA	1,776,062	Kansas City	MO	WOLF CREEK	88.2
			Kansas City	KS	WOLF CREEK	87.0
26	Milwaukee—Racine, WI CMSA	1,689,572	Milwaukee	WI	ZION	44.2
27	Orlando, FL MSA	1,644,561	Orlando	FL	CRYSTAL RIVER	98.7
28	Indianapolis, IN MSA	1,607,486	Indianapolis	IN	CLINTON	156.5
29	San Antonio, TX MSA	1,592,383	San Antonio	TX	SOUTH TEXAS PROJECT	161.3
30	Norfolk—Virginia Beach—Newport News, VA—NC MSA	1,569,541	Newport News	VA	SURRY	23.2
			Virginia Beach	VA	SURRY	53.4
			Norfolk	VA	SURRY	37.3

Notes

1 Populations from 2000 Census data for Continental USA
2 CMSA means "Consolidated Metropolitan Statistical Area"
3 MSA means "Metropolitan Statistical Area"
4 Distances shown are relative to a central feature such as a city hall, county seat, or capitol building.

Many cities with strong tourism industries are located closer to existing storage facilities than Las Vegas would be to a repository at Yucca Mountain. Therefore, those who assert that a repository 90 miles from Las Vegas would have dramatically negative effects on local tourism have the burden of producing strong evidence to back up their claims. They have not done so. Thus, I know of no reason to believe that there is any compelling argument that the Las Vegas economy would be harmed by a repository at Yucca Mountain.

9.7. Assertion 7: It is Premature for DOE to Make a Site Recommendation for Various Reasons

9.7.1. The General Accounting Office has concluded that it is premature for DOE to make a site recommendation now

The GAO did make this statement in its draft report, *Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project*, which was prematurely released.[66] After receiving the Department's response, however, in the final version of this report, released in December 2001, GAO expressly acknowledged that "the Secretary has the discretion to make such a recommendation at this time." [67]

[66] *Nuclear Waste: Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project*, Unpublished Draft.
[67] *Nuclear Waste: Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project*, GAO-02-191, December 21, 2001.

9.7.2. DOE is not ready to make a site recommendation now because DOE and NRC have agreed on 293 technical items that need to be completed before DOE files a license application

The Nuclear Regulatory Commission provided a sufficiency letter to DOE on November 13, 2001, that concluded that existing and planned work, upon completion, would be sufficient to apply for a construction authorization. The agreed upon course of action by DOE and the NRC is intended to assist in the license application phase of the project, not site recommendation. In consultation with the Nuclear Regulatory Commission staff concerning *licensing*, DOE agreed it would obtain certain additional information relating to nine "key technical issues" to support license application. The DOE agreed to undertake 293 activities that would assist in resolution of these issues.

The NRC has *never* stated that this was work that DOE needed to complete before *site recommendation*. In fact, it went out of its way not to do so. The Commission is well aware that section 114(a)(1)(E) of the NWPA requires a Secretarial recommendation of Yucca Mountain to be accompanied by a letter from the Commission providing its preliminary comments on the sufficiency of the information the Department has assembled for a construction license application. Had it been of the view that site recommendation should not proceed, its preliminary views would have stated that this information is not sufficient and that the Commission has no confidence that it ever will be.

Instead, in its section 114(a)(1)(E) letter, the Commission said the opposite: "[T]he NRC believes that sufficient at-depth 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*" (emphasis added). It also listed the outstanding issues as "closed pending," meaning that the NRC staff has confidence that DOE's proposed approach, together with the agreement to provide additional information, acceptably addresses the issue so that no information beyond that provided or agreed to would likely be required for a license application.

The DOE has completed over one-third of the actions necessary to fulfill the 293 agreements and has submitted the results to the NRC for review. The NRC has documented 23 of these as "complete." The remaining work consists largely of documentation (improve technical positions and provide additional plans and procedures) and confirmation (enhance understanding with additional testing or analysis or additional corroboration of data or models).

As I explained earlier, the NWPA makes clear that site recommendation is an intermediate step. The filing of a construction license application is the step that comes after site recommendation is complete. It is entirely unsurprising that the Department would have to do additional work before taking that next step. But the fact that the next step will require additional work is no reason not to take this one.

9.7.3. It is premature for DOE to make a recommendation now because DOE cannot complete this additional work until 2006. The NWPA requires DOE to file a license application within 90 days of the approval of site designation

When Congress enacted the NWPA in 1982, it included in the Act a series of deadlines that represented its best judgment regarding how long various steps should take. These deadlines included the 90-day provision referenced above. They also included a requirement that DOE begin disposing of waste in 1998, in the expectation that a repository would by then have been built and licensed.

Obviously, the timeframes set in the Act have proven to be optimistic. That is no reason, however, for the Department not to honor what was plainly their central function: to move along as promptly and as responsibly as possible in the development of a repository. Accordingly, to read the 90-day provision at issue as a basis for proceeding more slowly stands the provision on its head.

Our current plans call for filing a license application at the end of 2004, not 2006. Assuming Congressional action on this question this year, that would mean that DOE could be two years late in filing the application. But any delay in site recommendation will only result in *further* delay in the filing of this application. For the reasons explained in section 7, I believe I have the information necessary to allow me to determine that the site is scientifically and technically suitable, and I have so determined. That being so, I am confident that I best honor the various deadlines set out in the Act, including the central 1998 deadline (already passed) specifying when the Department was to begin waste disposal, by proceeding with site recommendation as promptly as I can after reaching this conclusion.

10. Conclusion

As I explained at the outset of this document, the Nuclear Waste Policy Act vests responsibilities for deciding how this country will proceed with regard to nuclear waste in a number of different Federal and state actors. As Secretary of Energy, I am charged with making a specific determination: whether to recommend to the President that Yucca Mountain be developed as the site for a repository for spent fuel and high-level radioactive wastes. I have endeavored to discharge that responsibility conscientiously and to the best of my ability.

The first question I believe the law asks me to answer is whether the Yucca Mountain site is scientifically and technically suitable for development as a repository. The amount and quality of research the Department of Energy has invested into answering this question — done by top-flight people, much of it on the watch of my predecessors from both parties — is nothing short of staggering. After careful evaluation, I am convinced that the product of over 20 years, millions of hours, and four billion dollars of this research provides a sound scientific basis for concluding that the site can perform safely during both the pre- and post-closure periods, and that it is indeed scientifically and technically suitable for development as a repository.

Having resolved this fundamental question, I then turned to a second set of considerations: are there compelling national interests that warrant proceeding with this project? I am convinced

that there are, and that a repository for nuclear waste at Yucca Mountain will advance, in important ways, our energy security, our national security, our environmental goals, and our security against terrorist attacks.

Finally, I examined the arguments that opponents of the project have advanced for why we should not proceed. I do not believe any of them is of sufficient weight to warrant following a different course.

Accordingly, I have determined to recommend to the President that he find Yucca Mountain qualified for application for a construction authorization before the Nuclear Regulatory Commission, and that he recommend it for development of a repository.

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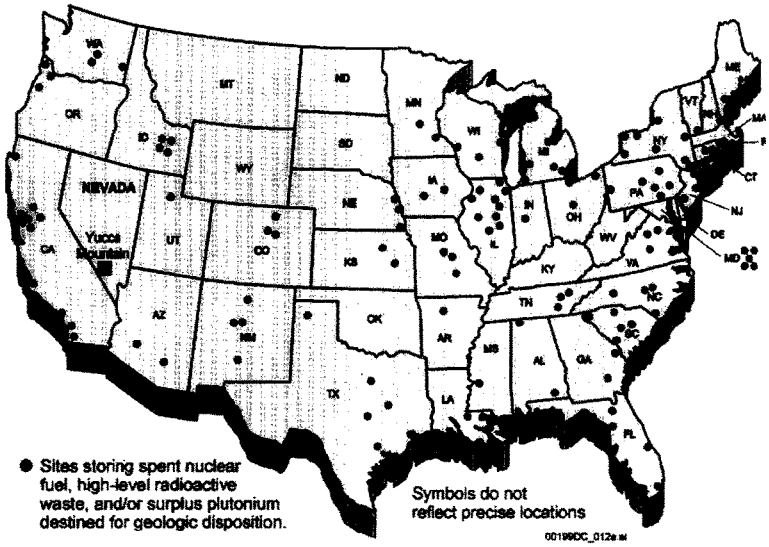
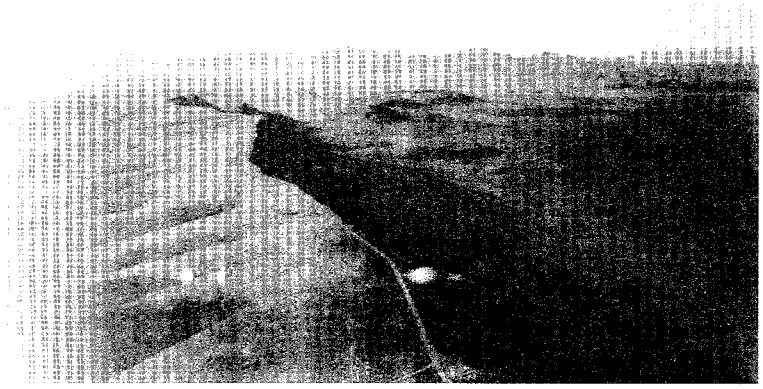


Why Yucca Mountain?

Frequently Asked Questions



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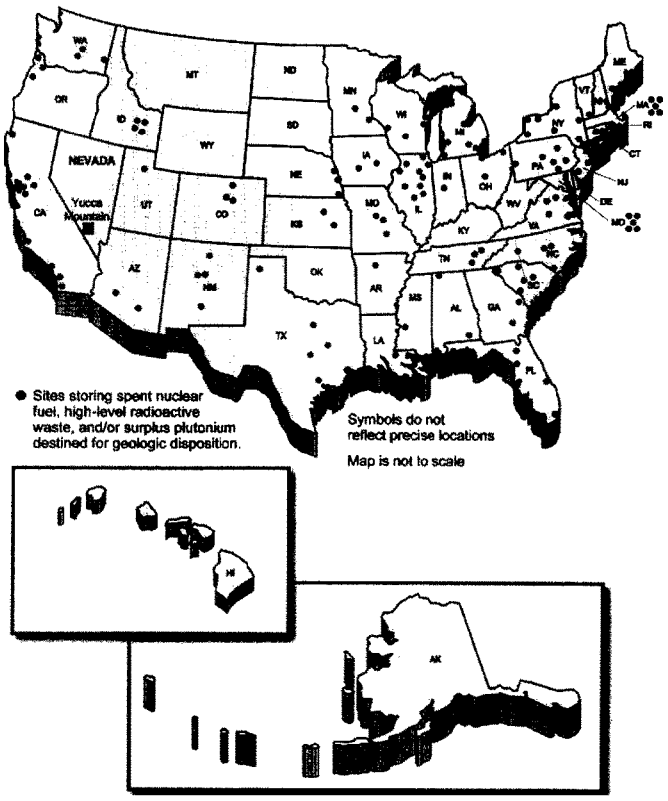
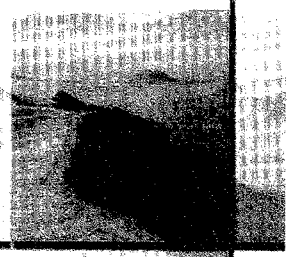
At present, spent nuclear fuel and high-level radioactive waste are temporarily stored at 131 locations in 39 states.



Introduction



The purpose of this question-and-answer document is to provide information to the general public on the possible use of Yucca Mountain as an isolated geological repository for the nation's nuclear waste. This waste has been generated over the past 50 years by defense activities and the U.S. military, the cleanup of World War II-era nuclear weapons plants, nuclear power plants, and the reduction of the nation's nuclear arsenal. In an effort to work towards a solution to the nuclear waste issue, Congress passed the Nuclear Waste Policy Act in 1982, and in 1987 amended the Act, directing the Department of Energy (DOE) to study only Yucca Mountain.

The federal government has spent over 20 years and $8 billion dollars analyzing and studying potential sites for disposal of nuclear waste. Throughout the scientific inquiry, there has been no evidence that disqualifies Yucca Mountain to serve as the nation's underground nuclear waste repository.

Yucca Mountain is located in Nevada, in a remote desert environment far from any population center, and on federally protected land. The site sits adjacent to the Nevada Test Site, the ground-zero location of over 800 nuclear bomb tests conducted up until the early 1990s. If a repository at Yucca Mountain were built, nuclear waste currently stored in temporary surface facilities at 131 sites in 39 states would be secured 1,000 feet beneath the desert surface.

Topics covered in this document reflect the primary issues and concerns raised by the general public over the course of studying Yucca Mountain, including those topics raised in the past year during public participation in more than 66 public hearings on the Secretary's consideration of whether or not to recommend Yucca Mountain for development as a repository.

The discussion topics in this pamphlet include answers to the following questions:

1. What is radiation? How do we control our exposure? What are spent nuclear fuel and high-level radioactive waste?
2. Why is the DOE studying only Yucca Mountain?
3. What makes Yucca Mountain a good place to store waste?
4. Would a repository at Yucca Mountain protect public health and safety?
5. Can radioactive waste from the repository contaminate the groundwater in Las Vegas?
6. Would a repository at Yucca Mountain withstand earthquakes?
7. Would volcanoes affect repository safety?
8. Is the repository protected from sabotage?
9. Can waste be transported safely to a repository?
10. How do we protect shipments of high-level radioactive waste from sabotage?
11. Is my property insured against potential damage resulting from transporting high-level radioactive waste?
12. What direction, review, and oversight have been provided for the project?
13. How can the DOE be certain that its calculations of events thousands of years in the future are accurate?
14. Will taxpayers subsidize large utilities for the disposal of high-level radioactive waste?
15. Does the DOE plan to monitor the repository after its closure?
16. What alternative technologies might eliminate the need for a repository?
17. What are some of the public policy issues associated with a repository the Secretary is considering?
18. Why have the DOE's siting guidelines changed?
19. What steps of the repository development process would follow a recommendation by the Secretary?
20. Where are the wastes that would be placed in a repository?
21. How can the DOE move forward with a site recommendation if there are a number of technical items yet to complete for the NRC?

Q: *What is radiation? How do we control our exposure? What are spent nuclear fuel and high-level radioactive waste?*

A: Put quite simply, radiation is energy traveling through space. Radiation can take the form of particles or waves — such as ultraviolet light or x-rays. "Ionizing radiation" is a category of radiation that causes changes to the structure of atoms it comes in contact with — it removes electrons, thereby creating "ions," which are charged particles. An atom that emits ionizing radiation is described as "radioactive." As this radiation is released over time, the atom becomes less radioactive, and more stable.

The atoms of most elements in our universe are stable. They don't lose energy on their own, and their atomic structure never changes. But certain elements are naturally radioactive; the atoms of such elements are called "radionuclides." When radionuclides lose excess energy and decay to a more stable atom with less energy, the energy released in the process is radiation.

The three major, commonly recognized types of ionizing radiation are alpha, beta, and gamma radiation. Alpha and beta radiation are emitted in the form of tiny, electrically charged particles. Gamma radiation is electromagnetic rays, similar to light and X-rays. An alpha particle is identical to the nucleus of a helium atom (i.e., two neutrons and two protons) and is positively charged. Beta particles are usually electrons (and thus negatively charged), but they can be positrons (positively charged particles of the size and weight of an electron).

Everyone is exposed to "natural background" and man-made sources of radiation (e.g., cosmic rays, radon, building materials, food, and medical procedures). The average American receives an annual radiation dose of about 360 millirem from these sources. A millirem is a standard measurement of radiation dose absorbed by the human body.

Radiation is energy, similar to light.

Exposure controlled by time, distance, and shielding.

There are three types of nuclear materials that could be disposed of at Yucca Mountain:

1) solidified high-level waste created by past, current, and future national defense activities,

2) surplus plutonium from nuclear weapons, and

3) spent nuclear fuel from defense and civilian reactors.

How do we control our exposure?

We can manage our exposure to radiation by controlling time, distance, and shielding. The less time we spend near materials emitting radiation, and the farther away we stay, the lower our exposure. Alpha particles are comparatively large and can travel only a short distance in air before being stopped or blocked. Alpha particles can also be stopped or blocked by something as thin as a sheet of paper. Beta particles are smaller than alpha particles and travel a longer distance in air before being stopped, but, again, they can be blocked by something as ordinary as a sheet of aluminum foil. Like X-rays, gamma radiation can be blocked by sufficiently thick pieces of steel, concrete, or lead.

What are spent nuclear fuel, surplus plutonium, and high-level radioactive waste?

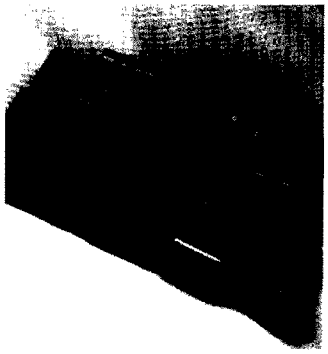
"Nuclear fuel" is made of solid ceramic pellets containing both uranium-235 and uranium-238. The more important isotope for the large-scale release of energy through fission is uranium-235, because it more readily releases energy. To make nuclear fuel, the pellets are enriched (made to have a higher concentration of uranium-235 than found in nature) and sealed in corrosion-resistant metal tubes called cladding. These tubes are then bundled together to form a fuel assembly. The energy released from the uranium pellets produces heat, which makes steam for turning turbines that are connected to electrical generators. After the fuel is no longer efficient at generating heat, it is considered "spent" or used.

Natural uranium is an alpha-emitter, and the metal cladding surrounding the pellets is sufficient to stop the alpha particles. When the fuel is used in the reactor, the uranium nuclei are broken apart by neutrons into fragments in a process called "fission." Some of these fragments produce gamma radiation, which can penetrate the cladding. Storage and transportation casks containing several inches of steel and lead protect workers and the public from unsafe levels of gamma radiation.

"Surplus plutonium" is plutonium from dismantled nuclear weapons; it is considered 'surplus because of arms-reduction treaties.

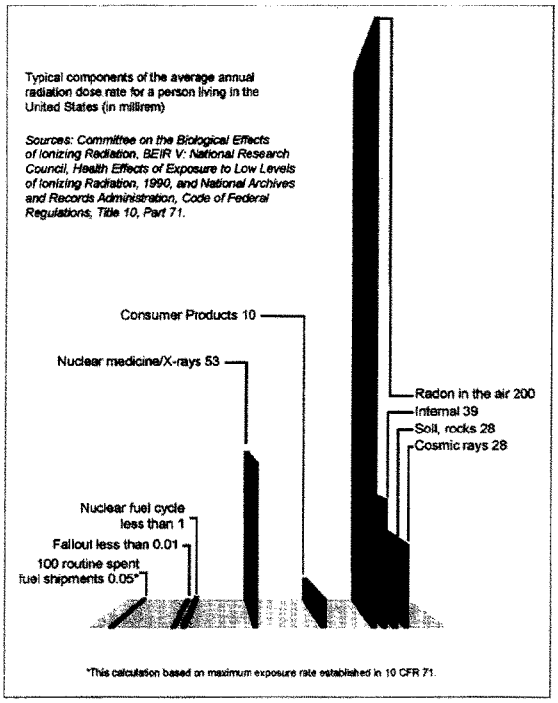
"High-level radioactive waste" that would be disposed of in a repository at Yucca Mountain is 1) solidified high-level waste containing byproducts from past processing of spent fuel to extract plutonium for nuclear weapons for defense needs, and 2) other highly radioactive material that requires permanent isolation, consistent with existing law.

Radioactive materials are routinely managed and handled for medical, industrial, and defense purposes. Safe techniques and procedures for handling these materials are well understood and well established.

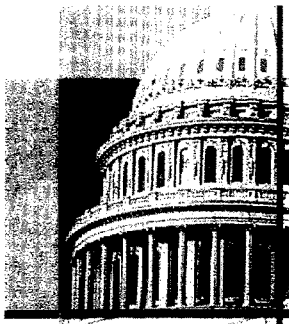


Solid ceramic nuclear fuel pellets, each slightly larger than a pencil eraser, containing both uranium-235 and uranium-238.

Comparison of natural and man-made radiation doses



The average American receives about 360 millirem of background (i.e., normal and expected) radiation every year from both natural and man-made sources.



Why is the DOE studying only Yucca Mountain?

Congress in 1987 directed the DOE to study only Yucca Mountain.

A: In 1987 Congress directed the DOE to study only Yucca Mountain after it was consistently ranked as the site that possessed the best technical and scientific characteristics to serve as a repository.

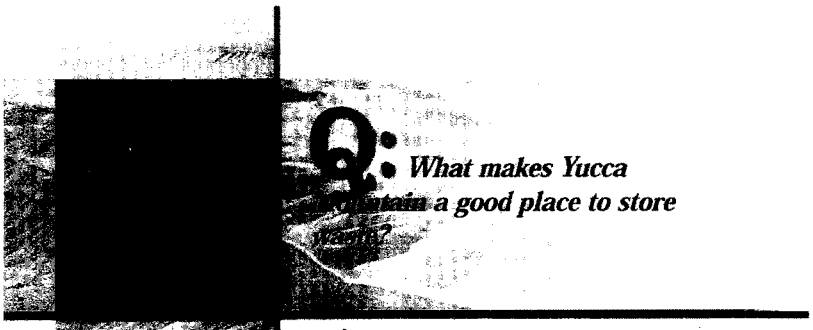
Some suggest that the site was picked on the basis of "politics" in that the State of Nevada is represented in Congress by a relatively small congressional delegation, and is outnumbered by other states. The fact is that years of scientific study, culminating in a 1986 comparison and ranking of the nine sites then under consideration for characterization, led the DOE to conclude that Yucca Mountain ranked at the top of all sites studied. The DOE also examined a number of ways of combining the components of the ranking scheme; this only confirmed the conclusion that Yucca Mountain came out in first place.

Shortly thereafter, in 1987, Congress directed the DOE to concentrate ***only*** on Yucca Mountain. As noted, at the time of the 1987 congressional decision, scientists had already collected much information about Yucca Mountain from field and laboratory studies. Additionally, the U.S. Geological Survey and national laboratories had already been studying the area's geology and hydrology since the start of atomic testing; beginning in January 1951 over 800 U.S. nuclear weapon tests have been conducted at the Nevada Test Site, in support of the weapons program.

In-depth follow-up studies have confirmed that Yucca Mountain has many positive attributes that would contribute to safe geologic disposal, including the site's remoteness, arid climate, multiple natural barriers, great depth to water table, and an isolated hydrologic basin. Yucca Mountain is located in a desert, isolated from population, in a region where the land is controlled by the federal government, including the U.S. military. Most of the land in this

region is under federally restricted access. In contrast, all major nuclear power generation facilities in the United States are located near large metropolitan centers, in order to reduce the amount of power that is lost during transmission. In fact, most metropolitan centers — and more than 161 million Americans — reside within 75 miles of a major nuclear facility (commercial, and/or defense). Yucca Mountain would truly be one of the few nuclear facilities to be located in a remote setting, more than 90 miles from the nearest population center.

Additionally, Yucca Mountain would not be the first repository for radioactive waste to be developed by the DOE. After more than 20 years of scientific study, the Environmental Protection Agency certified the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico. WIPP began receiving a specific class of defense-generated waste on March 26, 1999. However, the high-level waste and spent nuclear fuel contemplated for disposal at Yucca Mountain cannot, by law, be stored in WIPP.



Q: What makes Yucca Mountain a good place to store waste?

A repository at Yucca Mountain would be:

- **In a desert location**
- **Isolated away from population centers**
- **Secured 1,000 feet under the surface**
- **In a closed hydrologic basin**
- **Surrounded by military and other federal land**
- **Protected by natural geologic barriers**
- **Protected by robust engineered barriers and a flexible design**

8

A: Yucca Mountain is located in a desert, isolated from population centers, in a region where the land is controlled by the federal government, including the U.S. military. Most of the land in this region is under federally restricted access. Waste placed in Yucca Mountain would be located 1,000 feet underground — compared to its current location in temporary surface facilities at 131 sites in 39 states. Natural and engineered barriers would work in concert to isolate radionuclides from the accessible environment for tens of thousands of years.

Yucca Mountain has five key attributes that are important to long-term performance:

Limited Water Entering Emplacement Tunnels - The climate at Yucca Mountain is arid, with precipitation averaging about 7.5 inches per year. Future climates during the regulatory compliance period are expected to be slightly cooler and produce a higher mean annual precipitation of about 12.5 inches. Little of this precipitation percolates (seeps) into the mountain; nearly all of it (about 95 percent) either runs off, is picked up by the root systems of vegetation, or is lost to evaporation. This significantly limits the amount of water available to infiltrate the surface, move down through the thousand feet of unsaturated rock, and seep into emplacement tunnels.

Yucca Mountain consists of alternating layers of welded tuff (volcanic ash that was laid down when it was very hot and welded itself into a solid mass of rock) and nonwelded tuff (volcanic ash that was laid down when it was cool and became a cohesive mass when compressed by overlying rock). The mountain is layered with welded tuff at the surface, welded tuff at the level of the repository, and an intervening layer of nonwelded tuffs. These nonwelded units contain few fractures; thus, they delay the downward flow of moisture into the welded tuff layer below, where the repository would be located. At the repository level, a significant portion of what little water is

available in small fractures has a tendency to remain in the fractures rather than flow into larger openings, such as tunnels, due to capillary action. Just as water poured slowly from a glass tends to run slowly down its side, rather than drip straight down, what little water does seep into a tunnel could run down its side walls — and not drip on waste packages.

Long-Lived Waste Package and Drip Shield – Chemical conditions that would promote corrosion are not expected to occur in the repository environment, and both the titanium drip shield and the nickel-based alloy (Alloy 22) outer barrier of the waste package are expected to have extremely long lifetimes. In the repository environment, Alloy 22 is very corrosion-resistant, with general corrosion penetrating only about 0.03 inches in 10,000 years. The Titanium Grade 7 is also corrosion-resistant, with general corrosion penetrating only about 0.08 inches in 10,000 years. Only about 1 percent of the waste packages are projected to lose some of their integrity during the first 80,000 years.

Limited Release of Radionuclides from the Engineered Barriers – Even though the waste packages and drip shields are expected to be long-lived in the repository environment, the advanced computer simulations predict some eventual loss of waste package integrity. If water were to penetrate a breached waste package, several characteristics of the waste forms and the repository would limit radionuclide releases. First, because of the warm temperatures of the waste, much of the water that might penetrate the waste package will evaporate before it can dissolve or transport radionuclides. Neither spent nuclear fuel nor glass waste forms will dissolve rapidly in the water expected in the repository environment. In addition, the invert, part of the engineered barrier system under the waste package and support pallet, would contain crushed tuff that would also delay the transport of radionuclides into the unsaturated host rock.

Delay and Dilution of Radionuclide Concentrations by the Natural Barriers - Eventually, the engineered barrier systems could experience a decrease in their integrity, and small amounts of water could contact waste, dissolve it, and carry some radionuclides out of the repository and into the rock below. As water flows through fractures,

This piece of corrosion-resistant stainless steel still has a mirror-like finish after 60 years' exposure to the corrosive salt-waves and blasting winds of the Atlantic Ocean. The stainless steel for waste packages is even more corrosion resistant.

This picture shows samples of Alloy 22 and a high-quality steel, after exposure to an accelerated aging corrosion experiment. Alloy 22 is expected to lose its integrity very slowly in the repository environment.

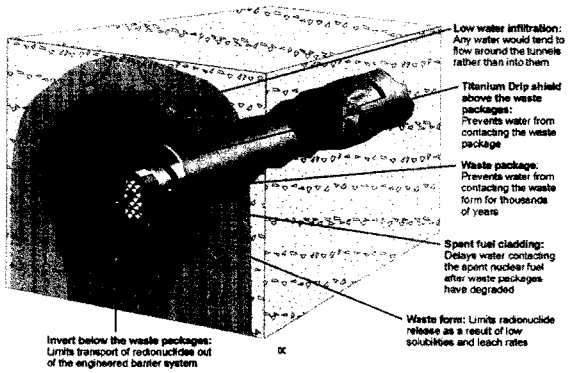
dissolved radionuclides would diffuse into and out of the pores of the rock matrix, increasing both the time it takes for radionuclides to move from the repository and the likelihood that radionuclides will be exposed to sorbing minerals (minerals that attract and hold them).

Radionuclide migration through the unsaturated and saturated zone is affected in two ways. First, radionuclides are exposed to minerals in the rocks called "zeolites" that trap many species of the radioactive waste; this delays the transport of radionuclides. Second, dispersive processes that occur during transport through the saturated zone dilute and reduce radionuclide concentrations in groundwater.

Once the saturated zone, which is about 1,000 feet below the repository, is reached the flow paths are generally southerly toward the Amargosa Desert and Death Valley. Yucca Mountain is located in a closed hydrologic basin. The boundaries of this basin are defined and understood. Water in this basin does not flow into any rivers or oceans, and is isolated from the aquifer systems of Las Vegas and Pahrump, the largest community in Nye County. Isolated hydrologic basins are a relatively rare geologic feature. The groundwater system in this basin conforms to the mountainous topography, and drains inward.

Low Likelihood of Potentially Disruptive Events - The DOE considered three specific disruptive processes and events (i.e., volcanism, seismic events, and nuclear criticality) that could impact the performance of a repository at Yucca Mountain. Seismicity is considered as a nominal, or expected, event and is treated as such in the analyses. Criticality was found to have such a low likelihood that it is not necessary to consider further, according to the regulations.

Of the three, volcanism resulted in a low but calculable dose when considering the remote probability of a volcanic disruption. The likelihood of the repository being disrupted by a volcano is extremely small (about 1 in 70 million, or a chance of 0.0000014 percent, per year). Following regulatory guidelines, the calculated peak dose would be less than one percent of the radiation protection standards set by the Nuclear Regulatory Commission and the Environmental Protection Agency.



Natural features work with engineered features to limit the amount of water that can contact waste forms, dissolve them, and transport radionuclides out of the repository. Natural forces cause the very small amount of available water to flow around, rather than into, the tunnels. Drip shields, waste packages, and cladding (metal tubes holding ceramic fuel pellets) are made of metals that resist corrosion, further protecting the waste forms, which are ceramic and glass.

Q: *Would a repository at Yucca Mountain protect public health and safety?*

A: The Environmental Protection Agency and the Nuclear Regulatory Commission have established stringent standards that protect the health and safety of individuals working and living in the vicinity of Yucca Mountain. The results of repository performance analyses indicate that a repository at Yucca Mountain would likely protect the health and safety of the public, for at least 10,000 years in the future.

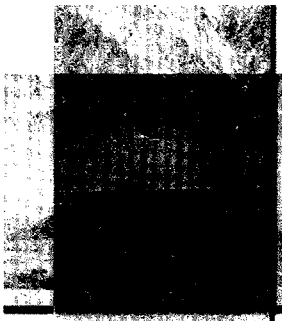
Before it will grant a license to construct or operate a repository, the Nuclear Regulatory Commission will require assurance that the repository would be safe for current and future generations. In addition, the Environmental Protection Agency and Nuclear Regulatory Commission standards that apply after closure of the repository would preserve the quality of the environment by establishing strict protection requirements for the groundwater.

The DOE has evaluated the safety of workers and the public for the time that the repository would be operating. The DOE also has conducted a safety evaluation for the period after the closure of the repository. Considering the results of these safety evaluations, the Secretary believes that a repository at Yucca Mountain will perform in a manner that protects public health and safety.

The average American receives an annual dose of about 360 millirem from both natural and man-made sources (cosmic radiation, radon, food, medical and dental procedures, etc.). Even after 10,000 years, the potential exposure to the public from a repository at Yucca Mountain is estimated to be less than 1 percent (less than 1/10 of a millirem) of the dose limit allowed by federal regulation. The potential dose from the repository is so small that when combined with the area's natural and other man-made sources it would be indistinguishable from the doses in other nearby communities.

As required by law, any repository would be monitored even after closure. This monitoring would provide additional assurances that the health and safety of future generations will be preserved.

Any repository for high-level waste and spent fuel must meet the stringent standards of the Environmental Protection Agency, be licensed by the Nuclear Regulatory Commission, and ultimately be subject to continuing congressional oversight. The Secretary believes a repository at Yucca Mountain would meet these rigorous tests.



Q: *Would volcanoes affect repository safety?*

No. The likelihood of a volcano disrupting the repository is extremely low (one in about 70 million, or a chance of 0.0000014 percent, per year).

A: The DOE has relied upon the careful evaluation of the relevant data by a team of world-class experts, in order to assess the possibility ... volcanic activity that might have an impact on how well a repository would contain and isolate the waste. Volcanologists started with a careful analysis of the entire geologic setting of Yucca Mountain. Then, with abundant data on regional volcanoes, they used computer modeling to understand each volcanic center's controlling structures. The DOE estimates the likelihood of such an event occurring during the first 10,000 years after repository closure to be one in about 70 million, or a chance of 0.0000014 percent, per year.

Between about 15 and 12 million years ago, a series of large-scale volcanic eruptions, located well to the north, deposited the materials that have formed Yucca Mountain. Hundreds of thousands of years ago, small-volume volcanoes (known as cinder cones), unrelated to the events that formed Yucca Mountain, erupted lava flows and cinders to the west of the site. These eruptions moved in a westward direction, away from the proposed repository. Volcanic activity in the Yucca Mountain region has been waning since then, with the last small eruption nearly 80,000 years ago. Because the conditions necessary for renewed volcanic activity have been reduced so much at Yucca Mountain, experts consider the chance of a volcano disrupting a repository to be virtually nonexistent.

Q: *Would a repository at Yucca Mountain withstand earthquakes?*

A: The repository would be located about 1,000 feet underground in a relatively stable block of solid rock, which would keep its contents safe from any significant impacts of any earthquake. Because vibratory ground motion decreases with depth, earthquakes have much less impact underground than on or near the surface. Underground inspections at Yucca Mountain and the tunnels at the Nevada Test Site, some of which are over 40 years old, have revealed little disturbance from historic seismic events. This phenomenon is not unique to the Yucca Mountain area; worldwide, inspections of subsurface structures after major earthquakes have reinforced this observation.

Nuclear Regulatory Commission regulations require that all facilities it licenses be designed and constructed to withstand the effects of natural phenomena, including earthquakes, without representing a threat to public health and safety from their operations.

Sudden movement in rock along ruptures or faults causes earthquakes. Scientists' extensive knowledge of the faults in this area allows them to estimate the frequency and size of future earthquakes, the potential intensity of ground movement, and the possible effects on the area's geologic features and man-made structures. Scientists expect future earthquakes to occur in the Yucca Mountain area. However, engineers can and will design the facilities to withstand any severe earthquake considered likely to occur at Yucca Mountain.

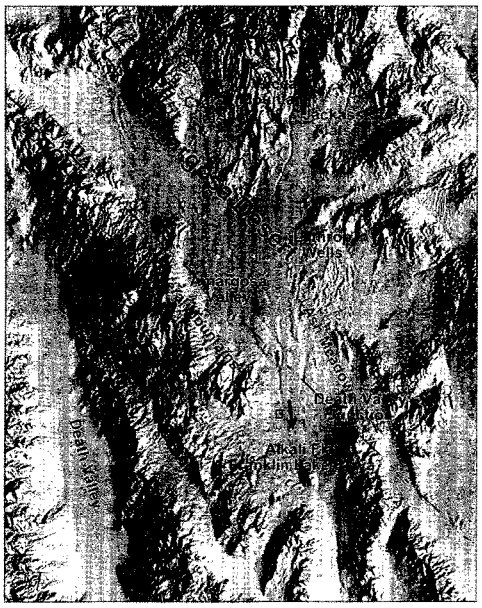
Additionally, extensive experience and proven techniques allow building the repository's surface structures so that they perform their safety functions both during and after an earthquake.

Yes. Geologic evidence shows that the mountain has resisted earthquakes for hundreds of thousands of years. Engineers will be able to design facilities to withstand severe earthquakes considered likely at Yucca Mountain.

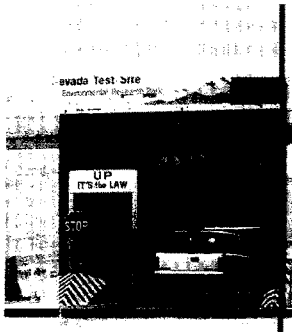
No. It is geologically impossible for the groundwater from Yucca Mountain to reach Las Vegas. The groundwater system below Yucca Mountain is not connected to the groundwater system serving Las Vegas. These groundwater basins have been separated for millions of years.

A: Yucca Mountain is located in the Death Valley hydrologic basin, the boundaries of which are defined and understood. Water in this basin does not flow into any rivers or oceans and is isolated from the aquifer systems of Las Vegas and Pahrump (the largest community in Nye County).

Isolated hydrologic basins are a relatively rare geologic feature. The groundwater systems in this region correlate well to the mountainous topography and have been stable for millions of years.



Yucca Mountain is located in a closed hydrologic basin. The groundwater system in this basin conforms to the mountainous topography, and drains inward. Water in this basin does not flow into any rivers or oceans, and is isolated from the aquifer systems of Las Vegas and Pahrump, the largest community in Nye County.



Q: *Is the repository protected from sabotage?*

Yes. Disposal of nuclear waste in a geologic repository 1000 feet underground renders it virtually impenetrable to acts of terrorism or sabotage.

A: A repository at Yucca Mountain would safeguard radioactive materials from acts of terrorism or sabotage. Being 1,000 feet under the desert surface makes it highly unlikely that an attack at the surface of a repository could have a significant impact on the extremely durable waste packages that contain the spent nuclear fuel and high-level radioactive waste. In addition, the Yucca Mountain site is remotely located on federal land more than 90 miles from any major population center. The Nellis Air Force Range surrounds the Nevada Test Site on three sides; the site has a highly effective rapid-response security force; and the airspace above Yucca Mountain is restricted.

In developing a repository, the United States will set an example for other countries to follow in the safe and secure disposition of radioactive materials. This could encourage other countries to follow the lead of the United States, and clean up contaminated sites and dispose of nuclear materials safely.

Q: ... safely to a repository?

A: The U.S. history of transportation of nuclear materials is impressive, as for the last 30 years, the nation has undeniably demonstrated that it can safely transport high-level nuclear materials. There has never been a transportation accident that has resulted in the release of any amount of radioactive material that has been harmful to the public or the environment.

For example, since 1965, government and industry groups have transported more than 10,000 spent fuel assemblies in more than 2,700 shipments over more than 1.6 million miles. While there have been a few accidents (four highway and four rail) involving the transport vehicles, none has resulted in the breach of a cask or the release of radioactive materials.

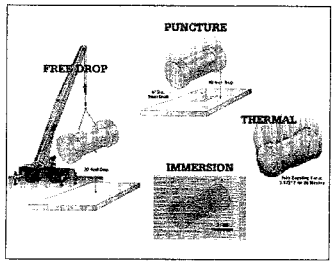
The DOE would use extremely durable and massive transportation casks whose designs are certified by the Nuclear Regulatory Commission for all waste shipments to the repository. To be certified by the Nuclear Regulatory Commission, casks must be designed to withstand severe accidents without release of their radioactive contents. To be certified by the Nuclear Regulatory Commission, each transportation cask design must be able to withstand ***all*** of the following tests, in the given sequence:

- A drop from 30 feet onto an unyielding surface (a surface so hard and resistant that it absorbs essentially none of the energy, causing the damaging energy to be absorbed by the cask itself at its weakest point). The forces that a cask experiences from this drop test are equivalent to hitting a bridge abutment at 120 m.p.h., followed by
- A drop from 40 inches onto a shaft 6 inches in diameter, followed by

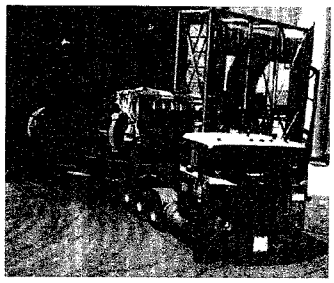
The safety record for spent fuel shipments in the U.S. and other industrialized nations is enviable. Of the thousands of shipments completed over the last 30 years, none has resulted in an identifiable injury through the release of radioactive material.

- A fully engulfing fire at 1475 °F for 30 minutes, followed by
- Immersion in 3 feet of water

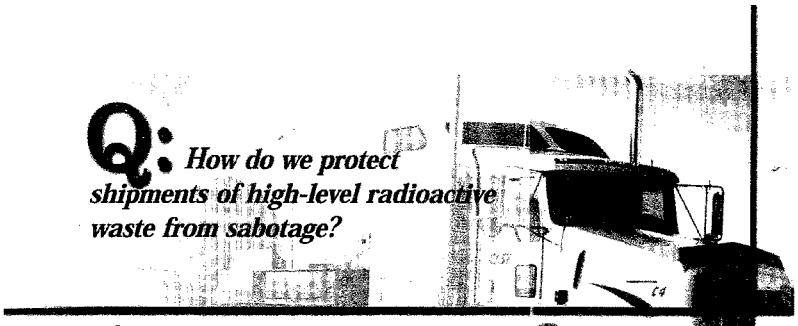
A separate cask must also be able to withstand immersion in about 650 feet of water for at least one hour.



To be certified by the Nuclear Regulatory Commission, every type of transportation cask must be able to withstand all of the tests shown above.



A legal-weight truck carries a cask containing spent nuclear fuel. Drivers are specially trained and certified, must be accompanied by at least one escort, must report in with the DOE every two hours, and are continuously monitored and tracked by satellite.

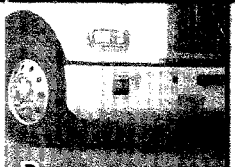


Q: *How do we protect shipments of high-level radioactive waste from sabotage?*

A: The same design features that make transportation casks capable of surviving severe accidents also limit their vulnerability to sabotage. In addition, the Nuclear Regulatory Commission surveys and must approve all routes. The governor of each state would be notified in advance, and shipments would be monitored around the clock through a satellite-based tracking system. All shipments would also be coordinated with local and federal law enforcement agencies.

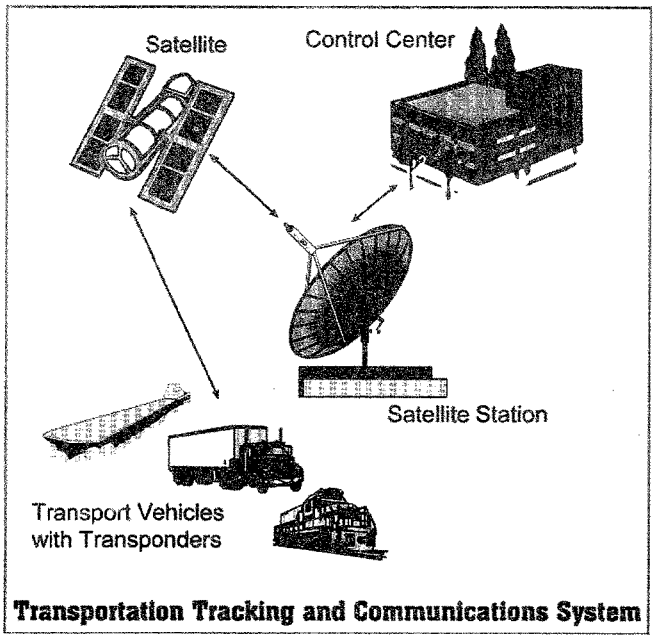
The Nuclear Regulatory Commission has a special set of rules in place to address the physical protection of spent nuclear fuel in transit. These rules are designed to minimize the possibility of sabotage, and require the following:

- Notification of the Nuclear Regulatory Commission and relevant governors prior to transport
- Current safeguard procedures for the shipper to follow in emergencies
- Escort training on threat recognition and management
- Advance arrangements with law enforcement agencies along the route
- Advance route approval by the Nuclear Regulatory Commission
- At least one escort to maintain visual surveillance of the shipment
- Status reporting every 2 hours by the escort(s)
- The capability to immobilize the cab or cargo-carrying portion of the vehicle (for highway shipments)



Physical security measures and the exceptional strength and durability of the transportation casks would protect shipments of radioactive waste from acts of terrorism or sabotage.

- Armed escorts for any shipment through heavily populated areas
- Protection of specific information about any shipment



Transportation Tracking and Communications System

Q: *Is my property insured against potential damage resulting from transporting high-level radioactive waste?*

A: The Price-Anderson Act establishes a system of financial protection (compensation for damages, loss, or injury suffered) for the public in a nuclear accident, regardless of who causes the damage. The Act provides for indemnification of liability up to $9.43 billion to cover claims that might arise from an accident in which radioactive materials were released or one in which an authorized precautionary evacuation occurred. If the damage from a nuclear incident appeared likely to exceed the amount, the Price-Anderson Act contains a congressional commitment to thoroughly review the particular incident and take whatever action determined necessary to provide full and prompt compensation to the public. In addition, Department of Transportation regulations require motor carriers to have a minimum of $5 million in private insurance coverage that would be made available in the event of an accident that did not involve the release of nuclear material or a precautionary evacuation.

Yes. The existing Price-Anderson Act indemnifies/insures against damages and injury incurred from a nuclear incident or precautionary evacuation involving the transport of spent nuclear fuel or high-level radioactive waste.

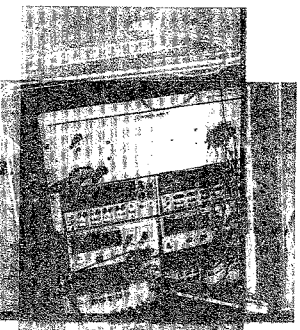
Q: *What direction, review, and oversight have been provided for the project?*

A: The DOE's work on Yucca Mountain has likely received more oversight than any project in history; is subject to external regulation by other federal agencies; and has been reviewed by national and international professional organizations. Site characterization information for Yucca Mountain was collected under quality assurance plans approved and accepted by the U.S. Nuclear Regulatory Commission. Four U.S. national laboratories and the U.S. Geological Survey collected most of the field data and interpreted the results. These laboratories commissioned independent reviews of their results, as did the DOE, often as formal independent peer reviews. Since the start of data collection for site characterization, the DOE has engaged in informal consultation with the Nuclear Regulatory Commission, as contemplated by the Nuclear Waste Policy Act. Also, the amendments to the Act in 1987 created the Nuclear Waste Technical Review Board, which provides reviews of the Project's technical work. The DOE cannot proceed to develop a repository without getting authorization from the Nuclear Regulatory Commission, and will be under constant scrutiny by Congress and other elected officials throughout the life of the project.

The DOE is following the path recommended by nearly all the world's organizations of nuclear waste experts. Among these groups are the United Nations' International Atomic Energy Agency and the Nuclear Energy Agency of the International Organization for Economic Cooperation and Development. In 2001, the National Research Council of the National Academy of Sciences noted that after four decades of study, geologic disposal remains the only scientifically and technically credible long-term solution available to meet the need for safety without reliance on active management.

In more than 20 years of study, the DOE's work on Yucca Mountain has likely received more oversight than any project in history. Oversight bodies include:

- **Nuclear Regulatory Commission**
- **Nuclear Waste Technical Review Board**
- **Government Accounting Office**
- **Department of Energy Inspector General**
- **Congress**
- **National and international professional organizations**



Q. ***How can the DOE be certain that its calculations of events thousands of years in the future are accurate?***

A. After more than 20 years of study, some of the nation's best scientists are confident in their understanding of the natural processes at Yucca Mountain and any changes to those processes that might result from waste disposal. The 10,000-year regulatory period is sufficiently long, however, that many people question how the DOE can be sure it understands the science well enough to be confident in using computer models to forecast what can happen that far into the future. Exactly that concern was a fundamental consideration as the regulations were being developed. For just this reason, the Environmental Protection Agency and the Nuclear Regulatory Commission require that the geologic repository rely on both the natural and engineered barriers. Having multiple barriers helps provide confidence that some uncertainty in an attribute of the performance of one barrier is acceptable, because other barriers are also acting to isolate the radionuclides.

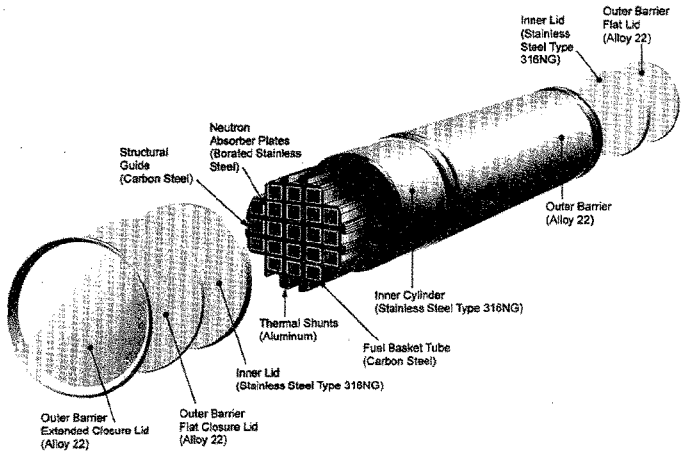
Although the research has produced an extensive scientific record, ranging from thousands to millions of years into the past, this record is subject to interpretation and includes uncertainties. The rocks themselves are millions of years old, and are not expected to change in 10,000 years. Some parameters, however, such as climate, for example, will change. The DOE's calculations assume such changes will occur in the future. While it is not known exactly when climate will change, there is very good data about climate and rainfall, covering more than the past 40,000 years, derived in part from the ancient, preserved nests of pack rats found at Yucca Mountain. For the 10,000-year period, the models use the current climate for the next 400 to 600 years, and then the models switch to what are called monsoon and glacial transition climates, during which the precipitation is increased by about 2 times and the infiltration is increased by about 4 times. Scientists also run what are called sensitivity studies on these and many other numbers used in the models to find out what hap-

Scientists base their projections of future performance on more than 20 years of tests and studies. Uncertainty is expected and treated in the regulations and multiple barriers are used to ensure safety.

pens if they were wrong. With the climate models, for example, the scientists examine ranges of rainfall and infiltration numbers to see how varying the inputs affects their forecasts of releases of radionuclides.

By doing this, the performance assessment results examine the capability of the repository barriers to perform under a range of conditions representing both likely and unlikely future conditions. The analysts deliberately use combinations of parameters causing less favorable performance, in order to provide confidence the repository will perform well.

The regulations established by the Nuclear Regulatory Commission and the Environmental Protection Agency require an engineered barrier system in addition to the natural barriers provided by the geologic setting. The engineered system would be built to complement the natural system. Project scientists have an understanding of how the natural and engineered systems change over time, and how they interact, based on scientific principles, tests, and evaluation of natural analogues. To be sure that its calculations for the Total System Performance Assessment were appropriate and sound as an approach to supporting a site recommendation decision, the DOE asked for and received a peer review that reflects an international perspective on the adequacy of its performance assessment approach to support a site recommendation decision. The review panel found the work done by the DOE for the Site Recommendation to be competent, consistent with sound international practices, and

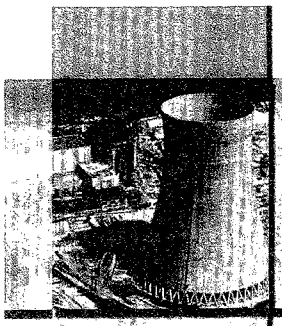


Waste packages use multiple layers of highly corrosion-resistant Alloy 22 and stainless steel, along with multiple welded lids, to provide confidence that water will be kept away from the solid waste forms contained inside. By way of comparison, waste package walls are about 20 times thicker than a propane tank wall.

appropriate for a site recommendation decision. They also observed many conservative aspects of the calculations.

Over the past several years, the Nuclear Waste Technical Review Board has stated that it is appropriate for decision makers to consider the full range of outcomes in performance assessment calculations, and has recommended additional performance assessment analyses to better understand uncertainties. In response, the full range of outcomes in performance assessment calculations, as well as the results of the additional performance assessment analyses to better understand uncertainties, have been examined.

There is a strong basis for confidence in the outcome of safety evaluations to support the Site Recommendation. Project scientists believe the majority of the important data and model inputs used in the Total System Performance Assessment accurately reflect the current state of knowledge, which is considerable. In other cases, the scientists used deliberately and demonstrably cautious estimates to accommodate those things that are not presently well known. The Nuclear Waste Technical Review Board, the Nuclear Regulatory Commission, and the DOE recognize that additional information will be collected before the Nuclear Regulatory Commission could issue a license to construct. Also, information will be collected during the entire time the repository is operational if it is constructed. The plans to collect this new information will be guided by oversight groups and will reflect how best to continue to reduce uncertainty. The nation can have confidence that safety will be assured because the entire repository development process will bring in the formal licensing requirements of the Nuclear Regulatory Commission. The Nuclear Regulatory Commission will thoroughly review, question, and oversee every scientific and engineering aspect of the repository, including the collection of additional information, for many decades to come.



Q: *Will taxpayers subsidize large utilities for the disposal of high-level radioactive waste?*

No. Users of electricity generated by nuclear power pay a fee for disposal of the wastes from power generation.

A: The taxpayers are not subsidizing the utilities. The federal government's policy is that utilities' customers who receive the benefits of electricity generated by nuclear means should pay the costs of site characterization for the future disposal of commercial spent nuclear fuel, whether disposal occurs at Yucca Mountain or elsewhere. For wastes generated by the federal government, the federal budget pays the costs of site characterization and for the disposal of waste forms.

As required by the Nuclear Waste Policy Act, the consumers of electricity generated by commercial nuclear power plants pay a fee based on how much nuclear-generated power they use. This fee is 1.0 mil per kilowatt-hour of nuclear-generated electricity (i.e., one tenth of one cent per thousand watts supplied continuously for one hour). A kilowatt-hour is the amount of electricity required to run ten 100-watt light bulbs for one hour. The fees are then paid by the electric utilities into the Nuclear Waste Fund, held in account for the repository program by the U.S. Treasury. Each year Congress appropriates money from this fund for the repository program. If the program goes forward, the utilities' customers will continue to pay most of the costs of constructing, operating, and closing a repository. Costs associated with disposing of wastes generated by defense-related activities are covered by the federal budget.

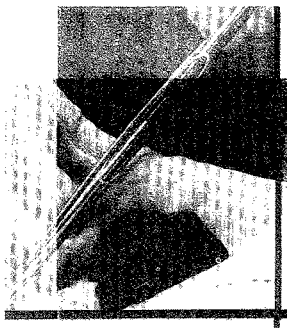
The Nuclear Waste Policy Act required the DOE to have a repository or related facility sited, constructed, operational, and accepting commercial spent nuclear fuel by January 31, 1998. Because that deadline was not met, several electric utilities with nuclear power plants have sued the United States for breach of contract. The U.S. Court of Appeals for the District of Columbia Circuit has ruled that the DOE had an unconditional obligation, the reciprocal of the utilities' obligation to pay the prescribed fees, to begin spent fuel disposal by January 31, 1998.

Q: *Does the DOE plan to monitor the repository after its closure?*

A: The repository is designed such that it could be kept open for up to 100 years without precluding the capability of keeping it open for up to 300 years. Keeping the repository open means that the underground storage areas can be directly inspected and the waste packages readily retrieved, were that necessary. Thorough performance confirmation testing and monitoring will be performed during this operational period. In addition, the DOE must design and implement a postclosure monitoring program that complies with Nuclear Regulatory Commission regulations at 10 CFR Part 63. Before the DOE could close the repository, it would have to submit to the Nuclear Regulatory Commission an application to amend the license to permit the closure. The application would include, among other things, a description of the postclosure monitoring program.

The application also would describe the DOE's proposal for continued monitoring to prevent any activity that would pose an unreasonable risk of breaching the repository's engineered barriers, or that would increase the exposure to the public beyond the limits imposed by the Environmental Protection Agency and the Nuclear Regulatory Commission. In its application to close the repository, the DOE would define the details of this program. These requirements for a license amendment for closure, combined with the additional experience and knowledge gained during the intervening years, would allow the DOE to take full advantage of any new information, insights, or technologies that had developed since the start of repository operations.

Yes. Federal law requires the DOE to monitor the repository both before and after closure. Monitoring after closure of the repository will last for an indefinite period of time.



Q: *What alternative technologies might eliminate the need for a repository?*

For the foreseeable future, there are no technologies that would eliminate the need for a repository. Options for the management of high-level wastes have been evaluated, but all produce high-level radioactive waste as byproducts that must themselves be disposed of in a repository to protect public health and safety.

A: Alternative technologies and options have been, and will continue to be, evaluated for the responsible management of high-level radioactive waste.

Many nations reprocess their spent nuclear fuel, which slightly reduces the volume of high-level radioactive waste. Liquid high-level radioactive waste, however, is a by-product of reprocessing. Prior to transport or disposal, this new amount of liquid waste must be vitrified, a process by which the waste is combined with sand and other materials and melted together to form a stable glass. This waste also must be disposed of in a repository to ensure the protection of public health and safety.

The DOE supports, and continues to fund, further research and development of accelerator transmutation of nuclear wastes, a process that could reduce the amount of long-half-life actinides (a type of radionuclide) in the commercial spent fuel. The high-level radioactive waste that is a by-product of this process also requires disposal in a repository to ensure the protection of public health and safety.

A repository at Yucca Mountain would centralize the disposal of high-level radioactive waste, while maintaining the option to retrieve it. With the waste retrievable, we preserve future generations' options to take advantage of alternative technologies, while protecting the health and safety of the public for thousands of years in the future.

Q: *What are some of the public policy issues associated with a repository the Secretary is considering?*

A: The relevant public policy issues all converge on safety and security. If Yucca Mountain is chosen as the repository site, it will enhance the safety and security of the high-level radioactive waste and spent nuclear fuel through disposal.

Protecting Public Health and Safety and Preserving the Quality of the Environment

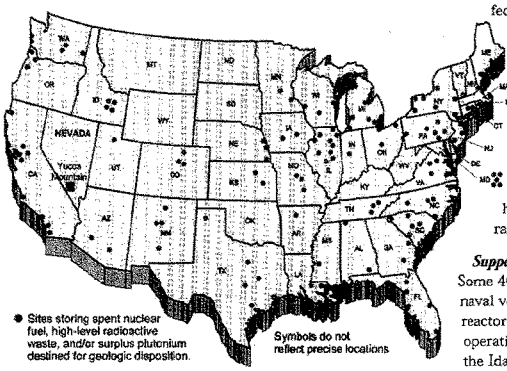
At present, spent nuclear fuel and high-level radioactive waste are temporarily stored in surface facilities at 131 locations in 39 states. It is clearly preferable to store wastes 1,000 feet underground, if it can be done safely. Most of the existing storage sites are near population centers, and because nuclear reactors require abundant water, most of these sites are also located near rivers, lakes, and seacoasts. Analyses indicate that these stored materials, if left where they are indefinitely, could become a serious hazard to nearby populations and the environment. If not perpetually maintained and safeguarded, this material could travel through groundwater and surface water runoff to rivers and streams that people use for domestic and agricultural purposes. Should this occur, 20 major waterways and all seacoasts could be adversely impacted. Currently, more than 30 million people are served by municipal water systems with intakes along the potentially affected portions of these waterways. Over the 10,000-year regulatory compliance period, without a geologic repository, trillions of dollars could be required to maintain facilities and thousands of lives would be impacted.

Local residents' safety and health and the environment are also protected. The Environmental Protection Agency and Nuclear Regulatory Commission regulations address the performance of a repository by setting radiation protection standards that protect the

The most compelling issue is the protection of the health and safety of millions of Americans in almost every state. In addition, a repository would also protect national security and support a balanced energy supply.

public, workers, and the environment. The DOE has evaluated the ability of the natural and engineered barrier systems to isolate radioactive materials from the environment. These studies and analyses indicate that the health and safety of all those individuals living in the vicinity of the repository would be protected.

Environmental cleanup of Cold War weapons facilities: The production of nuclear weapons during World War II and the Cold War resulted in a legacy of high-level radioactive waste and spent nuclear fuel that is currently stored in



Spent nuclear fuel and high-level radioactive wastes are currently stored in temporary facilities in 39 states

Washington, South Carolina, Colorado, and Idaho. Large volumes of high-level radioactive waste were created in the past when spent nuclear fuel was reprocessed to extract plutonium for weapons use. The high-level waste left over from that process exists in liquid and solid forms. Federal sites where this liquid waste has been stored, and in some instances has leaked from holding tanks, require varying degrees of remediation. The cleanup and decommissioning of the former weapons-production sites will require permanent disposal of all these materials.

Protecting the Nation

Protecting the nation from acts of terrorism: Fundamentally, deep geologic disposal of radioactive waste is safe from acts of sabotage or terrorism. No reasonably conceivable attack at the surface of a repository could have a significant impact on the high-level waste contained in very long-lasting metal containers some 1,000 feet underground in solid rock. In addition, the Yucca Mountain site is remotely located on federal land, with restricted access because of its proximity to the Nevada Test Site, where the United States has conducted over 800 nuclear weapons tests. Yucca Mountain is also surrounded on three sides by the Nellis Air Force Range, which has restricted airspace, and the site already has a highly trained and effective rapid-response security force.

Supporting the U.S. Navy nuclear fleet: Some 40 percent of the nation's large naval vessels are powered by nuclear reactors. Spent nuclear fuel from naval operations is currently being stored at the Idaho National Environmental and Engineering Laboratory, in temporary storage facilities, and is awaiting final disposal. This waste must be disposed of in order to maintain our naval capability, now and in the future.

Dismantling nuclear weapons: The end of the Cold War has brought the welcome challenge to our country of disposing of surplus weapons-grade plutonium. This could be used as mixed oxide fuel, which would then generate spent fuel, or immobilized material. The spent fuel or immobilized material would be secure in the geologic repository, where unauthorized removal would be very hard even if institutional controls were lost.

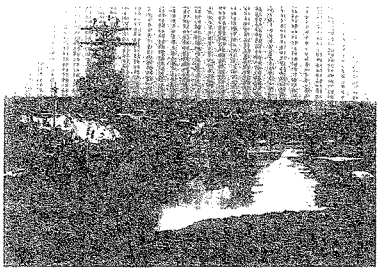
By permanently disposing of surplus nuclear weapons materials, the United States would encourage other nations to do the same.

Fuel from research reactors: The DOE has provided fuel for use in research reactors in both U.S. and foreign universities and laboratories. To support nuclear nonproliferation objectives, these research facilities are required to return the DOE-owned spent nuclear fuel. These spent fuels are being stored at the Savannah River Site, in South Carolina, and at the Idaho National Engineering and Environmental Laboratory, while awaiting disposal in a repository.

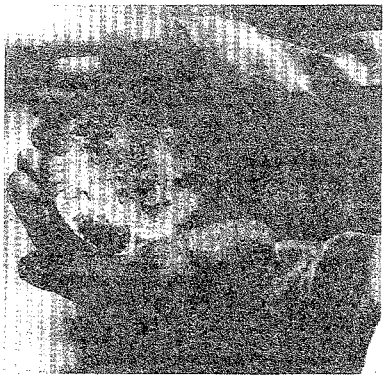
Providing support for America's balanced energy security

Roughly 20% of our country's electricity is generated from nuclear power. This means that, on average, each home, farm, factory, and business in America runs on nuclear fuel nearly five hours a day. If we continue to avoid resolving the nuclear waste question, sooner or later we will have to decide which five hours of electricity we are willing to do without.

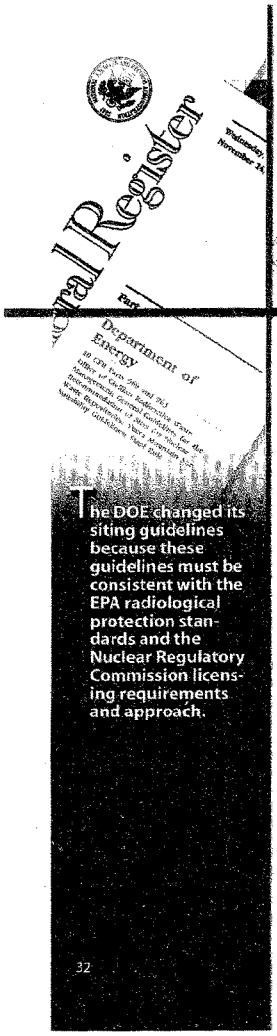
Some existing facilities are limited in the amount of spent nuclear fuel they can store onsite. When the limits are reached, either new or additional storage space will have to be negotiated, or in some cases, these reactors may have no choice but to close down prematurely. Moreover, the costs for additional onsite dry spent fuel storage and security have been rising rapidly.



The U.S. Navy's aircraft carriers and submarines are powered by nuclear reactors, which produce waste that must be disposed of in a repository.



Nuclear arms reductions result in excess plutonium, which must be disposed of in a repository. Geologic disposal of defense waste protects the health and safety of the public, while keeping such material out of the reach of terrorists and rogue nations.



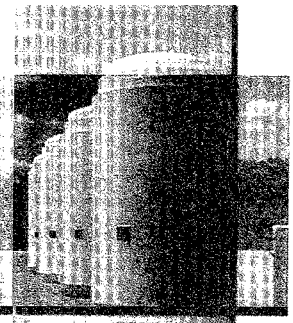
The DOE changed its siting guidelines because these guidelines must be consistent with the EPA radiological protection standards and the Nuclear Regulatory Commission licensing requirements and approach.

Q: *Why have the DOE's siting guidelines changed?*

A: In 1987 and 1992, Congress changed the law governing evaluation and selection of a repository site. This change required the Environmental Protection Agency and Nuclear Regulatory Commission to issue new regulations solely for Yucca Mountain, and those regulations became final in 2001. In concert with these changes, the DOE proposed new, Yucca Mountain-specific suitability guidelines in 1999. The DOE guidelines were finalized shortly after those of the Environmental Protection Agency and the Nuclear Regulatory Commission, in order to ensure their consistency.

Congress, and the Environmental Protection Agency and the Nuclear Regulatory Commission acting pursuant to congressional direction, have changed the regulatory framework in such a way that the prior suitability guidelines at 10 CFR part 960 no longer fit comfortably within that framework. In addition, the 1987 amendments to the Nuclear Waste Policy Act have eliminated any obligation on the DOE's part to make comparative judgments about sites in the course of making the suitability determination.

Accordingly, the DOE changed its siting guidelines to be consistent with this new framework. Indeed, it would have been impermissible and unreasonable not to have changed the prior guidelines that were based on out-of-date standards and licensing regulations. The revised guidelines, at 10 CFR 963, reflect the 1987 amendments' directive to DOE to focus on Yucca Mountain alone, the basic analysis for assessing repository performance recommended by the National Academy of Sciences, which differs from that embedded in the 1984 Guidelines, the adoption by the Environmental Protection Agency of Yucca Mountain specific radiological protection standards, as mandated by the Energy Policy Act of 1992, and the adoption by the Nuclear Regulatory Commission of new regulations for licensing repositories which, under the NWPA's structure, must define the areas and methodology of the DOE's inquiries into Yucca Mountain's suitability.

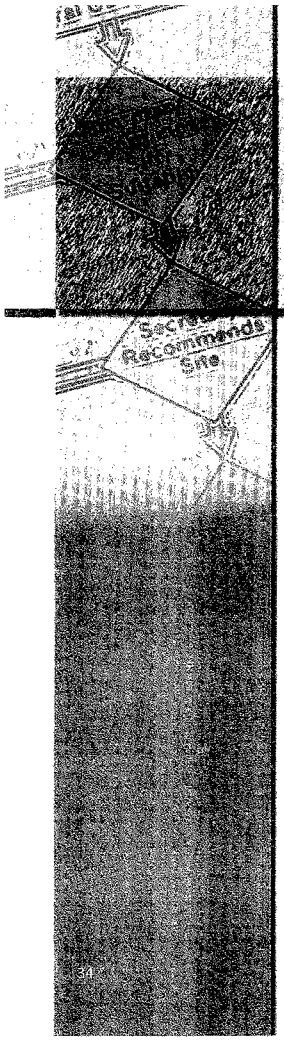


Q: *Where are the wastes that would be placed in a repository?*

A: The U.S. Navy's nuclear-powered vessels, the nation's past production and ongoing dismantlement of nuclear weapons, the commercial generation of 20 percent of the country's electricity, and many research and development activities produce high-level radioactive waste. These materials have accumulated since the mid-1940s and are currently located at 131 sites in 39 states in temporary surface storage facilities while awaiting final disposal. Most of these storage sites are near population centers, and because nuclear reactors require abundant water, most of the sites are also located near rivers, lakes, and seacoasts. In all, more than 161 million Americans reside within 75 miles of where radioactive wastes are stored, closer than the residents of Las Vegas are to Yucca Mountain.

As early as 1957, a National Academy of Sciences report to the Atomic Energy Commission suggested burying radioactive waste in geologic formations. In 2001, the National Research Council of the National Academy of Sciences noted that after four decades of study, ***geologic disposal remains the only scientifically and technically credible long-term solution available to meet safety needs*** without reliance on active management. It also offers security benefits because it would place fissile material out of reach of all but the most sophisticated weapons builders.

High-level radioactive waste and spent nuclear fuel from the use of nuclear materials to power naval vessels, make nuclear weapons, and produce electricity have accumulated since the mid-1940s. These materials are currently located at 131 sites in 39 states in temporary storage facilities awaiting final disposal.



Q: *What steps of the repository development process would follow a recommendation by the Secretary?*

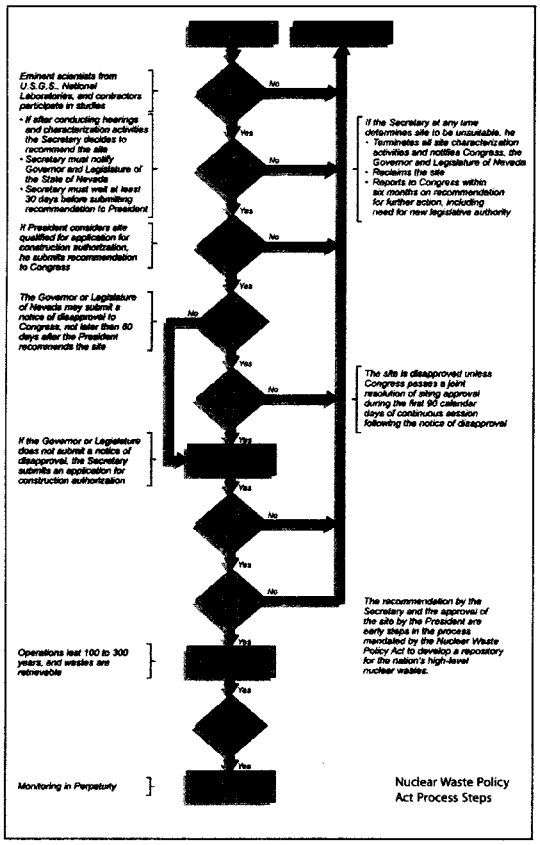
A: Following a recommendation by the Secretary, the President may recommend the Yucca Mountain site to Congress if he considers it qualified for application to the Nuclear Regulatory Commission for authorization to construct a repository. If the President submits a recommendation to Congress, he must also submit to Congress a copy of the statement of the basis for the Secretary's recommendation. Nevada has the right to disapprove any Presidential recommendation submitted to Congress, and if Nevada chooses to exercise its right, both houses of Congress must act affirmatively to accept the recommendation.

Steps in the repository siting and development process as required by the Nuclear Waste Policy Act are shown in the figure on the opposite page.

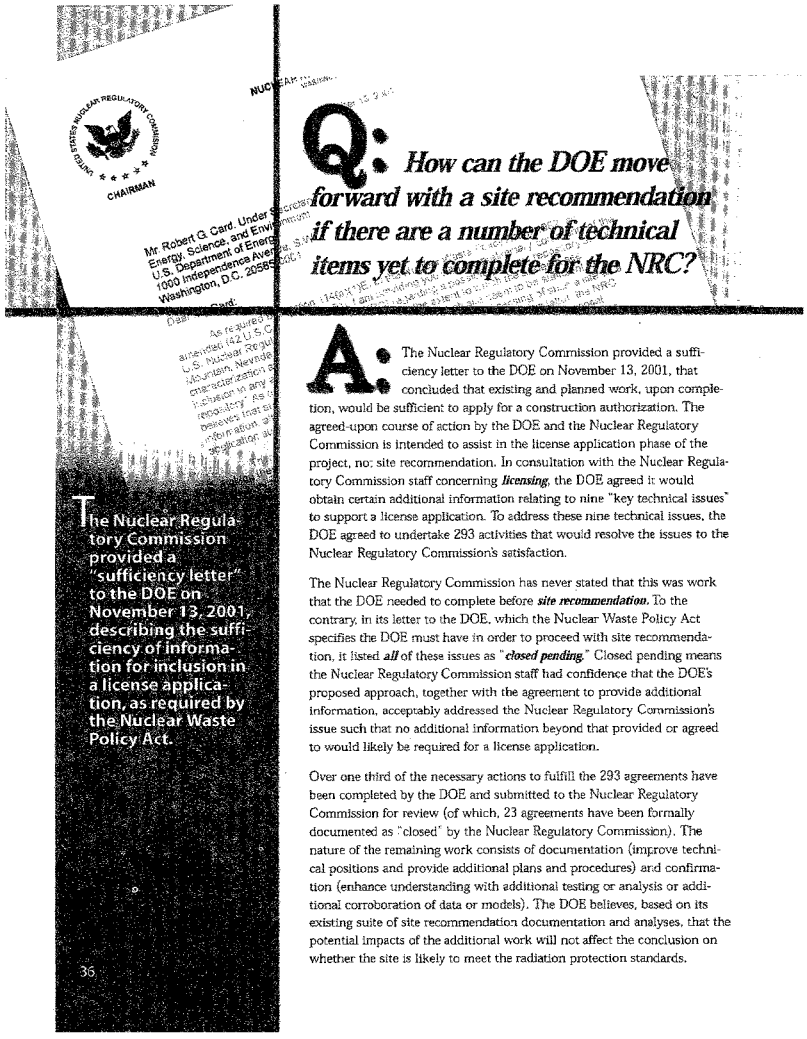
Any recommendation by the President would be an intermediate step in the process of developing a repository at Yucca Mountain. The political process determines ultimate acceptance of the Presidential recommendation. Construction or waste emplacement could begin, if and only if, the DOE submits a license application, goes through a multi-year review and public adjudicatory hearing process, and receives a construction authorization from the Nuclear Regulatory Commission. The Nuclear Regulatory Commission has the statutory responsibility to ensure that any repository constructed at Yucca Mountain would meet stringent safety standards. The hearings conducted by the Nuclear Regulatory Commission would be an extensive construction licensing proceeding, focusing on public health and safety. The Nuclear Regulatory Commission review process, including the hearings, is expected to take a minimum of three years after the DOE submits a license application. Opposing viewpoints will be heard in the proceeding, which will be conducted by an administrative court, not the DOE or the Nuclear Regulatory Commission. Following construction authorization, the DOE would

have to complete initial construction, and apply for and receive a license from the Nuclear Regulatory Commission before any wastes could be received or emplaced.

The DOE would be subject to Nuclear Regulatory Commission oversight throughout the construction and operation phases of the repository. The Nuclear Regulatory Commission would impose on the DOE certain conditions for operation, and requirements to collect data to ensure that the repository was functioning as described in the licensing documents. The DOE will continue to study important issues to ensure confidence in any decision to close the repository. For example, the Nuclear Regulatory Commission requires that the DOE implement a performance confirmation program during the preclosure period. Operation of the repository would also be subject to congressional oversight and annual authorization through the budget process.



Nuclear Waste Policy Act Process Steps



The Nuclear Regulatory Commission provided a "sufficiency letter" to the DOE on November 13, 2001, describing the sufficiency of information for inclusion in a license application, as required by the Nuclear Waste Policy Act.

Q: *How can the DOE move forward with a site recommendation if there are a number of technical items yet to complete for the NRC?*

A: The Nuclear Regulatory Commission provided a sufficiency letter to the DOE on November 13, 2001, that concluded that existing and planned work, upon completion, would be sufficient to apply for a construction authorization. The agreed-upon course of action by the DOE and the Nuclear Regulatory Commission is intended to assist in the license application phase of the project, not site recommendation. In consultation with the Nuclear Regulatory Commission staff concerning ***licensing***, the DOE agreed it would obtain certain additional information relating to nine "key technical issues" to support a license application. To address these nine technical issues, the DOE agreed to undertake 293 activities that would resolve the issues to the Nuclear Regulatory Commission's satisfaction.

The Nuclear Regulatory Commission has never stated that this was work that the DOE needed to complete before ***site recommendation.*** To the contrary, in its letter to the DOE, which the Nuclear Waste Policy Act specifies the DOE must have in order to proceed with site recommendation, it listed ***all*** of these issues as "***closed pending.***" Closed pending means the Nuclear Regulatory Commission staff had confidence that the DOE's proposed approach, together with the agreement to provide additional information, acceptably addressed the Nuclear Regulatory Commission's issue such that no additional information beyond that provided or agreed to would likely be required for a license application.

Over one third of the necessary actions to fulfill the 293 agreements have been completed by the DOE and submitted to the Nuclear Regulatory Commission for review (of which, 23 agreements have been formally documented as "closed" by the Nuclear Regulatory Commission). The nature of the remaining work consists of documentation (improve technical positions and provide additional plans and procedures) and confirmation (enhance understanding with additional testing or analysis or additional corroboration of data or models). The DOE believes, based on its existing suite of site recommendation documentation and analyses, that the potential impacts of the additional work will not affect the conclusion on whether the site is likely to meet the radiation protection standards.

U.S. Department of Energy
Office of Public Affairs

1000 Independence Ave. SW
Washington, DC 20585
http://www.energy.gov

KENNY C. GUINN
Governor

OFFICE OF THE GOVERNOR

April 8, 2002

The Hon. Robert C. Byrd
President *Pro Tempore*
United States Senate
United States Capitol
Washington, DC 20510

RE: Official Notice of Disapproval of the Yucca Mountain Site

Dear Mr. President *Pro Tempore*:

Pursuant to Section 116(b)(2) of the Nuclear Waste Policy Act of 1982, *as amended,* 42 U.S.C. §10136(b)(2), I am transmitting to you for submission to the Congress a Notice of Disapproval of the site designation of Yucca Mountain in Nevada as the nation's high level nuclear waste repository.

A Statement of Reasons explaining why I have submitted the Notice of Disapproval accompanies this notice.

Sincerely,

KENNY C. GUINN
Governor

101 N. CARSON STREET • CARSON CITY, NEVADA 89701 • TELEPHONE: (775) 684-5670 • FAX: (775) 684-5683
555 E. WASHINGTON AVENUE, SUITE 5100 • LAS VEGAS, NEVADA 89101 • TELEPHONE: (702) 486-2500 • FAX: (702) 486-2505

KENNY C. GUINN
Governor

OFFICE OF THE GOVERNOR

April 8, 2002

The Hon. J. Dennis Hastert
Speaker of the House of Representatives
United States Capitol
Washington, DC 20510

RE: Official Notice of Disapproval of the Yucca Mountain Site

Dear Mr. Speaker:

Pursuant to Section 116(b)(2) of the Nuclear Waste Policy Act of 1982, *as amended*, 42 U.S.C. §10136(b)(2), I am transmitting to you for submission to the Congress a Notice of Disapproval of the site designation of Yucca Mountain in Nevada as the nation's high level nuclear waste repository.

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Statement of Reasons Supporting the Governor of Nevada's

Notice of Disapproval of the Proposed Yucca Mountain Project

Kenny C. Guinn
Governor of Nevada

April 8, 2002

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 low 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 fear-mongering, 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 studies, 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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For additional information, see Nevada's Yucca Mountain website at *www.state.nv.us/nucwaste*. This Statement of Reasons has been posted there.

PREPARED STATEMENT OF HON. KENNY C. GUINN, GOVERNOR, STATE OF NEVADA

Honorable Mr. Chairman and members of the Committee, my name is Kenny C. Guinn and I am Governor of the State of Nevada. I appreciate the opportunity to submit written comments for the Committee's consideration. Due to conflicting commitments, I am unable to be present in person, and I apologize for that. I am disappointed, however, that the Committee was unable to accept Mr. Steven Molasky to testify for Nevada in my place. Mr. Molasky, a respected Nevada businessman, is a senior member of the Nevada Commission on Nuclear Projects and would have made a valuable contribution to your deliberations. I am likewise disappointed that your Committee was unable to accept the testimony of Mr. Robert Loux, the long-standing Director of Nevada's Agency for Nuclear Project, and perhaps the most knowledgeable Nevadan when it comes to Yucca Mountain issues.

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 that reason, we believe 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 to represent my written testimony to the Committee. In addition, I would like to supplement this testimony with the following:

More on the Unsound Science of Yucca Mountain

Yet another document, perhaps *the* key document, 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 non-existent.

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 Proliferating Storage Sites

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 do anyway,* in the real world. The only question about the PECO solution is whether it will be implemented using funds from the Nuclear Waste Fund, or from some alternative funding source. 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.

Transport Issues

The final issue I want to bring to your attention again is the nuclear transportation issue. Some have accused Nevada of fear mongering simply for honestly and sincerely raising the many questions that nuclear waste 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.

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. No, instead 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?

These are but a few of the many legitimate questions that remain about high-level waste and spent nuclear fuel transport. As a nation, we deserve clear and honest answers. Industry claims and a "trust me" attitude are simply not enough.

Thank you for your consideration.

Mr. BARTON. The Chair would recognize himself for 5 minutes for questions and then we'll go on to Mr. Boucher and members of the majority and minority side.

Mr. Secretary, I believe you're aware that under the Nuclear Waste Policy Act of 1982, as amended in 1987, that the government of the United States was required to begin to accept the high level waste generated by our civilian reactors beginning on January 1, 1998. I'm sure you're aware of that.

Mr. ABRAHAM. I am.

Mr. BARTON. So in fact, if we're not to move forward with Yucca Mountain, the taxpayers of the United States will be subjected to billions and billions of dollars in claims by the operators of these reactors who have been waiting patiently for the last 4 years for us to begin to move forward on the repository. Is that not correct?

Mr. ABRAHAM. Mr. Chairman, obviously, I don't want to speculate as to the possible litigation liability of the Federal Government in the situation that you've outlined. But as you know already, lawsuits have been brought because we have already failed to meet the initial time table.

Mr. BARTON. As we move forward and hopefully we will move forward, if in fact, the House and the Senate override the veto of the Governor of Nevada, the next big issue, once we have a site selected is going to be a transportation plan and numerous Members of Congress have got serious questions about the ability to transport this waste. I'm going to briefly describe what the design criteria area and then ask you a question about the ability to transport the waste safely.

Under the law, any cask that's used to transport high level nuclear waste has to withstand a 30-foot free fall on to an unyielding surface which would be equivalent to a head on crash of the cask at 120 miles an hour into a concrete bridge. It also has to be able to withstand a puncture test allowing the container to fall 40 inches onto a steel rod, 6 inches in diameter. It also has to be able to withstand 30 minutes exposure to a fire at 1,475 degrees Fahrenheit that engulfs the entire container and then that container has to be able to withstand submergence underwater for 8 hours. Now the Department of Energy has conducted tests at Sandia National Laboratory in New Mexico and the District of the Congresswoman Heather Wilson, who is a member of the subcommittee in which they had a flatbed truck loaded with one of these casks which smashed into a 700-ton concrete wall at 80 miles an hour. They subjected another cask to a rocket assisted broadside by 120 ton locomotive train traveling at 80 miles an hour. They dropped a cask from 2,000 feet onto soil as hard as concrete. That must have been my backyard that they dropped it onto which was traveling 235 miles an hour at impact. In Great Britain, Great Britain's equivalent of the Department of Energy ran an unmanned locomotive at 100 miles an hour into a cask in front of 2,000 spectators. It was shown on British National Television. The cask sur-

vived with minimal damage. And finally, 4 years ago, one of the proprietary producers of these casks shot a TOW anti-tank missile into the side of one of these casks, first with the cask unprotected by its proprietary material. That did create an indentation into the side of the cask, but there was no—there would have been no resultant loss in radiation. They then fired another anti-tank TOW missile into the cask with their proprietary protection and there was no damage done at all.

Do you as Secretary of Energy have any doubt that once we work through the transportation issues about the routes and the locations with the various governments, that the casks themselves are going to be unsafe in any way to the American people?

Mr. ABRAHAM. I'm confident, Mr. Chairman, that first of all, we will use only casks which have been certified for these purposes by the Nuclear Regulatory Commission, and I'm confident that there will be casks to meet the tests. I would point out the issue of transportation is one that gets raised and legitimately so, but that there has been ample amount of evidence compiled about our capabilities to transport waste, including nuclear waste, both here in the United States and in Europe, for over 30 years without any harmful radiation effects or releases. In fact, in Europe, I believe the amount that's already been transported is approximately the total amount which would be transported to Yucca Mountain.

So there is a very successful track record of doing this, both here and in Europe, we're confident that based on not only that record, but also on the work that was done in preparing our environmental impact statement, that we can continue that excellent track record into the future.

Mr. BARTON. Thank you, Mr. Secretary, my time is expired. I would now recognize the gentleman from Virginia, Mr. Boucher, for 5 minutes for questions.

Mr. BOUCHER. Thank you very much, Mr. Chairman, and Secretary Abraham, thank you for your appearance here today and your very able testimony and I also want to say thank you to you and to your staff for the very careful and thorough work that your Department has done in analyzing the Yucca Mountain site, forwarding your Department's recommendation to the President.

Mr. BARTON. Would the gentleman yield, please?

Mr. BOUCHER. I'll be happy to yield.

Mr. BARTON. Would you care to introduce the members of your staff that are here because I understand you have some of your senior staff with you today.

Mr. ABRAHAM. We have a number of them. I believe—too many of them, maybe.

Mr. BARTON. Well, the senior staff.

Mr. ABRAHAM. Let me introduce Bob Card, Undersecretary of Energy. Let me introduce our General Counsel, Lee Otis. Let me also introduce the very recently confirmed appointee Dr. Margaret Chu, who will lead our Civilian Radioactive Waste Program and will oversee this project in the future. There are probably a variety of others here who I should be introducing and to them my apologies are extended.

Mr. BARTON. Thank you.

Mr. BOUCHER. Well, again, Mr. Secretary, I want to thank you and the individuals you've introduced and others who have worked with you and with them for the thorough and careful work that you've done.

The critics of the Yucca Mountain decision allege that this decision is not based on sound science. Your review has looked at the scientific work that has been done during the course of the last 20 years and I would welcome this morning your response to that criticism. What about the argument that this project is not based on sound science?

Mr. ABRAHAM. Well, as I've said to the committee, this Department has over 24 years invested $4 billion in scientific research. We have researched almost anything people raised as concerns. As I said earlier, not only did we consider whether for the first 300 years we could build and operate in a preclosure period, but we also have investigated whether 10,000 years from now we could meet a groundwater standard equivalent to the current drinking water standards and a total pathways radiation standard of 15 millirems per year, which is a very small level of exposure. We have done a variety of tests and a variety of total system performance assessments, both through computer modeling as well as actual tests inside Yucca Mountain itself.

I visited the mountain. It's a very isolated place, as you know. I am confident that the men and women who have worked on the science have done their job exceedingly well. And, I would note that while when you have a debate like this, it's entirely expected that you will have people on both sides—whether it's the nuclear energy industry or it's the State of Nevada with their own experts, who would make the case either way—a variety of independent groups who have looked at this have confirmed what we've said. The International Atomic Energy Agency said that an adequate basis exists for supporting a statement of likely compliance within the regulatory period of 10,000 years, and accordingly, for the site recommendation. The U.S. Geological Survey said that it believes that the scientific work performed to date supports a decision to recommend Yucca Mountain for development as a nuclear waste repository. The Nuclear Regulatory Commission itself has extended a sufficiency letter based on their assessment of the work done, saying that we will have met the sufficiency standard for a license application. I believe with strong conviction, as I've said already, that the science is sound and we can move to the next stage. But again, the next stage is letting the NRC's team of independent objective experts review the competing claims and make the final adjudication. I think we're confident enough to go to that stage. Those who opposed this wouldn't even allow the next stage to test it.

Mr. BOUCHER. Thank you very much. It's also true, is it not, that even after construction begins on the site and waste is received at the site, that prior to permanent closure of the site there will be a period of time during which even further scientific learning can come forward and there will be an even additional opportunity to apply whatever knowledge is gained from that process to additional protections?

Mr. ABRAHAM. Absolutely. As I said, we're talking about a preclosure period of 50 to 300 years. If you look backward a similar

time period that would be the year 1700. Consider the progress science has made in that period. If you go back just 50 years, you're talking about the dawn of the nuclear age. So it's my strong belief that in that period in which we would be monitoring the facility in which we would obviously be making great advances in terms of issues that relate to safety and security, that the opportunities will be available to perfect what we already believe is a satisfactory design.

Mr. BOUCHER. Mr. Secretary, we've spent now 20 years analyzing the Yucca Mountain site. It has taken us that long to get from where we started to the present day. We are now on the verge of approving, and I think we will approve it—legislation that moves this process forward with regard to Yucca Mountain. But let me ask you what your alternatives are in the event that we do not take that step, if Congress were not to pass this bill, if the disapproval announced by the Governor of Nevada of this site should stand, what alternatives then does the Department of Energy have for disposing of waste?

Mr. ABRAHAM. Well, there is no alternative. Obviously, Congress would be in a position, with the executive branch, to presumably work together to try to go back to square one and to make a decision as to what comes next. But the way the Nuclear Waste Policy Act is established sets in motion a clear set of decision milestones, the first of which was my decision to recommend to site, the second of which was the President's recommendation. The third step was obviously the actions that Nevada has taken. Now Congress has this decision before it.

Again, I would remind the members the decision you have is whether or not to allow this to move to the stage at which the NRC's independent, neutral, objective, expert organization will decide whether or not the claims we've made in fact can be met. Failure to do this leaves us with the responsibility for the waste with no plan to move forward to address that responsibility. The potential consequences that I mentioned earlier are adverse in nature to our national security, nonproliferation programs, and the like.

Mr. BOUCHER. Thank you, Mr. Chairman, we appreciate you being here this morning, thank you.

Mr. BARTON. The Chair will now recognize the gentleman from Georgia, Mr. Norwood, for 5 minutes for questions.

Mr. NORWOOD. Thank you very much, Mr. Chairman and Mr. Secretary, thank you for being here and your staff. I think I'm going to be fairly brief. 1998, as you recall, DOE missed the statutory deadline to begin removing fuel from reactor sites and at that point provided a revised schedule, as you remember and at that point committed to start receiving fuel at Yucca Mountain by 2010. Do you still agree with that? Is that still a commitment?

Mr. ABRAHAM. It is, and we believe that the 2010 date can be met, assuming that this process moves forward.

Mr. NORWOOD. Is there anything that Congress can or should do to help you reach that goal?

Mr. ABRAHAM. Well, I think that the first decision process obviously relates to moving ahead to the next step by overriding the veto of Nevada. Certainly there will be the need for sufficient funds to be able to finish the licensing process of Congress. I believe both

the 01 and 02 appropriations process focused our resources on the science research as opposed to putting resources into the licensing process. It's one of the reasons that we now have more to do on the licensing side and as we move ahead, we will need to have those resources.

We will also need to address, I think, some issues that pertain to the site itself. But, I think it would be premature to speculate on all of those unless we move to the next step nothing can happen.

Mr. NORWOOD. Anything that comes to mind that we might do to improve on that date?

Mr. ABRAHAM. I think it would be very hard to move quicker than 2010. I wouldn't want to leave the committee under any misunderstandings. We think that's not an overly ambitious deadline. We think it's a reasonable one. It would be our belief that if Congress acts to override the State of Nevada's veto that it can be met.

Mr. NORWOOD. A question earlier was what happens if, in fact, we don't use Yucca Mountain and I'd like to ask that question too. Specifically and narrowly tailored in is if we don't Yucca Mountain, what's going to happen or what do you think might happen to the Nation's overall energy supply situation if we don't use Yucca Mountain?

Mr. ABRAHAM. I think there are a couple of things that might occur. First, I think we will see an array of makeshift alternatives developed by people who currently are storing spent nuclear waste in temporary conditions. They're running out of storage space. They lack confidence in the future in terms of how much space they're going to have and the timeframe in which they will exceed whatever their limits are. We've already had one very recent application before the Nuclear Regulatory Commission in which a group of energy companies and the Goshute Indian tribe in the State of Utah are working together to build a facility on the tribal land to store waste. And by the way, Mr. Chairman, this goes back to the transportation issue you raised. I believe you'll see an array of ad hoc, makeshift alternatives developed in which transportation of waste is going to happen—not in the kind of coordinated programs we are recommending, but in an ad hoc fashion. So I think that's one thing that will happen. Another thing will be that it would probably affect decisions with respect to license extension of nuclear facilities. Existing facilities will reach the point where we don't have the same level of nuclear energy in our energy mix as we do today just because people will run out of storage. They'll have to either cease operations or not seek new license extension.

Mr. NORWOOD. When's the last time you've been to Yucca Mountain?

Mr. ABRAHAM. I was there in early January.

Mr. NORWOOD. I had the privilege of being there in 1996 and I came away impressed with a number of things: the tunnel digging machine, the scope of this entire thing was unbelievable and the amount of dollars that the taxpayers were spending particularly on science to try to have this right and I came away very impressed with the amount of dollars we were spending to make sure that the mountain or desert turtles would be all right. How are the turtles out there? Are they okay?

Mr. ABRAHAM. I'm not sure, but I'll take that question for the record.

Mr. NORWOOD. My point there is, of course, that you can make science say anything, but it is my observation that this has been not only very expensive, but very complete and I don't think there's much else really that I could imagine that you might study at this point and we do need to move our material from around the country out there and hopefully before 210.

Thank you, Mr. Chairman.

Mr. BARTON. Thank you, gentlemen. I had heard that most of the turtles had moved into Las Vegas and were dealing blackjack. That's what I had heard. Doing very well at it too, by the way.

The gentleman from Ohio, Mr. Sawyer is recognized.

Mr. SAWYER. Thank you, Mr. Chairman, and thank you, Mr. Secretary, for being here. The question that you're dealing with has been a thorny one for a very long period of time.

Let me ask you about procedure. The DOE is obligated under the law to once we have designated a repository site to make application to the NRC within 90 days. My understanding is that you and the NRC have drawn up a list of nearly 300 technical issues that confront that application process.

Are you going to be able to meet the 90 days, first of all, and I'm assuming you knew the difficulty of doing that when you initiated this process with the Congress.

Mr. ABRAHAM. I think, that first of all, there's been some confusion as to the interpretation of that 90-day provision. I think it would be turning the statutory provision on its head to treat it as a basis for delay, for not going forward with the project. I think the provision's purpose was really to speed up repository siting and licensing by trying to urge the Department—once we got to a point where the President had acted and Congress had acted—to move ahead with the license.

Mr. SAWYER. I'm not suggesting that. What I'm getting to is the point of whether or not you need more time in order to resolve the issues so that you don't have to do gymnastics around the law.

Mr. ABRAHAM. No, I don't think we need to go that route. The sufficiency letter which has been provided by the Nuclear Regulatory Commission is consistent with that. The NRC recognizes, and we agree, that most of the remaining work has to be done as a natural part of the licensing process. In fact, I think Congress was probably correct in limiting the funds available for pre-license or license-related activities until we decided we could make the decision to recommend the site. I think—and in fact, I know that we've actually reduced the number of remaining issues substantially since this past fall.

Mr. SAWYER. The Technical Review Board made a number of recommendations in its report in January. Do you agree with the findings of the report? How do you plan to respond to the recommendations? I'm particularly interested in the Board's strong recommendation to reverse previous thought on this and use a low temperature storage procedure.

Mr. ABRAHAM. I've met with both the chairman and other members of the Board. We take very seriously all of the recommendations they make, obviously recognizing that their role is to be a

part of this process, giving advice and counsel to the Department. Remember, as I said, there is this preclosure period in which we have plenty of time, I think, to further perfect what we think is the correct design. As I said, it's a duration potentially longer than the United States has been a country. Regarding some of the concerns that have been expressed, I would just say this. We are confident and we believe the tests that we have done allow us, with the present design and the information we have, to meet the very, very stringent standards of the EPA and the Nuclear Regulatory Commission. It is not surprising, I don't think, that reasonable people can differ as to the conclusions that we've reached far into the future: 10,000 years. But most of the issues, such as the one you mentioned, the storage design in terms of hot versus cold, are ones which we tried to factor into the design plan at this point, so that we have the flexibility to go either way. We have been, in no small measure at the Technical Review Board's urging, engaged in extensive testing and will continue to do that. We have time to make that ultimate decision as to what, in fact, is the preferable course. We've left that as an open issue, recognizing that in terms of the design, we can go in either direction and we do have to do more science research to decide which one is better, although I'm convinced that both would allow us to meet the standard. Now the question is how do we not only meet the standard, but what do we do to go the extra steps to do the best, most perfect approach.

Mr. SAWYER. One last question, Mr. Chairman. There are all kinds of conflicting numbers about the numbers of shipments that would be involved. I've seen it range from 10 to 40,000 and I suppose it all comes down to the size and concentration of shipments on a particular shipment. Have you developed thought on the concentration of waste that would be permitted on any given——

Mr. ABRAHAM. We have. It's our estimate, and I think that this number would be very accurate, that there would be less than one shipment per day. It's obviously part of the on-going process as we move through licensing, toward construction, and shipping to decide what is the right configuration. But, one shipment—less than one shipment per day is our current estimate—I don't mean to compare apples to oranges, but I do think that it's important to know that in this country somewhere in the vicinity of 300 million hazardous waste shipments per year take place. We have somewhere in the vicinity of 3 million shipments that involve some type of radiological material. We're talking about something less than 365 shipments to the repository at this point, perhaps substantially less.

Mr. SAWYER. Thank you very much. Thank you, Mr. Chairman.

Mr. BARTON. The gentleman's time has expired. We'd now recognize the full committee chairman, Mr. Tauzin for 5 minutes for questions.

Chairman TAUZIN. Thank you, Mr. Chairman. Mr. Secretary, thank you so much for being here to help us resolve this issue. Let me first point out that I'm aware, as I know the committee is aware, that there's been an attempt to characterize the Department of Energy's review of this important issue as being one sided. I'm reading from one report that indicated that by golly, you were meeting consistently with people who support the burial site in Ne-

vada and not meeting with those who opposed it and it refers specifically, in fact you met eight times with Republican lawmakers who support nuclear waste burial in Nevada. Will you describe those meetings? I was at one of those. I know about them. Would you tell us what those meetings were about?

Mr. ABRAHAM. Well, the subcommittee chairman, I think, was at two of those that were referenced. As both of you know, we talked about other matters. I think there's a tendency to want to extrapolate substantially, but I think——

Chairman TAUZIN. Were they meetings about Yucca Mountain?

Mr. ABRAHAM. No, they were not.

Chairman TAUZIN. They were not. I think some of those were simply your courtesy visits to come meet us after you had been nominated——

Mr. ABRAHAM. That's correct.

Chairman TAUZIN. And approved as Secretary of the Department. Is that correct?

Mr. ABRAHAM. That's correct.

Chairman TAUZIN. So these courtesy meetings have now been blown up into Yucca Mountain meeting when they never were, were they?

Mr. ABRAHAM. I find that, as far as I can tell, any meeting that took place with anyone who has had at some point expressed support for the project is characterized as a Yucca Mountain meeting——

Chairman TAUZIN. Whether you talked about it or not.

Mr. ABRAHAM. Right.

Chairman TAUZIN. In most cases, you tell me you didn't.

Mr. ABRAHAM. That's correct.

Mr. BARTON. Will the gentleman yield?

Chairman TAUZIN. Yes. I'll be happy to yield.

Mr. BARTON. The toughest question I asked in the first courtesy meeting was whether he was a Wolverine or a Spartan.

Chairman TAUZIN. How did he handle it?

Mr. BARTON. He said he had friends on both sides.

Chairman TAUZIN. He's still a Senator, for heaven's sake.

The other thing I want to point out was I have with me a copy of a letter dated September 5, 2001 from you to Representative Berkley in which you make it very clear that you're very interested in the views and comments of the citizens of Nevada. You set up a video conference link of the Las Vegas Public Hearings with locations in Carson City, Elko and Reno. You agreed to have the feed provided to the Senate recording studios so that any one of us could sit in and listen to those views, including Ms. Berkley. More importantly, you issued an invitation. I will be happy to meet with you, the Governor and the Members of the Nevada congressional delegation to hear your and their views directly.

Did Ms. Berkley take you up on that invitation?

Mr. ABRAHAM. Congresswoman Berkley——

Chairman TAUZIN. Ms. Berkley, I'm sorry.

Mr. ABRAHAM. No, she did not. I have met twice with Governor Guinn, but not with any of the delegation members.

Chairman TAUZIN. Yes, but you did offer to meet with the delegation. Ms. Berkley was the one you directed the letter to.

Mr. ABRAHAM. Actually, all the members received an invitation.

Chairman TAUZIN. A similar letter.

Mr. ABRAHAM. Right.

Chairman TAUZIN. And I think you got to meet with the Governor, who did agree to meet with you and that's it, right?

Mr. ABRAHAM. Right, well, there were local elected officials.

Chairman TAUZIN. Isn't it kind of hard—I mean how do you feel when you read from Ms. Berkley's statement that the Administration had a pro Yucca inclination from the beginning and the people they met with were all pro Yucca supporters and they threw in a meeting with the Governor as though you wouldn't meet with him. That wasn't true, was it?

Mr. ABRAHAM. Mr. Chairman, that is not true. We offered the delegation the opportunity to meet, and sincerely extended that invitation. I actually have had meetings during the timeframe in which our decision was made with members of the delegation in which, as was the case with the meetings I had with you and Congressman Barton, other topics were discussed, but this topic was not——

Chairman TAUZIN. We can argue about whether your decision was a good one, whether we should vote to override the veto of Nevada on its substance without this kind of stuff. I mean mischaracterizations of the process are just not very helpful and I wanted to point that out. These were mischaracterizations of the process.

But there is a process ongoing and I understand that one of the things you have yet to do is to hold hearings and I understand public hearings on the licensing process if we do overrule the State of Nevada. Is that correct?

Mr. ABRAHAM. Well, the licensing hearings would be part of the Nuclear Regulatory Commission's process.

Chairman TAUZIN. Right. And in those public hearings and in that process, people from Nevada, anyone can attend and those comments and those public hearings leading to license renewal—there will be further attempts to make sure the site does indeed pass the stringent test for health and safety, is that correct?

Mr. ABRAHAM. That's right.

Chairman TAUZIN. And the public will have a chance to comment at those hearings, correct?

Mr. ABRAHAM. That is correct.

Chairman TAUZIN. I noted, as did the State of Nevada, that the NRC has identified 293 unresolved technical issues in the 9 critical areas, could you give us just a brief idea of what those were about?

Mr. ABRAHAM. Most of these are confirmatory of the research which we've already conducted and it is our belief and the Nuclear Regulatory Commission's belief, these are the sorts of actions that are part of the licensing process, and therefore, they are not actions that would be predecisional in terms of the site recommendation. They are part of what you do as part of the licensing.

Chairman TAUZIN. So it's not like you haven't done your job at this point. Those are things that are resolved in the licensing——

Mr. ABRAHAM. The Nuclear Regulatory Commission, as I said earlier, already has provided us with a sufficiency letter saying

that we have met what would be needed to move to a licensing stage already.

Chairman TAUZIN. In that regard, DOE has resolved some of those questions already, have they not?

Mr. ABRAHAM. I think, well, of the——

Mr. BARTON. This will be your last question.

Mr. ABRAHAM. Yes, I believe that some 35 to 40 already have been resolved in the period since that number was identified.

Chairman TAUZIN. Thank you, Mr. Chairman. Thank you for your courtesy.

Mr. BARTON. This will be my last chairing of a hearing so I just cutoff the full committee chairman, but I am going to go by the rules.

The Chair would recognize the distinguished ranking member from Michigan, Mr. Dingell, for 5 minutes for questions.

Mr. DINGELL. Mr. Chairman, I thank you for your courtesy. Welcome, Mr. Secretary.

Mr. ABRAHAM. Congressman.

Mr. DINGELL. Mr. Secretary, we've got a great deal of fuss going on about this process. I'd like to try in the brief time I have available today to try to lay this out so that we can all understand what we're looking at here.

First of all, we spent about $12 billion characterizing the site up to this time, is that correct?

Mr. ABRAHAM. I don't know if it's $12 billion, I think it's closer to the $4 billion range.

Mr. DINGELL. It's close. I'll not argue with you if you come in with a larger or lower number.

The next thing is you have at this time completed your statutory responsibilities under the legislation to define whether it's safe enough to proceed to the next step. Is that correct?

Mr. ABRAHAM. That's correct.

Mr. DINGELL. This is a part of an orderly and ordinary congressional process, is it not?

Mr. ABRAHAM. Yes, it is.

Mr. DINGELL. So now having said that, there are now other steps which have to be taken also by you before you can submit the matter to NRC for the completion of the then licensing process which starts then at the NRC at the time you submitted it to the NRC, is that correct?

Mr. ABRAHAM. That's correct.

Mr. DINGELL. Now approximately how long will it be before you are going to be able to submit that to the NRC?

Mr. ABRAHAM. We believe that, assuming congressional action to override the veto occurred, that timeframe would probably be into the later part of the year 2004.

Mr. DINGELL. So we have between now and 2004 to continue scrutiny of this site to make sure that we're ready then to move to the licensing process, is that right?

Mr. ABRAHAM. Well, I believe that obviously some decision could be made in the interim. I think Congress' next action is to allow us to go to that next stage to prepare the license and submit it.

Mr. DINGELL. So you will then prepare that license and will submit that license——

Mr. ABRAHAM. The application, right.

Mr. DINGELL. Now what do you have to do between now and the time that you prepare the license and submit it to NRC?

Mr. ABRAHAM. Basically, we would be in a license application development process. It would be to address issues that would, and I would prefer to submit for the record the specific——

[The following was received for the record:]

License Application Development Process Work required between now and submittal of the Yucca Mountain License Application for a Construction Authorization includes the following:

The Department must provide a license application to the Nuclear Regulatory Commission (NRC) that will enable NRC to assess whether the proposed repository design within the Yucca Mountain geological setting can perform safely during the pre-closure and post-closure periods and whether the repository can meet NRC performance objectives. To accomplish this, we plan to close out our key technical issue (KTI) agreements, update our technical documentation, prepare a license application, and develop the necessary license review and documentation infrastructure. For example, the Department will implement a licensing support network to facilitate electronic review and docketing as required by 10 CFR 2. We expect this system to be operational in June 2004.

We will refine and conduct another iteration of the total system performance assessment for the license application. This will include refining our models and incorporating new scientific data that will further enhance our understanding of long-term repository performance.

Mr. DINGELL. I think that would be fine. But you will be addressing a number, including questions which have been raised this morning, is that not so?

Mr. ABRAHAM. Among others. Some of these issues that we've talked about, in terms of the unresolved issues which are "closed pending" are not ground breaking, new areas. They will be finalized so that the preliminary work will be completed.

Mr. DINGELL. Now Mr. Secretary, if the Congress votes your request to us down today, that stops the whole process?

Mr. ABRAHAM. Absolutely.

Mr. DINGELL. We've then wasted $12 billion. We've got to proceed forward with some new mechanism for storing this nuclear waste. Is that not so?

Mr. ABRAHAM. At that point, there would be no statutory process in place whatsoever. I suppose that Congress would have to then work with the executive branch to consider new legislation, new mechanisms for addressing the nuclear waste issue. As I said earlier, the responsibility for the waste does not expire if Congress fails to override. That responsibility stays with the Federal Government.

Mr. DINGELL. I want to come to that because what you're telling us if you're going to have a hell of a mess on your hands and the country is.

Now having said this what is the process that occurs in connection with the licensing undertaking? At that time you have to file a petition for a license before the NRC, is that right?

Mr. ABRAHAM. Right.

Mr. DINGELL. You have to comply with all of the laws and you have to see to it that you've submitted an application which assures that all the requirements of the statute are met and also that there is safety for the public, protection for the environment, compliance with all of your environmental and all of your applicable environmental and other statutory requirements.

Mr. ABRAHAM. Right, as you know, Congressman, the licensing process is very open. I believe it was referenced already that public comment and public participation of interested parties and others will occur. It's a process involving public hearings and discussions, so that all of these concerns that we've had presented about issues of safety and so on will be open for further discussion.

Mr. DINGELL. Now you've just made a very important point. Open process and the NRC then goes in to all of these questions, is that not correct?

Mr. ABRAHAM. Correct.

Mr. DINGELL. And they can impose whatever conditions that they feel are necessary to protect the public interest at that time, can they not?

Mr. ABRAHAM. They would have that option, of course.

Mr. DINGELL. And——

Mr. BARTON. This will have to be gentleman's last question.

Mr. DINGELL. I'm sorry?

Mr. BARTON. This will have to be the gentleman's last question.

Mr. DINGELL. Okay. Then why in the name of common sense are we sitting there other than voting for the bill and getting it moving forward so that the open process at NRC can be considered in a suitable and proper fashion?

Mr. ABRAHAM. Well, as I said in my opening statement, I think there's an overwhelming burden on those who oppose this at this stage to make the case that we shouldn't allow this open process conducted by an independent agency with expertise to do exactly the analysis that needs to be conducted. I think unless a member was convinced that there was no possibility, and convinced at very high level of burden or beyond a reasonable doubt, than the NRC would not approve this license, unless you have reached that conclusion, it would be inappropriate to vote no.

Mr. DINGELL. So the NRC will ultimately make, after an open process, a full decision on what it is that's going to happen on this matter and this is just a step or a way station on the travel to that particular point.

Mr. ABRAHAM. Correct. The choice is——

Mr. DINGELL. All questions will be considered in connection with——

Mr. ABRAHAM. I just want to state that we are strongly convinced, and I am convinced, beyond doubt that we will succeed in that process. So it's not a situation where it's simply a jump ball. However, you have correctly stated that the next step, if we move ahead, is to have a new independent analysis take place. Failing to move ahead ends the project, and ends literally an entire process here with no alternatives available, but with the Federal Government retaining the responsibilities that it assumed when it passed the Nuclear Waste Policy Act in 1982.

Mr. BARTON. The gentleman's time——

Mr. DINGELL. Thank you, Mr. Chairman.

Mr. BARTON. The gentleman's time is expired. The Chair would recognize the vice chairman, Mr. Shimkus for 5 minutes for questions.

Mr. SHIMKUS. Thank you, Mr. Chairman and welcome, Mr. Secretary. We do have the responsibility for the nuclear waste today, is that correct?

Mr. ABRAHAM. Yes, the Federal Government assumed that through the passage of the Nuclear Waste Policy Act of 1982.

Mr. SHIMKUS. Illinois' energy portfolio is approximately 40 percent nuclear, 40 percent coal and 20 percent natural gas and/or some renewables.

When the temporary storage sites at the nuclear facilities are full, what are the options for those nuclear generating facilities?

Mr. ABRAHAM. Well, as I indicated before, I think the options primarily focus on either ceasing operations and thus, producing no additional waste or finding an alternative location for waste storage, which as I indicated already is being investigated by companies who are working on an ad hoc basis rather than through the approach we're proposing, perhaps because they have a lack of confidence or perhaps because they want to have an alternative in case Congress doesn't act.

Mr. SHIMKUS. And what is the status, we don't have to be particular, but in general, most of the nuclear generating facilities, how much storage site availability left do they have before they close?

Mr. ABRAHAM. I can't say. I can provide you——

[The following was received for the record:]

The general status varies with each facility. Currently, 16 sites have dry storage and another 28 are projected to need dry storage by 2010. However, on-site storage can encounter challenges such as space limitations and state restrictions. For example, Minnesota has enacted a law restricting the amount of spent nuclear fuel that can be placed in dry storage at the Xcel Energy's Prairie Island nuclear plant. Without changes to the law, or other alternatives, Prairie Island will have sufficient storage capacity to operate only through 2007. Current efforts by Private Fuel Storage LLC (a consortium of eight utilities including Xcel Energy) to establish a private spent fuel storage facility in Utah reflect concerns by nuclear power generators that developing on-site storage can be increasingly difficult and could potentially jeopardize continued operation of their facilities.

Mr. SHIMKUS. If I may, we do have some in Wisconsin that in a year or do will be full and will have to make the decision.

Mr. ABRAHAM. I think it's in Minnesota, but I think there's another one very close to having no alternatives. Part of the challenge is that some facilities are in areas where they've got a lot of extra space and are in a position to seek and obtain whatever permits they need and the resources to build additional facilities. Others are constrained.

Mr. SHIMKUS. This whole debate should not just be a micro issue of Yucca Mountain, but also we should include it in the whole national energy debate. One of the concerns is if this resolution fails is that nuclear generating facilities have to go offline. If that's the case for a State like Illinois, if 40 percent of the power that we generate is nuclear, what would that do to our national energy policy and the pocketbook issues, what would it do to the price for the individual consumers?

Mr. ABRAHAM. Well, obviously, it has an immediate effect of requiring areas in which nuclear energy is a substantial provider of electricity to either build new alternative forms of electricity generation or find other mechanisms to purchase electricity. That

would obviously create a supply/demand problem for the ratepayers in those areas.

Mr. SHIMKUS. I would also like to follow up, I have my good friend from the State of Missouri, Karen McCarthy, who although we're on opposite sides of both States, she's on the western side of the State of Missouri, I'm on the southwestern side of the State of Illinois, we do have a couple of things in common. One is Interstate 70 and I have a great respect for her concerns. The questions that she's raised have not seemed to be a problem in the State of Illinois and we have a very good record of our relationship with the movement of high level nuclear waste. And I would also request, respectfully, that we work together so that she has as much confidence in the moving of nuclear waste that I do through the State of Illinois and I do know that the Governor of the State of Missouri actually changed his tune somewhat against the movement of nuclear waste when the nuclear reactor that services the University of Missouri at Columbia had an onsite storage problem that was going to require that medical reactor to close down. Then it was then in the State of Missouri's best interest to work with you all to move the nuclear waste and without any incident. Is that correct?

Mr. ABRAHAM. We have worked, and under very clear guidelines, with the Governor of any State in which there is going to be transportation. It's a very clearly structured approach. I just would reemphasize that we have a variety of safeguards in place: from escorts, to satellite monitoring of the movement, of shipments to prior work with the States and their first responder teams. Each step of the process is, I think, adequately safeguarded.

Clearly, as we move ahead with this, additional consideration will be given to perfect transportation even more. Ultimately, transportation routes must be approved by the NRC. So, I think that there are plenty of safeguards. I know that the congresswoman raised some questions. We have some disagreement on the interpretation of what has happened and why. But, we will provide to anybody who's interested what I think is a satisfactory resolution, addressing those concerns.

Mr. SHIMKUS. Thank you and thank you for your time. Mr. Chairman, I yield back.

Mr. BARTON. I thank the gentleman from Illinois. We would now recognize the other distinguished gentleman from Illinois, Mr. Rush for 5 minutes for questions.

Mr. RUSH. Thank you, Mr. Chairman and Mr. Secretary, again, I also join with my other colleagues in welcoming you here to this hearing.

Mr. Secretary, there seems to be a lot of fear mongering going on, particularly among the opponents of this piece of legislation and fear is a strong motivator to either act or not to act and in most cases to act, I'm somewhat intrigued by your comments a little earlier as it relates to the ad hoc efforts of some parties as it relates to making alternative plans and taking alternative steps in the event that this legislation fails.

Can you expound upon it more so?

Mr. ABRAHAM. Sure. I don't mean to be prejudgmental about those alternatives, or how they will work out. I'm not saying people

won't try to do things as safely as they can or won't get the proper licenses and permits. But, my point was that if people think that by not going forward with Yucca Mountain all the waste is going to stay put where it's at, in perpetuity, in temporary facilities above ground, and in many instances, at sites where long-term storage was never contemplated, they're wrong. That isn't going to be the end of the story. As I said a moment ago, it's going to mean that people will engage in their own self-help approach. That undoubtedly means, and it has already taken the form of, people seeking to find new alternative locations where they can store waste, either temporarily or permanently, but probably temporarily. That means it's going to start moving. It's going to be moving under the ownership or under the management of individual companies or entities, who have been put together to take this waste. This will presumably be profitable for those who agree to storage. So it doesn't mean, in other words, that there will be no transportation. There will be transportation. The question is do we want to do it in a coordinated national plan, or do we want it to take place on an ad hoc basis, with Company A and Indian Tribe B, or do we want to do it in a more coordinated national plan? I think the appropriate coordinated and safer approach is preferable.

Mr. RUSH. With that in mind, recently Governor Ridge basically gave a pretty enlightening response to a question that he received about homeland security and the Yucca Mountain program which included the transportation of material to Yucca Mountain.

Can you give us a little bit of your—the characterization of your interaction with Governor Ridge and his program and can you elaborate a little bit about homeland security issues as it relates to this program and can you also give us some kind of a glimpse into the effect of the homeland security issues as it relates to the ad hoc pursuit of these individual companies?

Mr. ABRAHAM. I would start by saying that at the request of the Office of Homeland Security, we provided, at the time we made the initial recommendation, extensive briefings to them as to what the plan was. Governor Ridge, having governed a State that has nuclear energy, already knows a lot about these issues. I think they've concluded that to the extent we can move a substantial amount, ultimately thousands of metric tons of waste, into one underground secured location next to an Air Force base in the middle of nowhere. We can better protect that waste. I don't want to suggest at all that we believe the current storage situations are insecure. But, we also have to think about the future, and I think prudence demands that we would move in a direction where we could protect more waste in a more effective, centralized fashion.

In a similar sense, I think it's the case that Congress and others have questioned how well private entities engaged in running nuclear reactors are doing. We think, according to everything I've seen from the Nuclear Regulatory Commission, they're doing a good job. But, the more places that emerge because of this ad hoc approach in which waste is stored, the more challenges will be presented.

We also have a number of places where former nuclear facilities have been decommissioned, but the waste is still there. We also have to worry about the protection of waste in those places. For ex-

ample, up in the northern part of my State of Michigan, the Big Rock facility is no longer operating as a nuclear reactor, but the waste is still there from its past operation. The idea—and it's right, is to move the fuel away from Lake Michigan.

The idea is that we could remove that waste and permanently store it in Yucca Mountain and no longer have to worry about security at that decommissioned facility. Big is pretty remote and is not necessarily something you want to be worrying about decades from now. Also, the waste that's stored at DOE facilities would be much more safely stored if we could move it to Yucca Mountain. Those are the considerations which we've taken.

Mr. BARTON. The gentleman's time has expired. The Chair would recognize the distinguished gentleman from Iowa, Mr. Ganske for 5 minutes for questions.

Mr. GANSKE. Thank you, Mr. Secretary, for being here today. In my opening statement I quoted from a Des Moines Register editorial of March 17 which was in favor of the Yucca Mountain repository. This was noteworthy because this represented an 180 degree shift from the Register's earlier position. A few weeks later another editorial was written and let me just read some of it.

"We forgot to mention something in a recent editorial about the proposed nuclear waste storage site at Yucca Mountain. We failed to point out that the editorial represented a change in position for the Register. Previous editorials in the Register opposed the nuclear repository at Yucca Mountain and urged that waste continue to be kept in temporary storage at the 130 or so nuclear power plants around the country. In the most recent editorial on March 17, we urged the government to move ahead with establishing the single repository. Our position changed because circumstances changed. First, the U.S. Department of Energy after many years of study, finally came out with a definitive recommendation for storing nuclear waste underground at Yucca Mountain. The Department offered satisfactory answers to all of the objections to the site. Second, the September 11 attacks suddenly made it seem far less wise to have radioactive material scattered at 130 above-ground sites near population centers, rather than at one highly secure underground site in the desert."

Now for years I've been talking to editorial boards around my State about this issue and advocating for Yucca Mountain. It's fair to say that I listen and learn as well as the editorial boards, but I thought it was noteworthy that at the end of this article, the editor said "not only do we change positions occasionally, we're sometimes even open to persuasion." I think that's something that is noteworthy.

My question to you is this, I have a sense of my District and my State and where they stand on this. We have a nuclear power plant very close to Cedar Rapids. What is your sense about where people stand in your travels around the country on this issue? Has there been a change in attitudes by other editorial boards, or by the public on this? I know that you're looking at making this decision based on science, or whether it's a safe place or not, but I'm curious as to what your sense is of where the country is standing on this issue.

Mr. ABRAHAM. Congressman, I haven't done any polling. I guess my view is that the national interests were so compelling that any member, I think, can go to their district and make an overwhelming strong case for moving forward, because, moving forward is important for our national security and our energy security reasons. It's important for homeland security reasons. It's important for environmental reasons. If you can make a case for anything based on all four of those pillars, I think it's a pretty hard case to refute. Again, had we done sort of a cursory study of this, rather than 24 years and $4 billion worth of study, if we confined our study to a small number of factors rather than the extraordinarily broad range of considerations and possibilities that might happen in 10,000 years, then maybe you could refute the arguments we've made. I don't know the answer to the polling question, but I think the arguments for moving forward are ones that are going to cause people who study this at all to agree with our conclusion.

Mr. GANSKE. Do you sense a change, though, in wanting to get this done in a satisfactory method sooner rather than later because of September 11 due to the fact that people are more concerned about attacks?

Mr. ABRAHAM. Clearly, there have been editorials since that date that have been focused on those kinds of concerns and probably on ones that might not have happened but for the events of that day. I think the American public expects us to look at the security issues and take immediate action rather than postponement. One of the things which I take very seriously in my job is that when it's time to make a decision, we've got to make it and this is one decision that had been obviously delayed for a long period of time. There's no question that you could continue research on this. The science research could continue potentially for 5 more Congresses or 10 more Congresses. But to me, we've reached the point where we have sufficient scientific support to move ahead and I was able, based on that scientific support, to conclude the time had come to stop and make that decision. Now we can move forward to perfect the research as I outlined here today.

Mr. BARTON. The gentleman's time has expired.

Mr. GANSKE. Thank you.

Mr. BARTON. I would announce to the committee that we're expecting a series of two votes in the next 10 minutes. There's an outside chance that we can get all members present a chance to ask their questions and then let the Secretary go and not have to have him come back after our votes, if we act expeditiously.

The Chair would recognize the gentleman from Pennsylvania, Mr. Doyle for 5 minutes.

Mr. DOYLE. Thank you, Mr. Chairman, and in the interest of time so that we can accommodate that, I'll try to be brief and not use my 5 minutes.

Mr. Secretary, thank you very much for coming here today. I just want to very quickly piggyback on a question that my good friend Chairman Barton had talked about with regards to the transport of waste and he talked a little bit about the safety factors, but I want to jump ahead to post-NRC licensing. I know that you continue to work on the transport issue, but what's the Department doing to fashion a plan for determining who will be afforded the

first opportunities to actually move their waste to the repository? I know you're well aware of some of the capacity constraints faced by many operators such that the storage issue can fundamentally alter daily operations. What kind of procedures do you envision to ensure that the transport of waste occurs in a timely and responsible manner?

Mr. ABRAHAM. I think we have contractual issues that come into play here. After the Congress acts, the Department could then begin negotiating agreements with different companies. Those contracts are obviously a basis on which a timing of transportation decisions will be made. Obviously, we will take into account emergency constraint problems as that's appropriate, but I don't think we're at a point yet to give a blueprint for how we would factor those kinds of considerations. Obviously, we've had our focus primarily on the issues that relate to the science.

Mr. DOYLE. So those determinations haven't been made yet.

Mr. ABRAHAM. Not final.

Mr. DOYLE. But obviously will.

Mr. ABRAHAM. We are governed by agreements that have been reached. But now we can move ahead, Congress and the Department can move ahead. Then the target was 1998 and so agreements were entered into consistent with that.

Mr. DOYLE. Thank you. Mr. Chairman, many of my other questions have already been answered so in the interest of time, I'll yield back.

Mr. BARTON. We thank the gentleman from Pennsylvania. I would recognize the gentleman from Kentucky, Mr. Whitfield for 5 minutes.

Mr. WHITFIELD. Thank you very much. Mr. Secretary, we're delighted that you're here today and appreciate your taking time to visit with us on this important issue. I think it's been made quite clear that most of us believe that this override will pass the House relatively easy and the real difficulty will probably be in the Senate. Senator Ensign testified this morning on the first panel and he raised some issues in my mind that I would like to just discuss with you briefly.

One, how many other countries are there around the world that have a repository for the long-term storage of high level nuclear waste?

Mr. ABRAHAM. This would be the first of this type.

Mr. WHITFIELD. This would be the first?

Mr. ABRAHAM. Yes. Although it's in discussion, obviously, and frankly, much of the world, I think is actually looking at whether we decide to go down this route. I think it could have implications for other decisions.

Mr. WHITFIELD. And it's my understanding that in Europe they do reprocessing of high level waste. Is that correct?

Mr. ABRAHAM. Right.

Mr. WHITFIELD. Although I don't know the details of it, it's also my understanding that the U.S. sort of moved away from reprocessing during President Carter's Administration. Is that correct?

Mr. ABRAHAM. During that timeframe, the focus on reprocessing as an option has been reduced.

Mr. WHITFIELD. And could you provide a synopsis of why the decision was made to move away from reprocessing?

Mr. ABRAHAM. I think that at that time and it's my impression that in the debates since that have focused on reprocessing, concern about issues that relate to proliferation were a principal reason for the policy. I think the decision was made by Congress, obviously, in 1982 that a preferable alternative is the deep underground storage approach which we've taken. I would note that reprocessing does not end the storage issue. There still is a byproduct that has to be stored permanently somewhere. While it could substantially reduced amounts, it does not eliminate the question of permanent long-term storage. It also raises the question of where, how much, how expensive, who pays and so on. Reprocessing is not, in my judgment, an option that would dispense with all that we have done. Given the challenges of siting and permitting and going forward, leaving aside other issues, I don't see it as a viable alternative, nor is it one that can permanently address the issue of waste.

Mr. Secretary, thank you very much.

Mr. BARTON. I thank the gentleman from Kentucky. The gentleman from Texas, Mr. Hall is recognized for 5 minutes.

Mr. HALL. Mr. Chairman, thank you, and Mr. Secretary, and your backup group. I thank you for what you're doing. I want to be practical. I remember back when we passed the Nuclear Waste Policy Act in 1987 that it was a painful one to pass because it was clear from the beginning some State needed to be the host of the repository. It was clear from the testimony we had then and it's been borne out that that State would be Nevada. All of us have high regard for those that represent that State and they've done a good job. They've done a bruising job of it. And we're friends. And it's not easy to cast a vote we're about to cast now. But we just have to pull our hat down over our ears and call them like we see them and I think that's what we're going to do.

Let's get some things out of the way though that have been bothering me and maybe you've answered them and I've not been here, but I want to accentuate them one more time. The people of my State have paid more than $334 million into the Nuclear Waste Fund with the understanding that the Federal Government would meet its obligation to dispose of the spent nuclear fuel. Now I think you've probably answered that for Dr. Norwood and I think Mr. Dingell alluded to it too as to what your intentions are and I'm satisfied with that. When we get down to the shipping of the radioactive waste, that's going to be the next battlefield and if they can't defeat where the waste is going to be stored. It's got to get there somehow. I've heard a lot of scare tactics about how you're going to be shipping radioactive waste around the clock every day of the week through the main streets of every town in America and I think someone said there would be 100,000 shipments. I live in Rockwell, a small town outside of Dallas and a Dallas guy used to come out there all the time looking for frog legs. He liked to gig frogs and this old farmer said, "come out to my tank, I got hundreds of frogs out there." The guy came out there and killed every frog there, gigged them all, but there weren't but five, they just sounded like a hundred. Don't you think that's the story that kind

of illustrates all the complaints? I don't mean I want to gig anybody that doesn't agree with us on this, but it's a thought.

Can you tell me, as close as you can, how many shipments DOE is going to make each year, if the repository is licensed? Have the routes have already been determined?

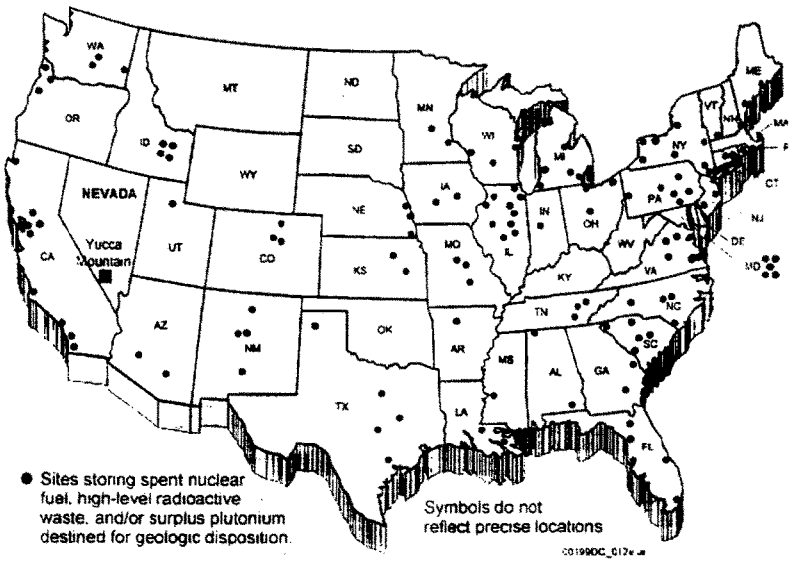
Mr. ABRAHAM. The projections are that the total number of shipments each year would be less than one per day, although the routes have not been finalized.

Mr. HALL. And I'd like to put this in the record, Mr. Chairman, if I might. These are the site storing nuclear spent fuel, high level radioactive waste and/or surplus plutonium destined for geologic——

Mr. BARTON. Without objection, so ordered.

Mr. HALL. I'd like to have that into the record to show that for all of those here that vote, they're voting to get rid of this stuff out of their own State and this shows how many sites are in each state. We have five in Texas. I think there are five in Massachusetts. There are twice that many, in Illinois, of any other State, so that's why we're here and that's why we need to listen to testimony like yours. I plan to vote aye and I hope everybody else uses the same common sense that I'm going to use.

Please click on one of the 39 current location states. The information page will open up in a new window, and can be resized.



Mr. BARTON. Will the gentleman yield back the balance of his time?

The Chair would recognize the gentleman from North Carolina for 5 minutes.

Mr. BURR. I'm a little intimidated to go after Ralph, but I'll try to.

Mr. Secretary, welcome and I'll try not to gig you. Since I've been here I have heard Yucca Mountain described as a repository, a depository and a suppository.

I think that explains it, it's a different meaning to everybody. But I just want to—I think I'm last, so I want to try to recap facts relative to this site and DOE's participation.

Is there any misunderstanding whether the Federal Government has made a commitment to the consolidated storage of nuclear waste?

Mr. ABRAHAM. The Federal Government has clearly made a commitment to accept responsibility for the waste. The Congress obviously has decided that the course of action to pursue is the one in which we would characterize and determine whether this specific site, which Congress chose among many that were initially examined, could be safely used for that purpose. So whether or not we go ahead here, Congress retains responsibilities for the waste that is generated around the country.

Mr. BURR. Is there any doubt in the minds of the Department of Energy whether there has been sufficient science to suggest that this is the right course of action?

Mr. ABRAHAM. I have concluded—and I've studied this at some length—that we have done more than sufficient research to move to the next step. We have, in fact, as I said earlier, tested not just whether or not this was something that could meet the very stringent standards that we've been asked to meet for the next foreseeable period during which we would build and monitor the site, but into the future; the 10,000-year period as well.

Mr. BURR. Is there any additional science that you think needs to be done or have we done it all?

Mr. ABRAHAM. I believe we have done sufficient science to be able to make the recommendation and to build the repository in a fashion that can safely meet the standards that have been set forth.

I believe it is also appropriate for us to seek to perfect, even further, how we would design the repository, how we would design the storage methods and so on because I think our goal should be to come as close as we can to perfection. Time will allow us, because of new advances, to improve on what we already think can be done to meet a very stringent standard.

Mr. BURR. Some suggest that we're not under a sense of urgency relative to moving nuclear waste from the interim sites that they're currently at spread across this country. Is there any nuclear plant that you can think of that built their interim storage pad with the intent of having it 100 years as Senator Ensign suggested it could withstand?

Mr. ABRAHAM. I am not aware that anybody anticipated that. The interesting thing about some of those contentions is that people are saying that without any significant research we can say just as a matter of course that a 100 years from now it will be safe

where it's at, but with $4 billion of research, we still need more study and more research to move to a licensing phase of this repository. To me that's not a very consistent approach. I think that it would be really off the track to just simply reach those kinds of conclusions about existing storage when we haven't come close to conducting the kind of scrutiny that the Yucca Mountain repository has been subjected to. It may or may not stand up. I don't know.

Mr. BURR. The likelihood is 10 years ago none of these sites would have thought they still would have had storage onsite, that we would have already been in a permanent facility.

Mr. ABRAHAM. That's why we already have evidence of people seeking alternative procedures to maintaining the storage on their existing facilities. I mentioned already the Goshute Indian Nation which is in the process of working with energy companies to build a storage facility on their reservation land in Utah. That, I think, is what we would quickly see develop if we don't move forward here.

Mr. BURR. Well, I think it's important that we understand, everybody understands, we have a commitment. You feel the science is sufficient to make the recommendation and there is a sense of urgency that we move forward and not rely on the current storage methods for the foreseeable future. I'm confident that this committee will do the right thing and I thank you for your testimony.

Mr. BARTON. The gentleman's time has expired. The Chair would recognize Mr. Markey for 5 minutes. We're going to continue the hearing to give every member present an opportunity to question the Secretary, but the Secretary has a 1 p.m. appointment that he cannot fail to appear at, so Mr. Shimkus is going to chair the rest of the hearing and then we'll—for this witness, and as soon as we finish with Mr. Markey, adjourn until approximately 1 to 1:15.

Mr. MARKEY. Mr. Secretary, you've got a tough job. I was on the committee in 1982 and 1987. I was here when this committee eliminated New Hampshire, Louisiana, Texas and Washington State because their politicians did not want it there. So that left us with one site, this committee picked Yucca Mountain, so if there are no other options, this committee decided there would be no other options. It picked Yucca Mountain in the Reagan Administration and insisted upon it.

So now we've reached this situation where there are many unresolved environmental questions in a site which Congress picks, a congressional expert is an expert only compared to other congressman, not compared to real experts, so as a result there are many unresolved scientific questions.

Now you said there are no harmful radiation releases in the last 50 years, 3,000 shipments, but there have been 72 accidents that have occurred. Now there's going to be 3,000 shipments in the first 2 years, once this Act goes into place. So my question is this, since the transportation security division of DOE which transports nuclear weapons fails about 85 percent of their security tests, if we can't ensure that nuclear weapons are safe from attack as they're being transported, how can we sure that nuclear waste is safe as it moves through hundreds and hundreds of communities with al Qaeda vowing to make "dirty bombs" from nuclear materials which

will harm American people, what gives you confidence that that 85 percent failure rate for nuclear weapons——

Mr. ABRAHAM. First of all, I'd be glad to, on another occasion, discuss the security of the nuclear weapons complex and transportation. I would not want to get into those discussions in an open forum because I think there's some information which would require clearance. But, let me just say this. The presumption in your question is that somehow or another if al Qaeda or any other terrorist organization were intent on doing something to nuclear waste, they would wait 10 years until it is moving secretly under very stringent security conditions and then try to figure out which box car out of hundreds of box cars or which truck out of hundreds of trucks it's in when they already know where it is today at 131 sites that are stationary. I think, very honestly, even at those 131 sites nuclear waste is secure. But, it is certainly a stretch to argue that somehow it is less secure when it's moving under the conditions I've mentioned.

Mr. MARKEY. If I may reclaim my time. I disagree with you. I think these materials are much more vulnerable in trucks, on trains than they are secure inside a nuclear power plant facility. So I totally disagree with you. I think these mobile Chernobyls out on the highways, byways and railways of our country are much more vulnerable and it's not a short distance from box cutters to box cars. It's a long distance getting inside a nuclear power plant facility. I disagree with you.

Next question. NRC has said there are 293 technical issues that must be resolved before DOE submits its license application. Do you intend to submit the license application to NRC in 90 days as is required by law?

Mr. ABRAHAM. As I answered earlier, first of all, the NRC has not only identified, working with us, those remaining issues, which by the way have been reduced since that number was publicly indicated, but they have provided a sufficiency letter which indicates that they believe we have established sufficient basis to move forward to the licensing process, notwithstanding the fact that those "closed pending" issues remain to be resolved. They are the normal sorts of things, we believe, that would be resolved in the licensing process.

Mr. MARKEY. Do you intend on submitting the application before resolving the hundreds of——

Mr. ABRAHAM. No, we will be resolving them in the period of time ahead. We would expect, as I testified before, to submit the application formally probably in the end of the year 2004.

Mr. MARKEY. Will it be before or after all environmental questions from the NRC are answered?

Mr. ABRAHAM. We will address those which are appropriate in a licensing application and then after that, of course——

Mr. MARKEY. No, will you answer all of the environmental questions the NRC raises before you submit the license?

Mr. ABRAHAM. We will answer all those that are appropriate to a licensing application.

Mr. MARKEY. So the answer is no, you are not going to answer all of the——

Mr. ABRAHAM. I don't know that there are any that won't be answered.

Mr. MARKEY. You're saying that you are going to decide which Nuclear Regulatory Commission safety questions you're going to answer and you're going to determine which ones you're going to answer. Is that correct?

Mr. ABRAHAM. The fact is that we will submit an appropriate license——

Mr. MARKEY. I understand that. Will you answer all of the safety and health and environmental issues which the Nuclear Regulatory Commission asks you to resolve before you submit an application?

Mr. ABRAHAM. We will answer all of those that are appropriate——

Mr. MARKEY. I appreciate that. That's what we're afraid of.

Mr. ABRAHAM. No, it's not. I think, Congressman, that you're standing the procedure on its head. I mean there is no requirement, nor would there be legitimately one in which we would address every issue that's part of the licensing, open licensing process unless we want to deny the public an opportunity to participate in the licensing process that we would answer every single contention before we engaged in that open process. Now if you want a closed process that doesn't include the public, we could go down that route. Our choice is to make it a more public approach. And that's what we intend to do.

Mr. MARKEY. Well, I don't think that's what I'm hearing from you.

Mr. ABRAHAM. All right, let me just calm your concerns. We will answer all questions.

Mr. MARKEY. Excellent answer. Now the next one I want to make is I think we should be abundantly clear to the American public that spent fuel needs 5 years to cool down as it sits next to nuclear power plants, so that every American who lives near a nuclear power plant who things that all of the nuclear waste is going to be removed from their nuclear power plants and they won't have it outside their plants any more should know that for 5 years after all spent fuel is created, it has to sit next to the plant. So as long as nuclear power plants are in operation, all of those plants are going to have, for at least 5 years, spent fuel sitting next to them, is that true?

Mr. ABRAHAM. Yes.

Mr. MARKEY. Yes. So this is not going to be any permanent solution. There is going to be an on-going risk in communities that the nuclear waste——

Mr. ABRAHAM. I would note, though, in just one final comment, that we already have a number of facilities that are no longer in operation where spent fuel is sitting now and could be moved as we close down those facilities. Failing to go ahead with this process——

Mr. MARKEY. Are you bumping them up in the priority list so they handled first?

Mr. ABRAHAM. We will make a decision later.

Mr. MARKEY. So you're creating a problem and you can't solve it, but you're not——

Mr. SHIMKUS [presiding]. The gentleman's time has more than expired. Thank you. Because of my great admiration for my friend of Massachusetts, I do not want you to miss your vote on the floor, so be expeditious and move rapidly and with that, Mr. Secretary, we want to thank you for coming.

Mr. ABRAHAM. Thank you.

Mr. SHIMKUS. We're going to recess the hearing until 1 o'clock p.m.

[Brief recess.]

Mr. BARTON. If the subcommittee will come to order. As soon as we get our third panel assembled, we'll reconvene the hearing. We have our Commissioner here and we have Ms. Jones here and Dr. Cohon here. Mr. Holmstead. And here he comes, looking very serious.

The subcommittee will come back to order. We're now going to hear from Panel III. We have the Commissioner of the Nuclear Regulatory Commission, the Honorable Greta Dicus. We have the Chairman of the Nuclear Waste Technical Review Board, Dr. Cohon. We have the Assistant Administrative for Air and Radiation for the United States Environmental Protection Agency, the Honorable Jeffrey Holmstead. And we have the Director of the Natural Resources Environment Team at the U.S. General Accounting Office, Ms. Gary Jones.

The Chair is going to recognize Congressman Doyle to make an introduction and then we'll hear from our panel.

Mr. DOYLE. Mr. Chairman, thank you very much for allowing me the opportunity to introduce Dr. Jared Cohon. Since becoming a member of this subcommittee, I've had the pleasure of introducing a number of distinguished individuals from Pennsylvania, specifically from the Pittsburgh to my colleagues and in that regard, I want to compliment the chairman for recognizing the region's highly skilled individuals from academia, the research community and industry who are concerned about energy issues and are actively involved in shaping solutions and developing new opportunities.

Dr. Cohon was appointed to the U.S. Nuclear Waste Technical Review Board in 1995 and was appointed chairman in 1997. Dr. Cohon is President of Carnegie Mellon University and I've had the pleasure of knowing Dr. Cohon in this capacity since 1997. Dr. Cohon, who is a registered professional engineer has more than 25 years of teaching experience, is widely published and has been recognized with numerous prestigious engineering awards and Mr. Chairman, I am proud to report that most recently he was named Pittsburgher of the year, a very prestigious award in our part of the country.

Mr. BARTON. Is that Pittsburgh, Texas?

Mr. DOYLE. That's Pittsburgh, Pennsylvania. That's with an H on the end.

Mr. BARTON. If it's Pittsburg, Texas, that would be something. I think that's in Congressman Hall's district.

Mr. DOYLE. His research interest focused on multi-objective programming, a technique for decisionmaking in situations with multiple conflicting objectives. He's also focused on water resource planning and management in the United States, South America and Asia and on energy facilities siting including nuclear waste

shipping and storage. He began his teaching career at Johns Hopkins and went on to become Dean of Yale University's School of Forestry and Environmental Studies. But I'm most pleased that he currently serves as President of Carnegie Mellon. He is a shining star in the Pittsburgh Region and I'm proud to call him my friend. Mr. Chairman, it's my pleasure to introduce Dr. Jared Cohon.

Mr. BARTON. It's an excellent introduction and Dr. Cohon, we're delighted to have you before the subcommittee.

Mr. COHON. Thank you, Mr. Chairman, and thank you, Congressman Doyle. Do I have any time left?

Mr. BARTON. Well, we won't take that time away from you. My guess is he's going to ask you to do something back in Pittsburgh.

Mr. COHON. That was a very generous introduction and much appreciated, thank you very much.

Mr. BARTON. We're going to start with the Chairman of the Nuclear Regulatory Commission. There is a small protocol. We're going to go with Commissioner Dicus and then the Assistant Secretary for Air and Radiation, I've probably got that wrong. Assistant Administration for Air and Radiation, Mr. Holmstead, and then you, Dr. Cohon, and then you, Ms. Jones. Commissioner Dicus, you're welcome, your statement is int he record. We recognize you to elaborate on it for 7 minutes.

STATEMENTS OF HON. GRETA JOY DICUS, COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION; HON. JEFFREY R. HOLMSTEAD, ASSISTANT ADMINISTRATOR FOR AIR AND RADIATION, U.S. ENVIRONMENTAL PROTECTION AGENCY; JARED L. COHON, CHAIRMAN, NUCLEAR WASTE TECHNICAL REVIEW BOARD; AND GARY JONES, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT TEAM, U.S. GENERAL ACCOUNTING OFFICE

Ms. DICUS. Thank you, Mr. Chairman, and certainly members of the subcommittee. Dr. Richard Meserve, the Chairman of the NRC is on travel on a previous commitment. He sends his regrets he is not here. In his absence he designated me as Acting Chairman, so I'm very pleased to join you to testify on behalf of the Nuclear Regulatory Commission 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. If the President's recommendation becomes a final decision, several important steps must be taken before the Commission can decide whether or not to authorize construction of a potential repository at Yucca Mountain.

First, DOE must submit a high quality application. Second, our staff at the NRC must conduct an independent safety review and issue a safety evaluation report. And third, we must conduct a full and fair public hearing on the DOE application. Only after these steps are complete will the NRC be in a position to determine based on all of the information before us, whether the DOE's license application complies with our regulations.

Last November, the NRC promulgated the Health and Safety Regulations that will guide any licensing decision on Yucca Mountain. As directed by Congress, our regulations are consistent with the dose-based environmental standards that have been established by the EPA. In forwarding his recommendation to the President,

Secretary Abraham included the Commission's preliminary comments on DOE's examination of Yucca Mountain. In offering these comments, the NRC drew no conclusions about the suitability of Yucca Mountain site. Rather, we commented on whether sufficient information will exist to begin a potential licensing review if DOE submits an application.

The DOE and the NRC have reached and documented numerous agreements regarding additional information and have discussed the quality of information that will be needed for a licensing review should that happen. In addition, NRC provided comments to DOE on the final environmental impact statement that was forwarded to the President.

The NRC staff recently published a draft of the review plan for public comment. 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 the NRC's Advisory Committee on Nuclear Waste.

Federal regulation of spent fuel transportation safety is shared by the U.S. Department of Transportation, the 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, the NRC establishes design standards for the cask used to transport license spent fuel and we review and certify 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 conduct an inspection and enforcement program and reviews and approves physical security plans for spent fuel shipments.

The Nuclear Waste Policy Act requires DOE to utilize NRC certified casks for spent fuel shipments to a repository; follow NRC's advanced notification requirements; and to provide emergency response training along shipments routes. The NRC believes the safety protection provided by the current transportation regulatory system is well established. Nonetheless, we continually examine the transportation safety program. For example, over two years ago, the 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. The NRC is also supporting several other studies that I did discuss in my full statement.

The NRC plans to utilize the results of these studies as input into its rather comprehensive review of security in light of the events of September 11 and Mr. Chairman, that completes my statement. At the appropriate time, I'd be pleased to, of course, answer questions.

[The prepared statement of Greta Joy Dicus follows:]

PREPARED STATEMENT OF HON. GRETA J. DICUS, COMMISSIONER, UNITED STATES NUCLEAR REGULATORY COMMISSION

Mr. Chairman, members of the Subcommittee, 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 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. 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.

As you know, 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, just weeks ago, 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. Also, on April 8th, Governor Kenny Guinn of Nevada provided the Congress with the State's "Notice of Disapproval of the Proposed Yucca Mountain Project." The President's recommendation will become a final decision if, within 90 calendar days of continuous session, Congress approves a resolution of siting approval. If the President's recommendation becomes a final decision, it represents a determination that DOE may apply to the NRC for a construction authorization. If that is the case, 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, our 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 given the responsibility for establishing dose-based environmental standards for Yucca Mountain. Congress directed 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 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 for public comment. 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.

SAFETY AND SECURITY OF SPENT FUEL TRANSPORTATION

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, 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 reevaluated 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. 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. 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.

Mr. BARTON. Thank you, Commissioner.

We'd now like to hear from Assistant Secretary Holmstead for 7 minutes.

STATEMENT OF HON. JEFFREY R. HOLMSTEAD

Mr. HOLMSTEAD. Thank you, Mr. Chairman. I don't think I'll need my full 7 minutes. As you indicated, I'm Jeffrey Holmstead and I currently serve as the Assistant Administrator for Air and Radiation at the U.S. Environmental Protection Agency and I am very pleased to be here today to discuss EPA's role in setting radiation protection standards for the proposed repository at Yucca Mountain. I appreciate this opportunity to discuss EPA's responsibilities related to this important national project.

EPA's role 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. As you've already heard earlier today, the same statutes assign other roles and responsibilities to other government agencies and departments.

EPA issued its final standards for the Yucca Mountain repository on June 13 of last year. These standards, I should point out, were developed through extensive consultation with DOE, NRC, the Office of Science and Technology Policy and were the subject of significant public comment.

As you've heard, DOE must address these standards in its license application and NRC may issue a license for the proposed repository only if it determines that DOE has shown that the repository will comply with all the provisions of the EPA standards. EPA believes that disposal in compliance with EPA's stringent standards will be protective of public health and the environment.

Under EPA standards, DOE must demonstrate compliance with three separate provisions. First, an individual protection standard; second, a human intrusion standard; and third, standards that are specifically intended to protect groundwater 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 that the reasonably maximally exposed individual or the RMEI, as we call it, will not receive an annual dose of radiation about 15 millirem from all exposure pathways combined. The RMEI is a typical individual whose location and lifestyle would place him or her among the most highly exposed members of the population. Although NAS recommended using something called a critical group approach, it has also agreed that EPA's approach was "broadly consistent with its recommendation."

We strongly believe that this approach is preferable to hypothesizing unrealistic scenarios to protect those whose lifestyles may lead to unusually high exposures and that this approach is consistent with 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 according to the NAS.

In accordance with this recommendation, EPA's human intrusion standards require DOE to meet the same RMEI standard as in the individual protection analysis.

Finally, EPA adopted a separate groundwater protection standard because it is long standing agency policy to protect groundwater as a natural resource, particularly where that resource is either a significant current resource or likely future source of drinking water. This is particularly important in arid regions such as southern Nevada where groundwater is scarce and precious and cleaning up the aquifer would be challenging and costly. Therefore, EPA's standards for Yucca Mountain require DOE to meet very stringent groundwater limits that are consistent with EPA's radiation standards for drinking water.

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. First of course, 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 we also plan to comment throughout the licensing process as appropriate.

EPA also expects to review DOE's plant for transportation, even 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 about EPA standards, but on the other repository-related activities that I've mentioned before.

Thank you again for the opportunity to appear today before the subcommittee to present EPA's views. This concludes my statement and I would also be happy to address any questions you may have at the appropriate time.

[The prepared statement of Hon. Jeffrey R. Holmstead follows:]

PREPARED STATEMENT OF JEFFREY HOLMSTEAD, ASSISTANT ADMINISTRATOR FOR AIR AND RADIATION, U.S. ENVIRONMENTAL PROTECTION AGENCY

Mr. Chairman and Members of the Subcommittee: 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 Moun-

tain 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.

Mr. BARTON. Thank you, sir.

Now we're going to hear from Dr. Cohon and we'll give you 2 minutes since the introduction took about 5.

You're recognized for 7 minutes.

STATEMENT OF JARED L. COHON

Mr. COHON. Thank you, Mr. Chairman, and I apologize for being over eager before and my thanks again to Congressman Doyle for that wonderful introduction.

Mr. Chairman, with your permission I would like my full statement to be included in the record and I will summarize.

Mr. BARTON. Without—I should have said that. All the written statements are in the record in their entirety without objection.

Mr. COHON. Thank you very much. Congress created the Nuclear Waste Technical Review Board in the 1987 Act which amended the Nuclear Waste Policy Act. In that Act, in creating the Board, the law provides that our members will be appointed by the President based on a list provided by the National Academy of Sciences. As you heard from Congressman Doyle, I also serve as President of a major university in Pittsburgh. All of our members, similarly, are engaged in other professions and serve on this Board in a part-time capacity.

Mr. Chairman, with your indulgence because some of my colleagues from the Board are with us today, I'd like to tell you their names and ask them just to rise and we'll be very brief.

Mr. BARTON. We'd be honored to recognize them.

Mr. COHON. Thank you. Daniel Bullen. Dan, would you stand?

Mr. BARTON. He's standing. Let the record show, he's standing.

Mr. COHON. Dr. Bullen is a professor at Iowa State University.

Paul Craig, Dr. Craig is Professor Emeritus at University of California-Davis.

Debra Knopman is a Senior Scientist at the RAND Corporation, a former scientist at U.S. Geological Survey.

We're also assisted by a wonderful staff and I'd like to introduce Bill Barnard, the Executive Director. Bill, if you'd stand.

Mr. BARTON. He's making a face behind your back.

Mr. COHON. Well, I'd like them all to stand so that we can at least acknowledge them.

Mr. BARTON. They all did stand and they're very welcome in the hearing.

Mr. COHON. Thank you very much, Mr. Chairman. Mr. Chairman, our Board was created specifically to provide on-going advice to Congress and the Secretary, especially with regard to the scientific and technical aspects of the Yucca Mountain project. Indeed, this is just what the Board has done since its creation in 1987.

As part of that on-going advice and on-going study of the Yucca Mountain project, we submitted a letter to the Secretary and to Congress on January 24 providing our comments on the Secretary's recommendation for Yucca Mountain.

We reviewed in great detail the various aspects of that project. Overall, taken as a whole, we found that the technical basis for the DOE's repository performance estimates is weak to moderate at this time. We pointed out in that letter and I will point out now the Board has made and makes no judgment on whether the site should be recommended or approved. We recognize that that is a judgment for policymakers who quite appropriately have to factor into their decision policy considerations that are beyond the technical and scientific issues that the Board deals with.

A key aspect of that decisionmaking is the degree of uncertainty, technical uncertainty Congress and other policymakers are prepared to accept.

DOE's estimates of the performance of the Yucca Mountain repository are based primarily on a complicated model called the Total System Performance Assessment or TSPA for short. This is a method the Board endorses. It's a very good method. It's especially useful because it takes a systems view of the problem, that is, it looks at the entire repository system, not just one part of it and we think that is appropriate.

While at this point no individual technical or scientific factor has been identified that would automatically eliminate Yucca Mountain from consideration, uncertainties due to gaps in data and basic understanding result in the Board having limited confidence in current performance estimates that are the products of the DOE TSPA model.

We believe, as a Board, that confidence in performance estimates can be increased and we lay out in our letter report several specific things that we recommend DOE continue to pursue specifically to increase confidence. We recommend continued scientific study, specifically to create a better basic understanding of Yucca Mountain

as a system, not just as a modeling exercise, not just to show compliance, but basic understanding of the system. We point out that high temperatures in the base case repository design increase uncertainties in estimates of the performance of the repository and therefore decrease confidence in the performance of the waste package materials, in particular.

Considering a low temperature design is something we recommend that DOE do. And it may, they might find that it reduces uncertainties and it would be worth pursuing.

We've also recommended several other things that we think DOE can and should pursue to reduce uncertainties and increase confidence. We've indicated before that it's very important that uncertainties be identified, appropriately quantified and appropriately communicated to all of those who need that information; that DOE seek other supporting material other than TSPA as a way to make their case at Yucca Mountain is likely to work as predicted; and that defense-in-depth, the idea that if one part fails, one part of the system fails, another part won't, these arguments need to be further developed.

These and other activities, we believe, would increase confidence in DOE's estimates of the performance of a Yucca Mountain repository.

As we pointed out in the past and I want to emphasize now, it is not possible, ever, to reduce all of the technical uncertainty at Yucca Mountain or at any other proposed repository site. It is the policymaker's role, your role, to decide how much uncertainty is acceptable at the time that you make your decision.

Thank you, Mr. Chairman. I'd be happy to respond to questions at the appropriate time.

[The prepared statement of Jared L. Cohon follows:]

PREPARED STATEMENT OF JARED L. COHON, CHAIRMAN, U.S. NUCLEAR WASTE TECHNICAL REVIEW BOARD

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. 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 con-

text 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.

Mr. BARTON. Thank you, Dr. Cohon.

We'd now like to hear from Ms. Gary Jones with the Natural Resources Environment Team at the GAO. Your statement is in the

record in its entirety and we recognize you for 7 minutes to elaborate on it.

STATEMENT OF GARY JONES

Ms. JONES. Thank you, Mr. Chairman. We're pleased to be here today to discuss DOE's project to develop a nuclear waste repository at Yucca Mountain, Nevada. This afternoon, I would like to focus on three points. First, 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. Second, DOE is unlikely to achieve its goal of opening a repository by 2010; and third, DOE needs to reestablish a cost and schedule baseline for the project and use the baseline as one of the major tools to manage the project.

The President's recommendation of Yucca Mountain site to the Congress on February 15 triggered specific statutory timeframes for the next step in the repository project. On April 8, Nevada disapproved the site, so the Congress has 90 days in continuous session to enact legislation overriding the state's disapproval. If the Congress enacts such legislation, the Nuclear Waste Policy Act requires DOE to then submit a license application to NRC within 90 days. Thus, the process gives DOE about 5 to 8 months from the date of the President's recommendation to submit the license application. However, in a September 2001 detailed reassessment of the work required to submit a license application that would be acceptable to NRC, DOE's managing contractor concluded that DOE would not be in a position to submit the application to NRC until January 2006 or about 4 years from now. This is because DOE has entered into 293 agreements with NRC for DOE to collect more scientific data and/or improve it's technical assessment of the data in preparation for a license application that NRC would accept. These agreements generally relate to uncertainties about three aspects of long-term performance of the proposed repository. One, the expected lifetime of engineered barriers, particularly the waste containers; two, the physical properties of the Yucca Mountain site; and three, the supporting information for the mathematical models used to evaluate the performance of the plan repository at the site.

Minimizing uncertainties about the waste containers is especially critical because DOE's estimates that the repository system's performance depends heavily on the waste containers in addition to the natural features of the site.

According to NRC, as of March 4, 2002, DOE had satisfactorily completed work on 38 of these agreements and could resolve another 22 by September 30 of this year. DOE is also continuing to address technical issues raised by the Board. As Dr. Cohon noted, the Board has 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. For example, its most recent report on January 24, concluded that when DOE's technical and scientific work is taken as a whole, the technical basis for DOE's repository performance esti-

mates 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's performance assessment model.

The September 2001 contractor reassessment of the technical work agreed to with NRC also impacts the goal of opening repository by 2010. Based on that reassessment, a license application would not be ready until 2006. According to program estimates, 7 years would then be needed until the facility was operational, 3 years to obtain a license and four to construct a facility. This would extend the operating date until about 2013. However, even 2013 may be questionable. A repository at Yucca Mountain would be a first of a kind facility, meaning that any schedule projections may be optimistic. The contractor's reassessment said that the proposed schedule to reach license application did not include any cost or schedule contingencies. Further, 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.

Finally, 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 waste in 2010.

Because of the uncertainty of opening the Yucca Mountain repository in 2010, DOE is examining alternative approaches that would permit it to meet that date, such as storing waste on the surface until the capacity to move waste into the repository has been increased. This would be a modular approach where relatively modest size initial surface facilities to handle waste could be expanded later to handle larger volumes of waste.

DOE currently does not have a reliable estimate of when and at what cost a license application can be submitted, including the late 2004 date in its fiscal year 2003 budget request that the Secretary mentioned this morning. It also does not have a date when a repository can be opened because DOE stopped using its cost and schedule baselines to manage the site investigation in 1997. 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, nor was the baseline updated to reflect these changes.

Further, DOE has accepted only the fiscal year 2002 portion of the baseline Bechtel proposed in its September 2001 reassessment and then directed them to prepare a plan for submitting a license application to NRC by December 2004. The contractor has submitted such a plan and it is under review within DOE.

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 on the Yucca Mountain project recommended that the Secretary of Energy reestablish the baseline to the submission of a license application and follow the Department's management requirements including a formal procedure for changing program milestones. DOE is in the process of establishing a new baseline which should be completed according to them by the end of September 2002.

Thank you, Mr. Chairman.

[The prepared statement of Gary Jones follows:]

PREPARED STATEMENT OF GARY JONES, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT, UNITED STATES GENERAL ACCOUNTING OFFICE

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,[1] 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. If the Congress enacts such legislation, 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, in a September 2001 detailed reassessment of the work required to submit a license application that would be acceptable to NRC, DOE's managing contractor concluded that DOE would not be in a position to submit the application to NRC until January 2006, or about 4 years from now. 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. Another key factor is whether DOE will be able to obtain the increases in annual funding that would be required

[1] U.S. General Accounting Office, *Nuclear Waste: Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project,* GAO02191 (Washington, D.C.: Dec. 21, 2001).

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.[2]
- 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.[3]
- 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

[2] The Energy Policy Act of 1992 required EPA to establish specific health and safety standards for a repository at Yucca Mountain.

[3] The acceptance of a license application is not the same as approving an application. A decision to approve or disapprove any application would be made by NRC following extensive review and testing.

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

1DOE is not prepared to submit an acceptable license application to NRC within the statutory limits that would take effect if the site is 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.[4] 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 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.

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[4] See *General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories; Yucca Mountain Site Suitability Guidelines* (preamble), 66 Fed. Reg. 57298, 57322 (Nov. 14, 2001).

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

> "[a]lthough 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.[5] 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.

ESSENTIALLY THE SAME INFORMATION IS NEEDED FOR A SITE RECOMMENDATION AND A LICENSE APPLICATION

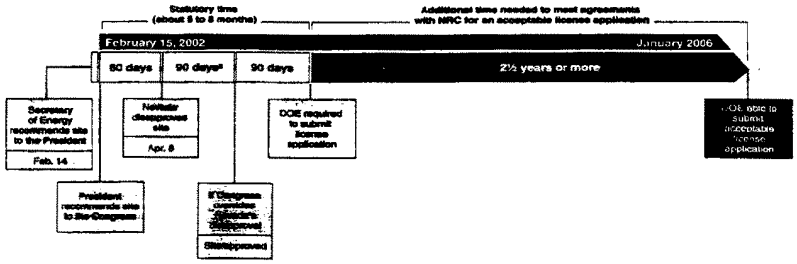
Under the Nuclear Waste Policy Act, DOE's site characterization activities are to provide information necessary to evaluate the Yucca Mountain site's suitability for submitting a license application to NRC for placing a repository at the site. In implementing the act, DOE's guidelines provide that the 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

[5] DOE's budget request for fiscal year 2003 is about $527 million, or $72 million more than assumed in Bechtel's reassessment. The preliminary amounts for fiscal years 2004 and 2005 are $538 million and $550 million, respectively.

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 program reassessment, however, DOE would not be ready to submit a license application to NRC until January 2006.

Figure 1: Comparison of Statutory Site Approval Process with DOE's Projected Schedule



*Ninety calendar days of continuous session of the Congress.

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 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 DWILL LIKELY POSTPONE 2010 REPOSITORY GOAL

An extension of the license application date to 2006 would almost certainly 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 January 2006 would extend the opening date for the repository until about 2013.

Furthermore, opening the repository in 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.[6] Bechtel anticipates a 5-year period of construction between the receipt of a construction authorization from NRC and the opening

[6] U.S. Department of Energy, *Independent Cost Estimate Review of the Civilian Radioactive Waste Management Program, 2001 Total System Life Cycle Cost* (Washington, D.C.: Jan. 2001).

of the repository. A 4-year licensing period followed by 5 years of initial construction could extend the repository opening until about 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.[7]

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 address 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.[8] 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

[7] U.S. Department of Energy, *Alternative Means of Financing and Managing the Civilian Radioactive Waste Management Program,* DOE/RW-0546 (Washington, D.C.: Aug. 2001).

[8] DOE's 2003 budget request states that DOE now expects to submit the license application between October and December 2004.

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.[9] 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.

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.

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[9] DOE estimated that the program cost $4.1 billion, on the basis of year-of-expenditure dollars from the program's inception in 1983 through March 2002. The $5.5 billion estimate for the license application is based on year-of-expenditure dollars from 1983 through January 2006.

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.

Mr. BARTON. Thank you, Ms. Jones.

The Chair would recognize himself for 5 minutes for questions.

There's another great Pennsylvanian who made the statement back in the late 1700's, I believe, that only one thing is certain in life and that's death and taxes. I think that was Benjamin Franklin. Now I may be wrong about that, but I'm going to attribute it to him and Poor Richard's Almanack.

Dr. Cohon, you're another great Pennsylvanian and you're here on behalf of the Nuclear Technical Review Board, your testimony is replete with illusions to uncertainty. In your mind, is the Yucca Mountain site so uncertain that we should stop consideration of it?

Mr. COHON. Well, Mr. Chairman, that's not a determination that Congress asked our Board to make. Rather, we see our role as making sure that the scientific and technical basis on which DOE has made its recommendation and on which you make your judgment is as strong as possible and to evaluate that technical basis for you.

As to whether or not the uncertainty is too great or not, that truly is a policy matter and we defer to you on that.

Mr. BARTON. Well, you're the president of a great engineering institution. I'm a registered professional engineer in the great State of Texas. I remember statistical analysis and what we call the normal bell curve and reasonable risk and acceptable risk and probability regression analysis.

Do you think that the risk in the Yucca Mountain site as currently configured is within the ranges of acceptable risk for policymakers to consider?

Mr. COHON. Well, clearly, the Chairman of the Nuclear Waste Technical Review Board is no match for the chairman of this subcommittee.

Mr. BARTON. Oh now.

Mr. COHON. In terms of trying to find the right spot. Having said what I did in response to your first question about the inherent policy nature of this issue, I will acknowledge that it certainly has a technical component as well. It is both a policy matter and a technical matter. The Board is on record as conveying its view that overall the scientific and technical basis is weak to moderate and that there is substantial uncertainty associated with the estimates of performance.

We've also indicated in our three page letter with long attachments several things that we believe are very important for DOE to continue to pursue in order to reduce that uncertainty. Our Board overall feels that its confidence in the technical basis would be moderate to high if all of those recommendations in that letter were completely followed and put into place.

Mr. BARTON. Well, I'll accept that. I mean there's an uncertainty when I hop on a plane to Texas, here hopefully in about an hour and a half that it may fall out of the sky or a terrorist may highjack or the pilot may decide he wants to go to Cuba, but the probability is that that plane is going to take off and 3 hours later land safely in Houston, Texas. I'll hop in a car and drive at a rea-

sonable rate of speed to College Station, Texas where I'll be given an award tonight by the Engineering Department at Texas A&M.

Mr. COHON. Congratulations.

Mr. BARTON. Thank you. I just wanted to put that in, you know.

Ms. Jones, you've talked quite a bit about time tables and license application periods and things of this sort. Would it not be common sense on behalf of the Congress if, in fact, we vote to override the Governor in Nevada's veto, we do have this 90-day statutory requirement to submit an application and I believe that Congressman Markey has some questions about that to the Secretary when I was not in attendance. But wouldn't it be common sense if we do decide that Yucca Mountain is suitable by overriding the Governor's veto that we give the Department sufficient time to submit a complete application to the Nuclear Regulatory Commission? If you were a Congressman, would you cut them off if they don't get the application in its totality in in the 90-day period?

Ms. JONES. I think that was the point of our comment in our report in December, Mr. Barton, that we did feel that the Department needed additional time to finish some of these technical issues before they submitted the license application.

Mr. BARTON. But we want them to right, rather than on time.

Ms. JONES. Absolutely, yes sir.

Mr. BARTON. It pains me to say that, but our good friends at the EPA are in noncompliance with several parts of the Clean Air Act 10 years later, but we want them to be right too, rather than to comply in a technical sense.

On our next panel we have a witness who has said either in the written testimony or in public comments that the Department of Energy's and I quote "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."

Now, Ms. Jones on behalf of the GAO, admittedly you're not the top dog at the GAO, but you're the best we have here today and you're doing a good job. Has the GAO said that the Yucca Mountain site is not suitable?

Ms. JONES. No sir. We have not.

Mr. BARTON. Okay, and Dr. Cohon, you are the top dog of the Nuclear Waste Technical Review Board, has your Board said on the record that the Yucca Mountain site is not suitable?

Mr. COHON. No sir.

Mr. BARTON. Okay. My time has expired. I recognize the gentleman from Pennsylvania.

Mr. DOYLE. Thank you, Mr. Chairman. Dr. Cohon, I'll not put you on the same spot that my Chairman did being from the District where the doctor resides, but I do want to ask some follow-up questions.

Dr. Cohon, we know that your Board has been charged with the technical and scientific review on DOE's efforts to characterize the site at Yucca Mountain and now that that site has been recommended, what do you see as the future role of the Board?

Mr. COHON. We believe and I believe and I speak for the whole Board here that the Board has a very important continuing role to play as this program proceeds if it does proceed, if Congress indeed overrides Nevada's veto. And we see three particular roles that we

have to play. One is continuing to provide the kind of scientific and technical review that we have of DOE's continuing scientific research which we strongly recommend should proceed. And all of that contributing to increased confidence in the estimates about the Yucca Mountain performance.

A second dimension of this is that again if the site proceeds, there will be by necessity be a performance confirmation plan worked out between DOE and NRC. This is another thing that requires, would benefit from the kind of technical and scientific review that our Board provides.

And finally, I'll point out that our Board was charged by Congress of looking at the nuclear waste management system overall, not just the repository at Yucca Mountain. As DOE turns to transportation and packaging and management and storage issues, our Board will surely increase its activities in that area as well.

Mr. DOYLE. Thanks, Dr. Cohon. Also, we know that your Board has been providing a great deal of information about the process that you've used to evaluate DOE's technical and scientific work, but I'm curious to hear more about the methodology. How did you determine the final list of 11 disruptive event scenarios and the 10 subsequent lines of questioning and as you reached your conclusions, were these areas of assessment prioritized or weighted in some way? Was the weak or moderate or strong rubric the only one used for your evaluation?

Mr. COHON. Thank you. It's a very good question and one that's rather involved, but I'll give you the short version. The eleven areas and ten questions were a product of—it's fair to say 15 years of study by our Board. It was sort of the natural conclusion of all that we've done over the years reacting and reviewing what DOE has done. So it was a product, really of the collective review by the Board Members and the staff to try and understand what the key issues were, and very much consistent with the way DOE had defined key issues in the past as well, but it came from the Board. It wasn't delivered to us or given to us.

In general, our conclusions, that is trying to evaluate how a particular factor stood against those 10 years, that was done by considering the entire written record that DOE has produced that's thousands of pages of reports, the public meetings we have at which DOE and others come to testify and where we can ask questions; and our own discussion and review using the technical backgrounds that we bring to the Board.

And it was that overall that led us to those conclusions.

To your question with regard to weighting, no, we did not attempt to weight. We took each of the critical factors and judged how they stood against the questions we posed and then overall came to this overall assessment of where we thought the technical basis was.

Mr. DOYLE. Thank you very much. Thank you for your testimony today.

Mr. Chairman, I yield back.

Mr. BARTON. Seeing no other members present, we'll give all members the requisite number of days to submit written questions to this Panel. We do thank you for your attendance. If we weren't in the process of finishing up today and heading out of town, I

would ask a second round, but especially to the Nuclear Technical Review Board, we appreciate your good work and to Commissioner Dicus, we wish you Godspeed in the work that's ahead of you in looking at the application process as is presented to you and your Commissioners.

This Panel is relieved and we will ask our fourth and last Panel to come forward.

If everyone could find their seat. We have the Honorable Laura Chappelle who is the Chairwoman of the Michigan Public Service Commission. She is testifying on behalf of the National Association of Regulatory Utility Commissioners or NARUC. We have Mr. Joe Colvin who is the President of the Nuclear Energy Institute. We have Mr. Jim Dushaw who is the Director of the Utility Department of the International Brotherhood of Electrical Workers. And we do not yet have Ms. Joan Claybrook who is the President of Public Citizen. Is there a representative of Ms. Claybrook's in the audience? Do you know where she might be? Is she on her way. Okay, we're going to go ahead and begin to let the other three testifiers testify and when she appears, we'll encourage her to come to the witness desk.

Welcome, lady and gentlemen. Your testimony is in the record in its entirety. We'll give each of you 7 minutes to elaborate on it and we'll start with Chairwoman Chappelle.

STATEMENTS OF HON. LAURA CHAPPELLE, CHAIRWOMAN, MICHIGAN PUBLIC SERVICE COMMISSION; JOE F. COLVIN, PRESIDENT AND CEO, NUCLEAR ENERGY INSTITUTE; AND JIM DUSHAW, DIRECTOR, UTILITY DEPARTMENT, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS

Ms. CHAPPELLE. Thank you, Mr. Chairman. It's an honor to be here today. I appreciate the committee letting me come forward on behalf of the National Association of Regulatory Utility Commissions, commonly known as NARUC, the State of Michigan and the Michigan Public Service Commission.

I have submitted a written statement this afternoon and I kindly request that that be included in today's record. I will attempt to keep my comments brief. We certainly have heard lots of testimony today regarding Yucca Mountain and I do just want to highlight NARUC and the State of Michigan's thoughts and position on this very important topic.

First, we want to reiterate that NARUC, the State of Michigan and the Public Service Commission strongly support the President's decision to approve the site at Yucca Mountain for this geologic repository. Over at the Michigan Public Service Commission we have been working on this issue in one form or another for about 19 years. Prior Chairman of the Michigan Public Service Commission have been before Congress to testify in support of finding a permanent repository and I am proud to continue in that position today.

We further encourage Congress to vote in support of Chairman Barton's resolution allowing DOE to submit its license application to NRC to begin the construction phase of Yucca Mountain.

Very quickly, first as Secretary Abraham has stated, the analysis clearly shows that the repository at Yucca Mountain can be de-

signed, built, operated, monitored and eventually sealed by meeting all statutory and regulatory requirements to protect the public health and the environment. While the scientific research about Yucca Mountain will certainly continue enough is known at this point to support the site designation today and to move the process forward.

We've heard a lot today about the transportation of the nuclear material. Certainly we've been hearing a lot about that through various forums. We're starting to hear that issue in Michigan. I was just out the other day when somebody found out I was coming before Congress and they started asking how are we going to ensure the safe transportation of this material when we are surrounded by Great Lakes? So certainly this is a very important issue.

We reiterate those comments that have been made that the Nation does have an excellent safety record of transportation of nuclear materials over the past 30 years and certainly the State of Michigan like very many other States, I agree, we do both license and make sure that we are diligent in various forms of transportation of other hazardous waste materials.

The State of Michigan and the other States involved through NARUC will certainly want and expect to work very closely with all various Federal agencies in determining the most appropriate and safe transportation routes.

Let me turn quickly to say obviously unless the Federal Government finds a way to dispose of spent nuclear fuel, some nuclear plants will need to shut down if they are unable to meet their license requirements to store used fool in pool or dry storage.

In Michigan, we do have one operating nuclear plant. We actually have three plants. One such plant, their pool storage has already been exceeded. They have extended their storage on a bluff overlooking Lake Michigan. I would submit that although that's a secure site, it's not the best site to store this nuclear material above a bluff over Lake Michigan.

Most importantly, NARUC represents 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 and have had to bear additional onsite waste storage expenses because the 1998 date to begin removing the fuel was missed. In my State of Michigan alone, ratepayers have paid over $430 million into the Fund and it's very difficult to explain to ratepayers that we have at least another 8 years before they begin to see a return on their investment.

Finally, I just want to note that there has been some discussion about a possible settlement to use money to store waste material again in temporary above-ground locations. I would submit this is not an appropriate settlement. It is not an appropriate answer to this very important issue.

I'd just close with recognizing Ranking Member Dingell's comment that what you have before you today is a necessary part of a fair progress and I echo Congressman Norwood's call to get this job done.

Thank you very much.

[The prepared statement of Hon. Laura Chappelle follows:]

PREPARED STATEMENT OF HON. LAURA CHAPPELLE, NATIONAL ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS

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. Simi-

larly, 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.

Mr. SHIMKUS [presiding]. Thank you very much also.

And now we'll recognize Mr. Joe Colvin from the Nuclear Energy Institute, President and CEO. Welcome. You have 5 minutes for your statement and your full statement is in the record.

STATEMENT OF JOE F. COLVIN

Mr. COLVIN. Thank you, Mr. Chairman. And good afternoon. I had to change my good morning to good afternoon, but we're glad——

Mr. SHIMKUS. It's pretty normal around here.

Mr. COLVIN. Pretty normal and we appreciate the opportunity to testify. As you may well recognize I represent the over 275 companies that are involved in the nuclear energy industry both in the

United States and internationally, including all the companies that operate our Nation's 103 nuclear power plants.

With the Secretary's recommendation and the President's decision, we have really moved to an important milestone in our Nation that will now take after two decades or over two decades of scientific study, move this process from the decision of suitability into the licensing phase and toward ultimately solving our Nation's, one of our Nation's most oppressing environmental and energy security issues.

I think the important point too that we have discussed today overall is that the science necessary to make the decision on suitability is complete. There's been some discussion about that. I think it's been interesting that the discussion from the Nuclear Waste Technical Review Board and Chairman Barton in that context and I don't intend to get into that per se, but the issue here is not, in my view, whether Congress has the role to determine whether the uncertainties, the technical uncertainties are sufficient for suitability or not, that is the decision that was made by the Department of Energy and in fact, by virtue of the Nuclear Waste Technical Review Board, they made in their statement, in fact, that at no point there is no individual technical or scientific factor that has been identified that would, in fact, prevent the site from moving forward from the standpoint of suitability.

I think that's an important distinction we need to recognize and now it's up to Congress to take this, the next step and move us into the licensing phase where we will, in fact, finalize the design of the repository and try to eliminate the uncertainties that exist and move forward to these processes.

I think as has been indicated, these are important issues from the standpoint of our energy security, national security and environment, but I need to recognize, Mr. Chairman, that electricity consumers in the United States in 1 out of 5 homes and businesses have paid for the government to, in fact, deal with this issue and to manage this. We have committed over $18 billion with interest to the Federal Government to deal with this issue. They expect a solution and deserve a solution to this issue.

Mr. Chairman, we fully support the efforts of the DOE and of the President to move forward on this issue. Thank you very much for the opportunity to testify today.

[The prepared statement of Joe F. Colvin follows:]

PREPARED STATEMENT OF JOE F. COLVIN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, NUCLEAR ENERGY INSTITUTE

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 sites(including Department of Energy facilities, university reactors, defense sites and commercial nuclear plants(to 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 2010(and 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; and 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; and 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

Mr. SHIMKUS. Thank you and thank you for being clear and concise.

We'd now like to recognize Mr. Dushaw of the Utility Department of the International Brotherhood of Electrical Workers. We appreciate your attendance and your full statement is in the record and you can begin.

STATEMENT OF JIM DUSHAW

Mr. DUSHAW. Well, thank you, Mr. Chairman. On behalf of our International President, Ed Hill and IBEW members, especially those who are working in the commercial nuclear power industry, thanks for the opportunity to present our views here on the Yucca Mountain repository. We've heard a lot about that today so I won't repeat, hopefully, some of the information you've already had.

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 and thousands more IBEW members rotate through the nuclear plants with refueling outages and maintenance. The IBEW's history with the nuclear industry goes back to the test reactor at Shippingport, Pennsylvania, around the corner from Carnegie Mellon University, I might say.

So we say without reservation that this is an industry with a proven record of exceptional safety and it's 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 as a set up that our union is biased in favor of sustaining nuclear power? Absolutely. But that's not the exclusive reason for our support for moving forward with the development of Yucca Mountain.

IBEW members want common sense to be heard on this issue. We applaud President Bush's decision to move forward with the 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 1970's had consecutive resolutions at our international conventions that went to expediting the establishment of a Federal repository for nuclear waste and accountability of the Federal Government for it's responsibilities.

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 in the future is of great concern to the IBEW. Our Union's view is that there's a compelling need for the Nation to develop in a thoughtful, 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 and ensure energy and security.

For all these reasons the Nation can now ill afford indecisive outcomes on vital energy issues in such threatening times that have come upon us. We are satisfied, of course, to leave the technical discussion of Yucca Mountain of which it's overflowing to the experts as we heard in the earlier panel.

The IBEW has confidence that the President of the United States has made a fully informed decision on the scientific merits of approving the Energy Secretary's recommendation of Yucca Mountain. We believe that in the range of alternative solutions, none compare well with the Yucca Mountain plan which intends to place fuel and nuclear waste with the potential for any harm and any access to it is tightly controlled.

Well, if plants start closing down due to a lack of spent fuel storage place, jobs will disappear, consumers for no compelling reason will lose the real contender for low cost electricity in this newly competitive electric supply industry. 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.

Of course, we know how much money has been spent and how long this has been studied. We need not repeat that. It clearly makes sense that used nuclear fuel should be stored at one centralized storage facility. Fuel is currently stored at more than 130, remember that, 130 long-term storage facilities in 39 States. As we heard earlier, there is no show stopper with respect to the DOE recommendation.

Mr. Chairman, I'd like to skip on and say yesterday I received a letter or became aware of a letter from our local union, IBEW Local Union 357 in Las Vegas, Nevada. I would like to read the punch line on that letter, skipping through the testimony. It's new, but we presented a copy of this to committee staff this morning and it will be sent to all Representatives and Senators.

From Local 357 in Las Vegas this is "no one wants a waste site, but everyone expects electricity. No one wants a chlorine plant next door, but everyone wants safe drinking water. No one wants a tank farm nearby, but we all drive cars. Today, we will light our homes, sip water and drive the kids to soccer games in well placed confidence. However, none of this would be possible without the basic infrastructure that supports our society. Nuclear power at Yucca Mountain are important parts of this continuum which we simply must depend on. Speaking as electricians, Nevadans and Americans, we believe that an aggressively managed repository at Yucca Mountain can make a meaningful and safe contribution to our country."

Many of our members just aren't saying this, they're living it because they work there.

Mr. Chairman, 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.

[The prepared statement of James L. Dushaw follows:]

PREPARED STATEMENT OF JAMES L. DUSHAW, DIRECTOR, UTILITY DEPARTMENT, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS®

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 deci-

sion 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.

is a challenge to the nation's will and determination to preserve and further develop all safe energy options.

Thank you.

INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS

LOCAL 357

4321 E. Bonanza Road
Las Vegas, NV 89110
(702) 452-9357

The Honorable John M. Shimkus
U.S. House of Representatives
Cannon House Office Building, Rm. 513
Washington, D. C. 20515-1320

Dear Congressman Shimkus:

The International Brotherhood of Electrical Workers Local Union 357 has followed the Yucca Mountain debate with exceptional interest. We are, after all, both Nevadans and electricians. We have long recognized that federal lands within Nevada have been used as a nuclear test facility, and more recently, that Yucca Mountain is a serious – some would even say singular – candidate site to host our nation's nuclear waste repository.

Some of our brothers and sisters work closely with nuclear materials, under the welcome scrutiny of the U.S. Nuclear Regulatory Commission, the Department of Energy and other appropriate authorities. We take these responsibilities seriously – our lives depend on safe, reliable, state-of-the-art engineering, substantial worker protections and continuously aggressive oversight.

We also know that America needs nuclear power. Fully twenty percent of the electricity that propels America's economy originated in one of America's 103 nuclear generation stations. Nuclear power is generated in a completely closed loop cycle. It does not materially contribute to global warming. It ensures we have a diverse generation mix, and minimizes our overseas dependency. It also helps keep costs down.

We know, too, that Yucca Mountain has become a lightning rod for those with strong feelings on this issue. We do not take issue with Nevada's public servants, in particular, the Governor and our federal representatives. We recognize there are honest differences of opinion on Yucca Mountain. Our popularly-elected representatives have a particularly difficult time divining a viable course.

No one wants a waste site, but everyone expects electricity. No one wants a chlorine plant next door, but everyone expects safe drinking water. No one wants a tank farm near by, but we all drive cars. Today, we will light our homes, sip water and drive the kids to soccer games in well-placed confidence. However, none of this would be possible without the basic infrastructure that supports our society. Nuclear power and Yucca Mountain are important parts of this continuum – which we simply must depend on. Speaking as electricians, Nevadans and Americans, we believe an aggressively managed repository at Yucca Mountain can make a meaningful and safe contribution to our country. Many of our members aren't just saying this – they're living it – because they work there.

Sincerely,

David R. Jones
Business Manager/Financial Secretary

Mr. SHIMKUS. Thank you and I ask unanimous consent that that letter be included into the statement and I will turn to the chairman of the subcommittee.

I will state that Ms. Claybrook is not in attendance yet, but she's already submitted her full statement for the record and then I'll turn to the chairman of the full committee.

[The prepared statement of Joan Claybrook follows:]

PREPARED STATEMENT OF JOAN CLAYBROOK, PRESIDENT, PUBLIC CITIZEN

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 reposi-

tory 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.

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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).

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.

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[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).

- 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

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[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.

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 pol-

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

icy 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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SHOW: 60 Minutes (7:00 PM ET) - CBS

March 17, 2002 Sunday

TYPE: Profile

LENGTH: 2493 words

HEADLINE: Poisonous stew; Department of Energy's handling of millions of gallons of highly radioactive liquid waste

ANCHORS: LESLEY STAHL

BODY:

A POISONOUS STEW

LESLEY STAHL, co-host:

The US government is no longer churning out nuclear warheads, but we are awash in the poisonous stew that was churned out when we were making them: tens of millions of gallons of highly radioactive liquid waste. Eight years ago, when we reported on the Energy Department's effort to clean it up, we found a slew of projects years behind schedule and billions over budget. However, officials insisted that they had learned from their mistakes and were about to get things under control. Well, have they? We went back to find out.

How are we doing?

Mr. BOB ALVAREZ (Former Senior Adviser, Secretary of Energy): Basically, I would describe it as--as a--an abysmal failure.

(Footage of Bob Alvarez)

STAHL: (Voiceover) From 1993 to '99, Bob Alvarez was the secretary of Energy's senior adviser on cleaning up the nuclear waste.

Mr. ALVAREZ: If you were to take a cup of that waste and put it in a crowded restaurant, within a period of 15 or 20 minutes, half of the people would have received lethal doses. That's how dangerous this material is.

(Footage of sign: Caution, Contamination Area; people with protective gear and equipment: waste storage area)

STAHL: (Voiceover) The material, the radioactive waste, is stored in old and failing underground tanks. Some of it has already seeped into the ground. The largest and most contaminated site in the world outside of Russia is here at Hanford in Washington state, right on the Columbia River. It's the home of the Manhattan Project, where they made the plutonium for hundreds of nuclear bombs, including the one they dropped on Nagasaki. Today it has 53 million gallons--53 million gallons--of high-level radioactive waste, and many of the underground tanks here have sprung leaks.

Dr. HARRY BOSTON: Those tanks are about 50 years old and about 500,000 gallons in capacity.

(Footage of Harry Boston and Stahl)

STAHL: (Voiceover) Harry Boston is the Energy Department official in charge of maintaining Hanford's 177 underground tanks.

And all around here are tanks under...

Dr. BOSTON: All around here--all around in front of us are one million-gallon tanks below ground, containing waste.

STAHL: How many of the tanks have leaked?

Dr. BOSTON: Sixty-seven have--are known or suspected to have leaked in the past. None are leaking today.

STAHL: Sixty-seven, though.

Dr. BOSTON: Yes, that's our numbers.

STAHL: But, Dr. Boston, how--how qu--is it a crisis? Do you--what are you--what are the words you use to say 67 tanks with the worst kinds of chemicals have leaked?

Dr. BOSTON: Well, first, let me say it's absolutely not a crisis. It's not a crisis because we are safely maintaining the war--the waste. It's very urgent, however, that we get on with this cleanup.

(Footage of cleanup site near river)

STAHL: (Voiceover) That's because radioactive waste has already contaminated a large pool of groundwater migrating toward the Columbia River, a major source of irrigation and drinking water in the Pacific Northwest.

Dr. BOSTON: There is 100 square miles of contaminated groundwater, and a lot of work is under way right now to hold that groundwater in place, to treat it and to keep--and to ensure that people are protected and don't have access to it.

STAHL: But wait--that's--but you are saying there's 100 square miles of contaminated groundwater under here?

Dr. BOSTON: That's true.

STAHL: That's enormous. This is not groundwater anybody's ever going to drink, obviously.

Dr. BOSTON: That's--that's absolutely correct.

(Footage of storage site; radioactive waste; Boston and Stahl)

STAHL: (Voiceover) Another of his problems is the volatility of the waste in the old, rickety tanks. Until last year, the radioactive soup in this million-gallon tank, which the Energy Department videotaped, got so hot, it rose uncontrollably toward the top. Until engineers got the belching bomb waste under control, there was a real fear it would explode. Harry Boston says they're working hard to fix the tanks before there's a catastrophe.

STAHL: Now wouldn't--wouldn't someone have said that to us eight years ago?

Dr. BOSTON: I would think so.

STAHL: And it's been eight years--I mean...

Dr. BOSTON: Well, for the last eight years--for the last 10 years, there have been commitments to do this work, and we're coming through on those commitments now.

STAHL: Behind schedule.

Dr. BOSTON: Behind the initial schedules; on our current schedules.

(Footage of waste facility; containers; Boston and Stahl)

STAHL: (Voiceover) The plan was, and still is, to convert the most highly radioactive waste into leak-proof glass logs that will then be buried in stainless steel canisters like these. It was originally budgeted as a $4 billion project and was supposed to have started in 1999. Now it's a $50 billion project that won't produce any glass logs till 2007. Yet, Harry Boston remains unfazed.

Dr. BOSTON: Well, I've got a good team and a good plan and tremendous public support.

(Footage of opening ceremony; Stahl at Savannah River site)

STAHL: (Voiceover) That's just the kind of assurance and optimism we heard eight years ago when we visited another Energy Department nuclear facility, the Savannah River site in South Carolina. They were just beginning to construct a glass logs facility, which opened with considerable fanfare a few years later.

Unidentified Man: We know how to make this thing work.

(Footage of waste plant)

STAHL: (Voiceover) Well, not exactly. In addition to being years behind schedule and billions over budget, the facility has been plagued by engineering problems, among them, this white elephant. It was designed to be a pretreatment facility. Pretreat the waste before it goes into logs. It was supposed to take three years and $32 million to build. It wound up taking 13 years and $1/2 billion, and when it was finished, it created more problems than it solved.

Ms. GARY JONES (General Accounting Office): It produced a--large amounts of benzene, which is a flammable, toxic gas.

(Footage of Jones at GAO)

STAHL: (Voiceover) Gary Jones of the General Accounting Office, Congress' investigative arm, says her agency issued warnings years before the construction of the facility was finished.

Ms. JONES: Well, in 1992, GAO said, 'You've got a problem. You need to look at other technologies.' In 1993, a DOE technical review team said, 'There's problems with benzene. You need to better understand the chemistry.'

STAHL: So you're saying inside the Energy Department, this was laid out?

Ms. JONES: Inside the Energy Department, they knew that this was a problem.

STAHL: OK. And they still went forward, is what you're saying?

Ms. JONES: They still went forward.

STAHL: And at the end of the project, they say there's a problem with benzene?

Ms. JONES: They turned it on, they started operating and they had so much benzene, it was a safety concern and they basically had to shut it down.

Mr. GREG RUDY: This was a setback. This was a disappointment.

(Footage of Rudy and Stahl)

STAHL: (Voiceover) Greg Rudy is the Energy Department's top cleanup official at the Savannah River site.

STAHL: Thirteen years, $1/2 billion, doesn't work.

Mr. RUDY: Doesn't work.

STAHL: What happened?

Mr. RUDY: The chemistry didn't work and it couldn't be overcome by engineering, is the short answer.

STAHL: Wasn't Savannah River warned that benzene was going to be a byproduct if they went ahead with that facility? Why'd they go forward?

Mr. RUDY: Because there were differing professional opinions on how much benzene and whether or not the system was going to be able to handle the benzene.

(Footage of Savannah River site; incinerator)

STAHL: (Voiceover) Instead of heeding the warnings, not just from GAO, but from the Energy Department's own engineers, Savannah spent $93 million on this incinerator in an attempt to engineer around the benzene problem.

Mr. RUDY: As it got into the early '90s, then perhaps a--a closer look should have been taken.

(Footage of incinerator)

STAHL: (Voiceover) The failure to take a closer look will cost taxpayers $1 billion to remedy.

Then if there is a lesson to be learned here, what is the lesson?

Mr. RUDY: Do not fast track projects.

(Footage of construction site; Stahl and Jones)

STAHL: (Voiceover) In fast-track projects, they begin building the facility before they even know if the technology works. Sound like a bad idea? Gary Jones thinks so. She blames the whole benzene fiasco on fast track.

Ms. JONES: When you're talking about these very complex, one-of-a-kind nuclear facilities, it's very, very risky to design the facility, develop the technology and construct it all at the same time.

(Footage of the Department of Energy; Pit 9; photo of truck dumping out barrels; waste site; footage of Snake River; sign; concrete structure)

STAHL: (Voiceover) But fast track has been a fairly routine practice at the Energy Department. It was employed at this project in Idaho--called Pit 9, where tons of radioactive garbage were dumped over a 50-year period right into the ground near the Snake River. Lockheed Martin was hired to clean up the mess, but using the fast-track approach, they constructed this building before the design and testing of a critical piece of equipment was complete.

So in other words, they started to build the plant before they'd finished doing the tests.

Ms. JONES: Doing the tests and doing the design, that's correct. They made some changes along the way to the design. Once they completed the design, what they found was they had made so many changes, that that particular piece would not fit into the facility as it was built.

STAHL: Wait a minute. You're saying they went ahead and built the building, and then when they were finished making all the changes, the equipment wouldn't fit in the building?

Ms. JONES: The equipment for this particular process would not fit into the building, as designed.

STAHL: It can't be true. It can't be true. It's true.

Ms. JONES: It's true.

Mr. ALVAREZ: If this were to happen in the private sector, people would be fired.

(Footage of Stahl and Alvarez)

STAHL: (Voiceover) Bob Alvarez, the former Energy Department official, says fast track is an unacceptable risk.

Mr. ALVAREZ: A company that would take a risk like this would go bankrupt. But th--now we're looking at taxpayer dollars. We're looking at a system that's used to getting a blank check. We're looking at a system that has not been held accountable, that is dominated by contractors who police themselves.

STAHL: And nothing's changed. We knew every bit of what you just said eight years ago, every single part of that.

Mr. ALVAREZ: That's correct.

STAHL: And nothing's changed.

Mr. ALVAREZ: Not--well, actually, what has changed is it's--I think—in my--my opinion, the situation has gotten worse.

(Footage of Pit 9 building; Stahl and Boston)

STAHL: (Voiceover) The Pit 9 mistake could cost taxpayers as much as $1/4 billion. Lesson learned? Well, look at the glass logs project at Hanford.

Harry Boston says they're not doing fast track exactly.

Dr. BOSTON: What we are doing is what we call just-in-time engineering.

(Footage of Radiation Area sign; construction site; Stahl and Boston)

STAHL: (Voiceover) But the GAO, and even the contractor, Bechtel, tell us that 'just in time' is just another name for fast track. They're scheduled to begin construction later this year, even though only part of the design will be finished.

Dr. BOSTON: You can start building the external structure before you've completed the design of every internal component. And if you just think about the way you build a house, you start building the frame of the house before you've selected your bathroom fixtures. You know how many rooms you have. You know where the bathrooms are. And given that foundation, you can move forward successfully and that's what we're going to do.

(Footage of Pit 9 site)

STAHL: (Voiceover) But do you know what happened at Pit 9?

Dr. BOSTON: Not in detail.

STAHL: Well, what happened...

Dr. BOSTON: And I think...

STAHL: ...in Pit 9 is that they did what you just said: They started to build the building as they were finishing the testing on component parts.

Dr. BOSTON: Well, what I will assure you is the firms we have here are using proven commercial practices that they've used around the world over and over again, and we have every confidence this is going to work.

Ms. JONES: Fast track does happen out in the real world. It could happen for a gas station...

STAHL: Yeah.

Ms. JONES: ...or a bank building, something that's kind of a cookie-cutter approach. But when you're talking about, you know, one-of-a-kind nuclear facility, we've been told is 90 percent of--of detail design before you would start construction.

(Footage of Hanford site; Stahl and Boston)

STAHL: (Voiceover) But at Hanford, only about 30 percent of the detail design will be in hand when construction of the glass logs plant begins.

But, you know, the GAO, the investigative arm of Congress. has said for years that this fast track has failed time and again, and it's inappropriate for these kinds of systems. Why didn't you stop it?

Mr. ALVAREZ: I'm--I wish I could. I mean, I wish I was all-powerful. Once these big projects start to get a lot of money poured into them, it's very hard to stop or slow these projects down. And the Department of Energy, the federal managers, don't have the technical skills to really oversee these very complicated projects, and therefore, have to basically engage in blind trust of the contractors.

STAHL: And that's what's happened?

Mr. ALVAREZ: That's exactly what's happened.

(Footage of cleanup operations; Alvarez)

STAHL: (Voiceover) In all fairness, the Energy Department has made some progress, such as removing contaminated soil along the Columbia River, and successfully extracting radioactive waste from two underground tanks at the Savannah River site. But as Bob Alvarez points out, after they've spent billions and billions of dollars, they've cleaned up only 2 percent to 3 percent of the 90 million gallons.

Mr. ALVAREZ: This is an agency that really needs to have some sort of structural management overhaul. We cannot afford to continue to do business as usual with this agency. I think the Department of Energy has reached a state where it's totally im--impervious to embarrassment.

STAHL: President Bush just gave his Energy secretary a new assignment: transport by road and rail some 70,000 tons of military and commercial nuclear waste and store it under Yucca Mountain in Nevada, located a mere 90 miles outside of Las Vegas. The department assured the president the waste can be stored safely for 10,000 years.

(Announcements)

Appendix B - List of House Energy and Commerce Committee Members Through Whose Districts Nuclear Waste Will Be Transported En Route to Yucca Mountain

W. J. "Billy" Tauzin, Chairman
John D. Dingell, Michigan, Ranking Member
Richard Burr, North Carolina, Vice Chairman
Nathan Deal, Georgia
Charlie Norwood, Georgia
John B. Shadegg, Arizona
Heather Wilson, New Mexico
Lois Capps, California
Christopher Cox, California
Mary Bono, California
Lee Terry, Nebraska
Diana DeGette, Colorado
Robert Ehrlich, Maryland
Thomas Davis, Virginia
Albert R. Wynn, Maryland
Rick Boucher, Virginia
Peter Deutsch, Florida
Greg Ganske, Iowa
Greg Walden, Oregon
Steve Buyer, Indiana
Fred Upton, Michigan
Paul E. Gillmor, Ohio
Ted Strickland, Ohio
Tom Sawyer, Ohio
Sherrod Brown, Ohio
Bobby L. Rush, Illinois *
John Shimkus, Illinois
Ed Bryant, Tennessee
Ed Whitfield, Kentucky
Bart Gordon, Tennessee
Chris John, Louisiana
Bill Luther, Minnesota *
Roy Blunt, Missouri
Karen McCarthy, Missouri
Joseph Pitts, Pennsylvania
Mike Doyle, Pennsylvania *
Frank Pallone Jr., New Jersey
Joe Barton, Texas
Gene Green, Texas
Ralph M. Hall, Texas
Barbara Cubin, Wyoming

*Available maps indicate that waste will likely travel through these individuals districts

Yucca Mountain Bought and Sold

Science smothered under a mountain of nuclear lobbyists

April 2002

Public Citizen's
Critical Mass Energy and Environment Program

Public Citizen is a nonprofit consumer advocacy organization based in Washington D.C.
For more information, please visit www.citizen.org.

Yucca Mountain: Bought and Sold

Science smothered under a mountain of nuclear lobbyists

Introduction

When Energy Secretary Spencer Abraham recommended that President George W. Bush designate Yucca Mountain in Nevada as the place to dump high-level nuclear waste, Abraham attributed his decision to "compelling national interests."[1] That was almost true.

Had the secretary been more precise, however, he would have attributed his decision to compelling *special* interests.

Yucca Mountain has not proven to be a geologically suitable site to store radioactive waste, which remains deadly for thousands of years. The Yucca Mountain Project would entail tens of thousands of shipments over the nation's roads, rails and rivers, posing innumerable questions about transportation safety in towns and neighborhoods nationwide. Even if Yucca Mountain begins accepting shipments, nuclear waste will continue to be stored at reactor sites, because irradiated fuel rods are so thermally and radioactively hot, that they can't be transported for at least five years. Hauling waste around the countryside simply multiplies the number of potential radioactive targets. The nation's security from potential terrorist assaults would not be enhanced, as the Bush administration disingenuously contends, but compromised.

The nuclear power industry, however, has one overriding goal when it comes to nuclear waste: make more of it. But storing even more deadly radioactive waste at reactor sites carries an added financial burden the industry would rather not pay. Similarly, nuclear plant operators would like to avoid the additional public scrutiny that would assuredly accompany any new plans for on-site storage. The industry is desperate to ship its lethal by-product to Yucca Mountain and will do, as the industry itself puts it, "what it takes" to make sure that happens.

What it takes, apparently, is heaps of money to influence politicians and government officials. The nuclear power industry contributed $13.8 million to federal candidates and committees during the 2000 election cycle.[2] And that was just the cover charge. Once the cost of getting in the door is squared away, special-interest spending to influence policy begins in earnest, on lobbying.

Public Citizen analyzed lobbyist disclosure reports filed for 2000 with the Secretary of the Senate and the Clerk of the House by some of the nation's leading nuclear corporations and their main trade association. The result: the industry's biggest players spent a whopping $25 million in a single year to lobby Congress and federal agencies to win support for a host of nuclear-friendly policies, including specific legislative and

[1] Letter from Energy Secretary Spencer Abraham to President George W. Bush, Feb. 14, 2002.
[2] Center for Responsive Politics

regulatory provisions dealing with Yucca Mountain. That's nearly a half-million dollars every week laid out for favorable government treatment.

Although the nuclear power interests analyzed in this report would figure on any list of the largest, most powerful players in the nuclear energy industry, there was another reason, another "compelling interest," as Abraham might say, to examine the spending habits of these particular Yucca dumpsters. They were their industry's largest contributors to the unsuccessful re-election campaign of a former U.S. senator from Michigan, a senator who later was named secretary of energy, and who subsequently recommended that the White House designate Yucca Mountain a nuclear waste dump: Spencer Abraham.

Spencer for hire

As might be expected from a presidential run that shattered several fundraising records, Abraham's boss, George W. Bush, topped the list of federal candidates getting campaign money from the nuclear power industry in 2000, with $290,209.[3]

But Abraham was no slouch when it came to raising money from nuclear power interests in 2000, bagging a handsome $82,728 from the industry during his failed bid to convince Michigan voters to return him to the U.S. Senate.[4] Owners of nuclear facilities in Michigan were the biggest nuclear contributors to Abraham's campaign. They were followed by ten of the nation's leading nuclear power corporations along with the Nuclear Energy Institute, the industry's trade association, for a combined grouping that accounted for 82 percent of the then-senator's nuclear industry money.

Table 1: Leading nuclear industry contributors to Spencer Abraham's Senate campaign, 2000

Company	Contribution
Detroit Edison Company	$15,850
CMS Energy	$14,000
Florida Power & Light	$9,000
Exelon	$5,500
Southern Company	$5,000
Nuclear Energy Institute	$4,000
American Electric Power	$3,250
Carolina Power & Light	$3,000
FirstEnergy, Inc.	$2,500
Dominion Resources	$2,000
Entergy	$2,000
Duke Energy	$1,000
Xcel Energy, Inc.	$500
Total	**$67,600**

Source: Center for Responsive Politics data analyzed by Public Citizen.

[3] Center for Responsive Politics
[4] Public Citizen Congress Watch analysis.

A handful of the 53 independent lobbying firms hired by those nuclear companies in 2000 contributed another $12,500 in hard money to Abraham's campaign.[5] Among those lobbying firms, the largest single contribution—$5,000—was courtesy of employees of a law/lobby firm called Winston & Strawn.

It's a particularly notable contribution because Winston & Strawn had to withdraw as a consultant to the Department of Energy's Yucca Mountain Project last year when it was revealed that the firm was lobbying for the Nuclear Energy Institute, a blatant conflict of interest. Unfortunately, though Winston & Strawn's participation in the Project was withdrawn, the firm's tainted work in support of the dump was not.

Spencer's spenders

Nuclear industry campaign cash flowed freely to Spencer Abraham, the man who recommended Yucca Mountain as a nuclear waste dump. But those campaign contributions are Lilliputian numbers compared to the enormous amount of money Abraham's leading nuclear supporters spent lobbying Congress and key federal agencies in 2000.

Table 2: Lobbying expenditures in 2000 by nuclear industry's biggest contributors to Abraham 2000 Senate campaign

Nuclear power company	Amount
Exelon Corp.	$4,060,000
Detroit Edison Company	$3,720,000
Southern Company	$2,820,000
FirstEnergy	$2,737,478
Entergy	$2.406,696
CMS Energy	$2,000,000
Florida Power & Light	$1,860,000
Nuclear Energy Institute	$1,460,000
Duke Energy Corp.	$1,270,000
Carolina Power & Light	$1,248,860
American Electric Power Co.	$596,287
Xcel Energy Inc.	$490,000
Dominion Resources	$400,000
Total	**$25,069,321**

Source: Lobby disclosure reports filed with the Secretary of the Senate pursuant to the Lobby Disclosure Act of 1995.

Between in-house lobbyists working directly for the corporations, and the 53 independent lobbying firms the corporations hired, 199 individual lobbyists reported working for those top nuclear interests in 2000 (See appendix).

[5] Lobby disclosure reports cross-referenced with Center for Responsive Politics data.

The Lobby Disclosure Act of 1995 requires lobbyists to name the "general issue areas" in which they worked, and to list "specific lobbying issues" within those general areas. Many lobbyists filed very detailed reports, citing specific pieces of legislation by name and bill number. Other lobbyists filed reports that were more vague, stating only that they worked on "climate change" or "utility issues" or, very commonly, "deregulation." A handful of lobbyists failed to comply with the requirements of the Lobby Disclosure Act, merely reporting who they were working for and how much they got paid, without specifying which issues they worked on.

But inconsistencies of disclosure reports notwithstanding, the filings leave no doubt that nuclear waste was one of the top reasons the industry was throwing around so much money in 2000. Of the 199 individual lobbyists named in the reports, 162, or 81 percent, listed working on nuclear waste legislation, appropriations for the Yucca Mountain Project, or closely related issues such as financial and tax regulations of nuclear plant decommissioning funds.

One of the key Yucca Mountain issues, and one listed by a majority of lobbyists, was specific legislation to ship nuclear waste to the Nevada Test Site, adjacent to Yucca Mountain, to store on a temporary basis until that day, presumably, when the permanent dump would take waste. Even now, two years later, scientific study about the suitability of Yucca Mountain is far from complete, and much of the science that has been completed has served only to shed doubt on the mountain's suitability. Still less was known about the site's inability to contain waste in 2000. But that was not a concern of the nuclear power industry, which pushed the temporary waste legislation for reasons that had little to do with sound science or good public policy. The industry wanted the bill because it would begin to get waste away from reactor sites, transferring the industry's ownership, costs and liabilities to the DOE in the process, and effectively allowing the companies to generate yet more nuclear waste—and more revenue. Shipping waste to a surface storage site at Yucca continues to be viewed as a strategy to cement the inevitability of a long-term dump at the mountain. In fact, if Congress overrides Nevada's objections in the upcoming Yucca Mountain vote, it would be no surprise to see the nuclear power industry and its political allies irresponsibly but immediately renew the push to establish an interim storage facility in Nevada - even before the Nuclear Regulatory Commission begins the long process of licensing the proposed repository.

Both houses of Congress succumbed to the industry's heavy lobbying and passed the legislation in 2000. It appeared as if that half-million a week was paying off handsomely for the nuclear power industry. President Clinton, however, vetoed the bill, and the industry fell just three votes shy of an override in the Senate.

Now, thanks to a recommendation made by Spencer Abraham (one of the biggest recipients of nuclear campaign cash in the 2000 election cycle), and delivered to George W. Bush (the biggest recipient of nuclear money in 2000), the nuclear power industry has another opportunity to lobby Congress on Yucca Mountain. Nevada's certain veto of the Bush/Abraham decision will stand unless overturned by a simple majority vote from both

houses of Congress. What could be a final, decisive vote on the Yucca Mountain Project is expected later this year.

The Nuclear Energy Institute (NEI) has boasted that money is no object, and that the industry will "do what it takes to get this through."[5] If lobbying expenditures in 2000 are any indication of the industry's willingness to spend lavishly to influence public policy, this is one time that NEI just might be telling the truth.

Why do you think they call it power?

But then, former high-ranking government officials, including former members of Congress, don't come cheap. Of 199 individuals who lobbied on behalf of the nuclear power corporations examined in this report, at least 89 had federal "revolving door" connections, including 7 former members of Congress.

Table 3: Former members of Congress lobbying for Abraham's top nuclear supporters in 2000

Lobbyist	Office held	Client(s)
Bill Brewster	U.S. Representative, D-OK, 1991-96	Entergy
William Carney	U.S. Representative, R-NY, 1979-86	Nuclear Energy Institute
Billy Lee Evans	U.S. Representative, D-GA, 1977-83	Exelon
Ronnie Flippo	U.S. Representative, D-AL, 1977-91	Southern Company
James Hayes	U.S. Representative, D-LA, 1987-97	Dominion Resources
J. Bennett Johnston	U.S. Senator, D-LA, 1972-97 (author of original bill singling out Yucca Mountain for nuclear waste)	Nuclear Energy Institute, Xcel Energy Inc.
L.F. Payne	U.S. Representative, D-VA, 1988-97	Dominion Resources

Source: Lobby disclosure reports filed with the Secretary of the Senate pursuant to the Lobby Disclosure Act of 1995.

Several other lobbyists had particularly notable, high-level political and governmental connections:

- Haley Barbour, whose firm received $200,000 to lobby on behalf of the Southern Company, was political affairs director in the Reagan White House and chairman of the Republican National Committee from 1993-96.
- Barbour's colleague in Barbour Griffith & Rogers, Edward Rogers, was a deputy assistant to the president during the first Bush administration.
- Gregory Simon, whose Simon Strategies received $40,000 from Southern, was the chief domestic advisor to Vice-president Al Gore from 1993 to 1996.

[5] Steve Tetreault, "Nuclear industry counters state effort," Las Vegas Review-Journal, Feb. 14, 2002.

- Elizabeth Moler is a former chairman of the Federal Energy Regulatory Commission. She was Deputy Secretary of Energy from 1997 to 1998, and served as acting Energy Secretary following the resignation of Frederico Pena in the summer of 1998, her name surfacing briefly as a permanent replacement for Pena. Moler now lobbies for Exelon, which at 17 reactors owns the largest fleet of nuclear power plants in the country. At $4.06 million, Exelon was also bigger than its corporate cohorts when it came to spending money to lobby Congress and federal agencies in 2000.

- James Curtiss of the aforementioned Winston & Strawn—the firm that had to withdraw from a consulting job with Abraham's DOE because of its conflict of interest—was a Reagan appointee to the Nuclear Regulatory Commission, serving on the NRC from 1988 to 1993.

The nuclear industry also hired eight of the lobbying firms that made *Fortune* magazine's most recent list of the 20 most influential firms in Washington.[7]

The table below shows the ten lobbying firms that held the largest contracts with nuclear interests that contributed to Abraham's 2000 Senate campaign.

Table 4: Key outside firms lobbying for Abraham's top nuclear supporters in 2000

[7] *Fortune* magazine, "The Power 25: Top Lobbying Companies," www.fortune.com.

Firm/Major Nuclear Contributor Clients	Amount
Ryan, Phillips, Utrecht & MacKinnon	**$600,000**
Southern Company	$240,000
Carolina Power & Light	$120,000
Florida Power & Light	$120,000
Nuclear Energy Institute	$80,000
Exelon	$40,000
Troutman Sander LLP	**$440,000**
Southern Company	$440,000
Hopkins & Sutter	**$380,000+**
Exelon	$380,000
Hooper Owen & Winburn	**$320,000**
Duke Energy	$320,000
Balch & Bingham LLP	**$300,000**
FirstEnergy	$200,000
Southern Company	$100,000
Johnston & Associates LLP	**$300,000**
Nuclear Energy Institute	$240,000
Xcel Energy	$60,000
Oppenheimer Wolff Donnelly & Bayh LLP	**$291,000**
Exelon	$291,000
Cauthen & Associates	**$280,000**
Southern Company	280,000
The Renkes Group	**$260,000**
Southern Company	$160,000
FirstEnergy	$100,000
The Smith-Free Group	**$220,000**
Southern Company	$120,000
Nuclear Energy Institute	$100,000

Source: Lobby disclosure reports filed with the Secretary of the Senate pursuant to the Lobby Disclosure Act of 1995.

Consumers foot the bill

Nuclear corporations are counting on high-dollar public relations and political cheerleaders to convince the public to accept more nuclear risk *a la* a "new generation" of nuclear power plants, extended licenses for old plants with aging parts, and a dangerous dump at Yucca Mountain.

None of these projects would be financially viable without taxpayer and ratepayer funded props. Nuclear power has never been an economical source of power. But it has always generated deadly waste. And nuclear waste remains the Achilles' Heel of nuclear energy.

The nuclear industry and its friends in government think they've found a way to mask the mounting problem of high-level radioactive waste in the proposal for a dump at Yucca

Mountain. But their careless "out of sight, out of mind" approach is not a solution and is certainly no substitute for responsible energy policy. The argument is particularly disingenuous coming from an industry that is simultaneously pushing for pro-nuclear policies and subsidies that will allow them to generate even more deadly waste.

After decades of study and billions of dollars spent, Department of Energy scientists have been unable to demonstrate that a repository at Yucca Mountain could safely isolate radioactive waste. A December 2001 report by Congress's General Accounting Office suggests that Abraham's Yucca Mountain site recommendation is premature in light of the 293 unresolved technical issues, identified by the Nuclear Regulatory Commission, that require further study and analysis. The Nuclear Waste Technical Review Board advised Congress in January that the technical basis for DOE's repository plan is "weak to moderate."

In addition to concerns about the site itself, which is precariously perched above a freshwater aquifer in an active earthquake zone, the risks associated with transporting high-level radioactive waste would threaten the health and safety of people in the 44 states and the District of Columbia through which nuclear shipments would pass en route to Nevada. Incredibly, Abraham's Yucca Mountain plan does not include specific details or analysis of this unprecedented nuclear transportation scheme.

Clearly, scientific analysis of the repository program cannot stand on its own merits. But instead of abandoning the failed Yucca Mountain Project, environmental and safety regulations have been weakened, rules have been bent, and the ill-conceived plan continues to move forward under the heavy influence of the nuclear industry.

In a broken campaign promise to Nevadans, presidential candidate George W. Bush pledged that his administration would base a repository decision on "sound science." Actions speak louder than words, however, and last February Bush approved a decision based on the whims of his deep-pocketed pals in the energy industry. Secretary Abraham's site recommendation is not science-based policy assessment but a bill of sale to the well-funded nuclear industry lobby.

Despite the numerous unresolved technical, environmental, and policy problems that plague the Yucca Mountain project, the nuclear industry no doubt anticipates that there is no economic problem, no public health threat, no long-term form of irrational energy policy idiocy that can't be overcome by spending "what it takes" to influence Congress.

And they know where to find the money, too. It will come from small business owners, teachers, students, working families and all the other folks who pay power bills.

Appendix A: Opperating Nuclear Power Plants Owned by Spencer Abraham's Top Nuclear Supporters

American Electric Power
D.C. Cook 1 & 2 (Michigan)

Carolina Power & Light
Brunswick 1 & 2 (North Carolina)
H.B. Robinson ((South Carolina)
Shearon Harris (North Carolina)

CMS Energy
Palisades (Michigan)

Detroit Edison
Fermi (Ohio)

Dominion
North Anna 1 & 2 (Virginia)
Surry 1 & 2 (Virginia)

Duke
Catawba 1 & 2 (South Carolina)
McGuire 1 & 2 (North Carolina)
Oconee 1, 2 & 3 (South Carolina)

Entergy
Arkansas Nuclear 1 & 2 (Arkansas)
Grand Gulf (Mississippi)
Indian Point 2 & 3 (New York)
James A. Fitzpatrick (New York)
Pilgrim (Massachusetts)
River Bend (Louisiana)
Waterford (Louisiana)

Exelon
Braidwood 1 & 2 (Illinois)
Byron 1 & 2 (Illinois)
Dresden 2 & 3 (Illinois)
La Salle County 1 & 2 (Illinois)
Limerick 1 & 2 (Pennsylvania)
Peach Bottom 2 & 3 (Pennsylvania)
Quad Cities 1 & 2 (Illinois)
Clinton* (Illinois)

* owned by AmerGen, a 50-50 joint venture between Exelon and British Energy

Three Mile Island* (Pennsylvania)

FirstEnergy
Beaver Valley 1 & 2 (Pennsylvania)
Davis-Besse (Ohio)
Perry (Ohio)

Florida Power & Light
St. Lucie 1 & 2 (Florida)
Turkey Point 3 & 4 (Florida)

Southern Company
Edwin I. Hatch 1 & 2 (Georgia)
Joseph M. Farley 1 & 2 (Alabama)
Vogtle 1 & 2 (Georgia)

Xcel
Monticello (Minnesota)
Prairie Island 1 & 2 (Minnesota)

* owned by AmerGen, a 50-50 joint venture between Exelon and British Energy

Appendix B: Nuclear lobbyists

Individual lobbyists working for Spencer Abraham's biggest nuclear industry campaign contributors in 2000

Name	Firm	Client(s)
Abert, Thomas	Birch, Horton, Bittner & Cherot	Nuclear Energy Institute
Albright, Sally	McGuire Woods	Nuclear Energy Institute
Badger, Doug	Washington Council Ernst & Young	Exelon
Bailey, Joel	FirstEnergy	In-House
Barbour, Gary	Gary Barbour	American Electric Power
Barbour, Haley	Barbour Griffith & Rogers	Southern Company
Barbour, Leslie	Nuclear Energy Institute	In-House
Bartlett, Doyle	The Smith-Free Group	Southern Company
Batoff, William	William W. Batoff Associates	Exelon
Biersack, Carl	Barbour Griffith & Rogers	Southern Company
Bogosian, Joseph	McGuire Woods	Dominion Resources
Bowen, Christine	FirstEnergy	In-House
Boyd, Mary	Duke Energy	In-House
Brewster, Bill	R. Duffy Wall & Associates	Entergy
Britto, Karen	Detroit Edison	In-House
Brown, David	Exelon (Commonwealth Edison/Peco)	In-House
Buckham, Ed	Alexander Strategy Group	Nuclear Energy Institute
Bumpers, William	Baker Botts	Entergy
Campbell, Chad	The EOP Group	Nuclear Energy Institute
Campbell, Sabrina	American Electric Power	In-House
Capella, Dennis	Exelon (Commonwealth Edison/Peco)	In-House
Caputo, Annie	Exelon (Commonwealth Edison/Peco)	In-House
Carney, William	Carney & Co.	Nuclear Energy Institute
Carroll, Ken	Entergy	In-House
Cauthen, Harvey	Cauthen & Associates	Southern Company
Chalmers, N.W.	Dominion Resources	In-House
Chapel, Christopher	Florida Power & Light	In-House

Name	Firm	Client(s)
Chapman, Kelly	Dominion Resources	In-House
Clark, Frank	Exelon (Commonwealth Edison/Peco)	In-House
Clark, John	CMS Energy	In-House
Cochrane, Anna	CMS Energy	In-House
Cohen, Jeff	General Public Utilities	In-House
Cole, Keith	Swidler Berlin Shereff Friedman	Florida Power & Light
Conklin, Brian	Washington Council Ernst & Young	Exelon
Crater, Jeffrey	Cauthen & Associates	Southern Company
Crews, Mark	Southern Company	In-House
Cunningham, Sean	Balch & Bingham	FirstEnergy, Southern Company
Curtiss, James	Winston & Strawn	Nuclear Energy Institute
Czepluck, Ralt	Ralt Czepluck	Southern Company
Darling, Lauren	Washington Council Ernst & Young	Exelon
Davis, Thomas	Davis & Harman	Florida Power & Light
DeAnna, Jennifer	Detroit Edison	In-House
Direnfeld, Barry	Swidler Berlin Shereff Friedman	Florida Power & Light
Doney, John	Washington Council Ernst & Young	Exelon
Donna Steele-Flynn	Washington Council Ernst & Young	Exelon
Dowling, Michael	FirstEnergy	In-House
Eames, Fred	Balch & Bingham	FirstEnergy, Southern Company
Edelson, Howard	CMS Energy	In-House
Evans, Billy Lee	Kessler & Associates Business Services Inc.	Exelon
Finley, Elise	Southern Company	In-House
Fitzgerald, Brian	Swidler Berlin Shereff Friedman	Florida Power & Light
Fitzgerald, Jayne	Washington Council Ernst & Young	Exelon
Fitzgerald, Kevin	Troutman Sanders	Southern Company
Flippo, Ronnie	R.G. Flippo and Associates	Southern Company
Fotis, Stephen	Van Ness Feldman, A Professional Corporation	American Electric Power
Free, James	The Smith-Free Group	Nuclear Energy Institute, Southern Company
Freeman, Jan	Exelon (Commonwealth Edison/Peco)	In-House

Name	Firm	Client(s)
Galliant, Gary	Swidler Berlin Shereff Friedman	Florida Power & Light
Garrett-Nelson, LaBrenda	Washington Council Ernst & Young	Exelon
Garrish, Theodore	Nuclear Energy Institute	In-House
Gasper, Gary	Washington Council Ernst & Young	Exelon
Gates, Bruce	Washington Council Ernst & Young	Exelon
Gessaman, Donald	The EOP Group	Nuclear Energy Institute
Gilliland, Michael	Hogan & Harston	Southern Company
Giordano, Nick	Washington Council Ernst & Young	Exelon
Gold, Richard	Holland & Knight	FirstEnergy
Goldfield, H.P.	Swidler Berlin Shereff Friedman	Florida Power & Light
Gordon Pehrson	Hopkins & Sutter	Exelon
Griffith, G.O.	Barbour Griffith & Rogers	Southern Company
Griles, J. Steven	J. Steven Griles & Associates	Dominion Resources
Hagan, James	Nuclear Energy Institute	In-House
Hall, Bill	Dominion Resources	In-House
Hanson, Jodi	Hopkins & Sutter	Exelon
Harris, Sheldon	Oppenheimer Wolff Donnelly & Bayh	Exelon
Hawkins, Matthew	Ryan, Phillips, Utrecht & MacKinnon	Nuclear Energy Institute, Florida Power & Light, Exelon, Southern Company, Carolina Power & Light
Hayes, James	Adams & Reese	Dominion Resources
Hezir, Joseph	The EOP Group	Nuclear Energy Institute
Hickmott, Robert	The Smith-Free Group	Nuclear Energy Institute, Southern Company
Himpler, Bill	Barbour Griffith & Rogers	Southern Company
Hohlt, Richard F.	Richard F. Hohlt	Nuclear Energy Institute
Hoppe, Rodney	Ryan, Phillips, Utrecht & MacKinnon	Nuclear Energy Institute, Florida Power & Light, Southern Company, Carolina Power & Light
Horn, Robert	Detroit Edison	In-House
Horn, William	Birch, Horton, Bittner & Cherot	Nuclear Energy Institute
House, Michael	Hogan & Harston	Southern Company
Hughes, Kristin	The Advocacy Group	Nuclear Energy Institute
Hunsicker, Karen	Entergy	In-House
Ingle, Ed	The Wexler Group	FirstEnergy

Name	Firm	Client(s)
Jensen, Thomas	Troutman Sanders	Southern Company
Jerris Leonard	Hopkins & Sutter	Exelon
Johnson, Michele	Xcel/Northern States Power	In-House
Johnston, J. Bennett	Johnston & Associates	Nuclear Energy Institute, Xcel
Jones, Beverly	Adams & Reese	Dominion Resources
Jones, Proctor	Johnston & Associates	Nuclear Energy Institute
Jory, David	R. Duffy Wall & Associates	Entergy
Kane, John	Nuclear Energy Institute	In-House
Katsurinis, Stephen	McGuire Woods	Dominion Resources
Kavanagh, Anthony	American Electric Power	In-House
Kenworth, William	Governmental, Strategies	Duke
Kessler, Richard	Kessler & Associates Business Services Inc.	Exelon
Kinney, Charles	Winston & Strawn	Nuclear Energy Institute
Koch, Cathy	Washington Council Ernst & Young	Exelon
Kripowicz, Mary Jo	CMS Energy	In-House
Lass, Conrad	Southern Company	In-House
Lawrence, H. Adam	Southern Company	In-House
Leonard, Bob	Washington Council Ernst & Young	Exelon
Levine, Jeffrey	Cauthen & Associates	Southern Company
Lewis, David	Shaw Pittman	Nuclear Energy Institute
Locke, Timothy	The Smith-Free Group	Southern Company
Loveng, Jeff	General Public Utilities	In-House
MacKinnon, Jeffrey	Ryan, Phillips, Utrecht & MacKinnon	Nuclear Energy Institute, Florida Power & Light, Exelon, Southern Company, Carolina Power & Light
Mares, Jan	The EOP Group	Nuclear Energy Institute
Marsan, William	Troutman Sanders	Southern Company
Marsh, Jeremiah	Hopkins & Sutter	Exelon
Marshall, Beverly	Duke Energy	In-House
McBroom, Martin	American Electric Power	In-House
McCool, James	Southern Company	In-House
McCormick, Patrick	Balch & Bingham	FirstEnergy, Southern Company

Name	Firm	Client(s)
McDaniel, Corey	The EOP Group	Nuclear Energy Institute
McKay, Bruce	Dominion Resources	In-House
McMillan, James	Hogan & Harston	Southern Company
Meltzer, Richard	Washington Council Ernst & Young	Exelon
Menezes, Mark	American Electric Power	In-House
Mengebier, David	CMS Energy	In-House
Miller, Joseph	Southern Company	In-House
Mohr, Karl	Southern Company	In-House
Moler, Elizabeth	Exelon (Commonwealth Edison/Peco)	In-House
Molm, John	Troutman Sanders	Southern Company
Monroe, Loren	Barbour Griffith & Rogers	Southern Company
Morton, Ann	Simon Strategies	Southern Company
Moss, Carolyn	Dominion Resources	In-House
Munk, Jeffrey	Hogan & Harston	Southern Company
Musser, James	Kessler & Associates Business Services Inc.	Exelon
Nichols, David	Sagamore Associates	Nuclear Energy Institute
Nordhaus, Robert	Van Ness Feldman, A Professional Corporation	American Electric Power
Nugent, John	The Advocacy Group	Nuclear Energy Institute
O'Donnell, John	Xcel/Northern States Power	In-House
Olson, Barbara	Balch & Bingham	Southern Company
Owen, Daryl	Hooper Owen & Winburn	Duke
Payne, L.F.	McGuire Woods	Dominion Resources
Pettey, Patrick	The Renkes Group	FirstEnergy, Southern Company
Phil Mosely	Washington Council Ernst & Young	Exelon
Phillips, William	Ryan, Phillips, Utrecht & MacKinnon	Nuclear Energy Institute, Florida Power & Light, Exelon, Southern Company, Carolina Power & Light
Pickart, George	CMS Energy	In-House
Planning, Mark	Ryan, Phillips, Utrecht & MacKinnon	Nuclear Energy Institute, Florida Power & Light, Exelon, Southern Company, Carolina Power & Light
Porter, John	Washington Council Ernst & Young	Exelon
Pride, Ann	Entergy	In-House

Name	Firm	Client(s)
Propst, Holly	Xcel/Northern States Power	In-House
Ramonas, George	The Advocacy Group	Nuclear Energy Institute
Renkes, Gregg	The Renkes Group	Southern Company
Riley, Richard	Hopkins & Sutter	Exelon
Riith, Michael	Southern Company	In-House
Roberts, David	Carolina Power & Light	In-House
Rogers, Edward	Barbour Griffith & Rogers	Southern Company
Roling, Richard	Exelon	In-House
Rosenzweig, Richard	Van Ness Feldman, A Professional Corporation	American Electric Power
Rowe, John	Exelon (Commonwealth Edison/Peco)	In-House
Rozen, Bob	Washington Council Ernst & Young	Exelon
Ryan, Thomas	Ryan, Phillips, Utrecht & MacKinnon	Nuclear Energy Institute, Florida Power & Light, Exelon, Southern Company, Carolina Power & Light
Scherder, Daniel	R. Duffy Wall & Associates	American Electric Power, Detroit Edison, Southern Company
Schlagenhauf, Jeffrey	McGuire Woods	Dominion Resources
Schule, Robert	The Wexler Group	FirstEnergy
Shalom, Joseph	Detroit Edison	In-House
Sikera, Clifford	Troutman Sanders	Southern Company
Simms, Kristy	Entergy	In-House
Simon, Gregory	Simon Strategies	Southern Company
Smith, Alicia	The Smith-Free Group	Southern Company
Smith, Timothy	Governmental Strategies, Inc.	Exelon; Duke
Smythe, Marianne K.	Wilmer, Cutler & Pickering	American Electric Power
Sporidis, Harry	Kessler & Associates Business Services Inc.	Exelon
Stinger, Cynthia	General Public Utilities	In-House
Studley, Janet	Holland & Knight	FirstEnergy
Sugiyama, George	Dorsey & Whitney	Southern Company
Taylor, Martin	Detroit Edison	In-House
Teig, Eva	Dominion Resources	In-House
Thomas, Ann Johnston	R. Duffy Wall & Associates	American Electric Power, Detroit Edison, Southern Company, Entergy
Thompson, Robert	Jefferson Consulting Group	Nuclear Energy Institute

Name	Firm	Client(s)
Tiner, Michael	Michael Tiner	Nuclear Energy Institute
Ulrich, Christopher	Simon Strategies	Southern Company
Urban, Tim	Washington Council Ernst & Young	Exelon
Vasapoli, Joseph	Ryan, Phillips, Utrecht & MacKinnon	Nuclear Energy Institute, Florida Power & Light, Exelon, Southern Company, Carolina Power & Light
Victor, Jayne	Dominion Resources	In-House
Viola, Beth	Holland & Knight	FirstEnergy
Wallace, Vickie	R.G. Flippo and Associates	Southern Company
Warnke, Christine	Hogan & Harston	Southern Company
Wasitis, Douglas	Sagamore Associates	Nuclear Energy Institute
Watson, Robert	The Dutko Group	Dominion Resources
Weinberger, Mark	Washington Council Ernst & Young	Exelon
Weise, George	Washington Council Ernst & Young	Exelon
Weixel, Jack	The EOP Group	Nuclear Energy Institute
Wexels, James	Xcel/Northern States Power	In-House
Wexler, Anne	The Wexler Group	FirstEnergy
Whitestone, David	Holland & Knight	FirstEnergy
Wilkinson, Andrea	Adams & Reese	Dominion Resources
Williams, James	Entergy	In-House
Wilson, Michael	Florida Power & Light	In-House
Wolak, Jeanne	Southern Company	In-House
Woodruff, Kathryn	CMS Energy	In-House
Woolerton, Chinch	Nuclear Energy Institute	In-House

January 17, 2002

The Honorable Spencer Abraham
Secretary
Department of Energy
1000 Independence Ave., SW
Washington, DC 20585

Dear Secretary Abraham:

In view of the significant campaign contributions you received from the nuclear industry in the last election cycle, Public Citizen urges you to recuse yourself from responsibilities related to the Yucca Mountain project in order to avoid the appearance of conflict of interest.

Our analysis of data provided by the Center for Responsive Politics show that you accepted $82,728 from the nuclear industry during the last election cycle (1995 through September 30, 2000). Based on Federal Election Commission filings, PoliticalMoneyLine reports that in 1999-2000 alone these contributions included $9,000 from Florida Power and Light, $5,000 each from Southern Company and DTE Energy, $4,000 from the Nuclear Energy Institute and $3,000 from PECO (now Exelon).

Under the terms of the Nuclear Waste Policy Act, the Secretary of Energy is required to evaluate the suitability of Yucca Mountain, Nevada, as the location for a proposed high-level radioactive waste repository. Your letter of January 10th to Nevada Governor Kenny Guinn indicates that you intend to favorably recommend the site - a decision certain to be controversial. As you know, the Yucca Mountain project is strongly opposed by Nevada s congressional delegation, governor and state legislature, as well as public interest, consumer advocacy and environmental organizations across the country. Already, three lawsuits are pending related to the repository proposal, with more likely to follow. In addition, recent investigations by the DOE Inspector General and the General Accounting Office have brought to light apparent contractor conflict of interest within the Yucca Mountain project and indications that the DOE is acting prematurely by preparing a site recommendation in the absence of data to support a potential license application.

The commercial nuclear industry is a long-time supporter of the proposed nuclear waste repository and would directly benefit if the project were approved. Independently and through various industry associations, nuclear operators have lobbied in support of the Yucca Mountain project. Your financial ties to the pro-repository nuclear industry pose an apparent conflict of interest in your evaluation of a Yucca Mountain site recommendation and threaten to undermine the integrity and objectivity of the DOE s process.

Conflict of interest regulations, codified in both 18 USC. 208(a) and 5 CFR 2635.502(d), require executive branch officials faced with an apparent or real financial conflict of interest to either recuse themselves or seek specific exemption from the conflict of interest rules. Therefore, and to ensure fair and independent proceedings related to the proposed repository, we urge you to immediately recuse yourself from involvement in the Yucca Mountain project.

Sincerely,

Joan Claybrook
President
Public Citizen

January 29, 2002

Dear Member of Congress:

As national, state, Native American, and local environmental and public interest organizations, we are writing to draw your attention to a recent report by the Department of Energy's Inspector General, which exposes apparent conflicts of interest within the Yucca Mountain Project.

Since 1987, Yucca Mountain has been the only site under consideration for a proposed high-level nuclear waste repository. The Secretary of Energy, under pressure from the nuclear industry, has indicated that he will recommend the site to the president next month. The president would likely refer a site recommendation to Congress. In light of new evidence, we urge you to oppose the Yucca Mountain Project.

Numerous technical, environmental, and policy problems plague the project, undermining the credibility of the Secretary of Energy's pending site recommendation. In addition, the attached report discloses evidence of potential conflict of interest involving the law firm Winston & Strawn, which was simultaneously employed as counsel to the DOE's Yucca Mountain Project and registered as a member of and lobbyist for the Nuclear Energy Institute, the pro-repository nuclear industry trade group, between 1992 and 2001.

The DOE, as a federal agency, is expected to be a fair and impartial arbiter in its evaluations of the repository proposal, and to uphold the same standards of integrity for its contractors. The Nuclear Energy Institute, on the other hand, is the lobbying arm of the nuclear industry and specifically advocates in favor of the proposed nuclear waste repository at Yucca Mountain, which would serve the narrow commercial 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 is a serious conflict of interest, which has no doubt compromised the integrity of the Yucca Mountain Project.

The recent Inspector General report notes as well that TRW, Inc., the managing and operations contractor for the Yucca Mountain Project until February 2001, was also 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 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 oversight of its contractors, resulting in an apparent pro-industry bias in the agency's site characterization and site recommendation activities. It would be irresponsible for Congress to allow the Yucca Mountain Project to continue without a thorough review of the causes and consequences of contractor conflict of interest that have recently been brought to light. In defense of responsible, accountable government, as well as public health and safety, we urge your decisive opposition to the Yucca Mountain Project.

Sincerely,

Lisa Gue
Policy Analyst
Public Citizen's Critical Mass

Kevin Kamps
Nuclear Waste Specialist
Nuclear Information and Resource Service

Also on behalf of the following 230 organizations:

National Groups

James Wyerman
20/20 Vision
Washington, DC

Lorraine Krofchok
Grandmothers for Peace International
Elk Grove,CA

Susan Gordon
Alliance for Nuclear Accountability
Seattle, WA

Jim Riccio
Greenpeace
Washington, DC

Steve Holmer
American Lands Alliance
Washington, DC

Richard LaFortune
Honor the Earth
Minneapolis, MN

Lynn Thorp
Clean Water Action
Washington, DC

Tom Goldtooth
Indigenous Environmental Network
Bemidji, MN

Sara Zdeb
Friends of the Earth
Washington, DC

Kevin Curtis
National Environmental Trust
Washington,DC

Tom Carpenter
Government Accountability Project
Seattle, WA

Geoffrey Fettus
Natural Resources Defense Council
Washington, DC

Kevin Martin
Peace Action Education Fund
Washington, DC

Robert Musil, PhD, MPH
Physicians for Social Responsibility
Washington, DC

Ellen Thomas
Proposition One Committee
Washington, DC

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INQUIRY REPORT

Review of Alleged Conflicts of Interest Involving a Legal Services Contract for the Yucca Mountain Project

NOVEMBER 2001

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
No. I01IG001

November 13, 2001

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: Review of Alleged Conflicts of Interest Involving a Legal Services Contract for the Yucca Mountain Project

Introduction

In September 1999, the Department of Energy awarded a contract to the law firm of Winston & Strawn in connection with the Yucca Mountain Project (the Yucca legal contract). Specifically, Winston & Strawn was to assist the Department with a potential license application to be submitted to the U.S. Nuclear Regulatory Commission in the event Yucca Mountain is approved as the site for a repository for the nation's high-level radioactive waste.

The Office of Inspector General initiated a fact-finding inquiry into allegations that Winston & Strawn had contemporaneously served as a registered lobbyist for the Nuclear Energy Institute while serving under the Yucca legal contract, and that Winston & Strawn did not disclose these activities when bidding on the Yucca legal contract. The Nuclear Energy Institute is a nuclear energy industry trade group and its members include commercial utilities with spent nuclear fuel that would be destined for Yucca Mountain in the event the site is recommended and approved for the repository.

Findings

In summary, the Office of Inspector General inquiry disclosed that:

- The Organizational Conflict of Interest (OCI) provisions of the Yucca legal contract sought the disclosure of information regarding other contractor relationships that could have caused the contractor to be "unable or potentially unable to render impartial assistance or advice to the Government" or that could impair the contractor's objectivity. Winston & Strawn's OCI disclosure, submitted when bidding on the Yucca legal contract in June 1999, made no mention of the law firm's work for the Nuclear Energy Institute, which included both lobbying and non-lobbying activities. At the time of bidding, the applicable OCI provisions sought information about covered activities and relationships dating back to June 1998;

- Winston & Strawn had been a registered lobbyist for the Nuclear Energy Institute from January 1995 to July 2001, but the law firm acknowledged to the Office of Inspector General that it did not discuss these activities with the Department until July 2001, when it terminated the registration. According to lobbying reports, Winston & Strawn was also engaged in lobbying activities for the Nuclear Energy Institute concerning nuclear waste legislation relevant to the Yucca Mountain Project in 1996 and 1997, while serving under a subcontract with TRW Environmental Safety Systems, Inc., the Department's then-Yucca Mountain management and operating contractor;

- Department officials stated that had the Department been told of the reported lobbying activities prior to award of the Yucca legal contract, a range of options were available. The Department could have: (1) disqualified Winston & Strawn; (2) insisted upon implementation of specific conflict avoidance measures; or, (3) made a determination that there was no conflict or potential conflict requiring such measures;

- An internal Winston & Strawn memo, dated June 17, 1999, recognized the potential for conflicts relating to Yucca Mountain and nuclear waste. This memo: (1) asserted that a number of steps had been taken to avoid "any hint of a conflict"; (2) stated that the law firm must "continue to remain on the DOE/Yucca Mountain side of this wall"; and, (3) indicated that Winston & Strawn avoided participating in certain Nuclear Energy Institute meetings concerning Yucca Mountain for these reasons;

- Winston & Strawn's activities concerning the Nuclear Energy Institute appeared inconsistent with the June 17, 1999, memo. For example, according to public lobbying reports filed by Winston & Strawn, it engaged in lobbying activities for the Nuclear Energy Institute that some Department officials characterized as, at a minimum, creating a potential appearance of a conflict of interest. Moreover, Winston & Strawn acknowledged to the Department and the Office of Inspector General that no firewalls were used on the Yucca legal contract or on any matters concerning the Nuclear Energy Institute. According to the law firm itself, 14 Winston & Strawn personnel who billed for work on the Yucca legal contract also worked on a variety of Nuclear Energy Institute matters during the period covered by the OCI provisions;

- When asked to reconcile the June 17, 1999, memo with Winston & Strawn's activities, including the non-disclosure of its lobbying activities to the Department, the memo's author, a senior Winston & Strawn attorney, advised the OIG that the memo's primary purpose was to help ensure that Winston & Strawn avoided inappropriate contacts with Department officials during the pendency of the contract bidding. The memo's author further explained that the memo also addressed how the law firm had avoided participating in industry efforts to sue the Department over its alleged failures to begin accepting commercially-generated spent nuclear fuel by a 1998 deadline to do so. The memo's author stated that the law firm wanted to avoid even the appearance that it was participating in these activities;

- Winston & Strawn stated that there was no conflict of interest, and that Winston & Strawn had not compromised the contract work or the Yucca Mountain Project. Department officials responsible for administering the Yucca legal contract advised that they have reached no conclusions concerning whether Winston & Strawn's lobbying activities or other representations of the Nuclear Energy Institute constituted actual or potential conflicts of interest or somehow violated attorney ethics. Department officials identified no examples to the OIG of actual compromise of the contract work or the Yucca Mountain Project. Department officials and Winston & Strawn identified examples of how Winston & Strawn had urged more thoroughness concerning the Yucca Mountain Project. Department officials expressed general satisfaction with Winston & Strawn's work;

- Winston & Strawn stated that it had retained an expert to advise whether Winston & Strawn needed to file amended lobbying reports, because a number of the reports already filed may list activities that never took place; and,

- In addition to the matters relating to Winston & Strawn and the Nuclear Energy Institute, the Office of Inspector General identified certain other matters warranting Department management attention, including apparent lobbying activities by an affiliate of the former Yucca Mountain management and operating contractor.

Observations

In conducting this inquiry, we found that: (1) as a condition of contract award, Winston & Strawn was required to have specific nuclear experience; and, (2) this experience was obtained by representing numerous nuclear industry clients, including utilities that had generated spent nuclear fuel. In this context, it was to be expected that the law firm's prior or current associations could intersect, and perhaps conflict, with its representation of the Department. At the heart of our inquiry was how, if at all, those intersections and potential conflicts were identified, disclosed, addressed, and resolved by the law firm and the Department. In our judgment, the Department was not entirely successful in managing these issues. In large measure, this was attributable to Winston & Strawn's lack of disclosure, about which Department officials expressed dissatisfaction.

Department officials' own efforts to evaluate these matters were impacted by assertions by Winston & Strawn that it could not answer certain questions about its lobbying and other activities for the Nuclear Energy Institute on the grounds of attorney-client privilege invoked by the Nuclear Energy Institute. Winston & Strawn also declined to answer some questions posed by the Office of Inspector General for the same reason.

It is our view that it is imperative that the contracting officer, in conjunction with other responsible Department officials, promptly evaluate the facts disclosed by the Office of Inspector General inquiry, and determine whether Winston & Strawn has in fact violated the terms of the Yucca legal contract or otherwise acted in a manner not in keeping with

its professional ethical obligations to the Department. If so, the Department should pursue remedies to ensure the integrity of the Yucca Mountain Project. Our findings are detailed in the report, which includes recommendations for management action.

I would be pleased to discuss our findings with you at your convenience.

cc: Deputy Secretary
Under Secretary for Energy, Science and Environment
Chief of Staff
General Counsel
Acting Director, Office of Civilian Radioactive Waste Management
Director, Office of Procurement and Assistance Management

Attachments

Mr. BARTON. Thank you. Mr. Colvin, if for some reason we were to not override the Governor of Nevada's veto, what would be the practical impact on that on the nuclear power industry in this country?

Mr. COLVIN. Mr. Chairman, I think it's a very complex issue to look at from the standpoint of our electricity supply, but we're in a time of renaissance in nuclear energy. It's a time that we're moving to deregulate and make our electricity supply more competitive in the United States and to look for energy sources that, in fact, preserve and protect the environment. And nuclear energy is an important part of our Nation's energy mix, both for now and the future. If we, in fact, cannot resolve this issue in the United States and I think it will not only have a negative impact on our industry and on our future investment into this technology and our benefits that society will derive from that, but will have a similar effect in other countries in the world. The U.S. is the leader in this technology. We have been from the beginning. We created the commercial part of the industry that is used around the world and the world looks to the U.S. for continuing leadership and is very, very supportive of us moving forward.

I think we need to look at this in a very important fashion and I commend this committee and I commend the leadership for taking this issue on and dealing with it in the context of our national energy security and our national security, in general.

Mr. BARTON. Is it not reasonable that if you make the assumption that we begin to generate electricity in commercial nuclear reactors in the 1950's, and if we override the veto and if the Department of Energy submits a suitable application and if the Nuclear Regulatory Commission approves it, that would mean somewhere around the year on a permanent basis probably 2015 to 2020 we would actually begin to store the waste in a centralized location, that's approximately 70 years. Isn't that a reasonable time for policymakers and engineers of the greatest engineering and economic society the world has ever known to come to some solution on this issue?

Mr. COLVIN. Absolutely, Mr. Chairman, without exception.

Mr. BARTON. Now Ms. Chappelle, you're here on behalf of the NARUC Commissioners. I am certain that if and when we certify Yucca Mountain as a site, the transportation issue of moving the waste from the existing decentralized locations to the one central repository are going to take a fair amount of your contemporaries' time. Do you have confidence that the various Federal agencies will work with the State PUCs and regulatory agencies to develop transportation routes and systems and time tables that will protect the public that you represent?

Ms. CHAPPELLE. We do, Chairman, and I think again on behalf of States, because all of the various States are quite unique, I think the States are going to play a crucial role in the transportation issue and I do think that they will be aggressive and I have no doubts that we will work hand in hand with the Federal Government to again determine the most appropriate safe routes for the transportation.

Mr. BARTON. Mr. Chairman, I don't have any other questions at this time.

Mr. SHIMKUS. And I thank the chairman and I'll just ask a few follow-up questions.

Mr. Colvin, on the whole transportation debate, it does make common sense that the fact that we have transported over 3,000 shipments safely that we will work in conjunction with our States to make sure that all their requests, except for those that are meant to stop any passage of transportation would be met. Do you think that's safe to say?

Mr. COLVIN. Yes sir, Mr. Chairman. And quite honestly, if you look at the transportation, the United States, the Congress and our regulatory agencies, in fact, have put in place a tremendous set of regulations that are in place today to protect the public from transportation issues dealing with hazardous materials including radioactive materials. And those, in fact, have been the foundation, if you may, for the type of protection and rigor that we've had in the transportation to date. So as we move forward to look at the Yucca Mountain issue and we look forward to going through the licensing process, there may be issues arise, perhaps issues that have been identified post-9/11 that will, in fact, be evaluated and be dealt with in the context of the regulatory bodies that exist. And NRC clearly will, in fact, deal with those issues and if there's a need to make adjustments to that they will be made. They cannot go forward without those being made. So your assertion is completely correct, Mr. Chairman. Thank you.

Mr. SHIMKUS. Thank you, and I want to follow up and Ms. Chappelle, you may have mentioned this in your opening statement and I apologize if I was in another meeting, but Big Rock Point on the banks of Lake Michigan, there was discussion earlier in this hearing in reference to the 5-year timeframe of once you use spent nuclear fuel to have to sit. But that's not an issue for Big Rock Point, is it?

Ms. CHAPPELLE. I defer to the exact mechanisms of how they are storing that.

Mr. SHIMKUS. But the fact is Big Rock Point is a closed facility.

Ms. CHAPPELLE. It is, it is.

Mr. SHIMKUS. So if they're not producing electricity, then that 5-year wait period is not an issue.

Ms. CHAPPELLE. Sure.

Mr. SHIMKUS. So to make a blanket statement that we're not going to reduce the number of sites around the country by moving it is not a correct statement?

Ms. CHAPPELLE. Agreed, absolutely. And I would just also reiterate the comments that even though that's a closed facility, even though it is in a temporary secured site, again, that is still now a site that will need security, that will need to be observed and further secured, so the fact that it's closed and not operating and the fuel is spent does not take it out of the equation of using due diligence to find a permanent repository.

Mr. SHIMKUS. Mr. Colvin?

Mr. COLVIN. Mr. Chairman, if I might just add to that. There was quite a bit of confusion in the earlier interchange with questions on this issue. If I might just clarify that. When we first take fuel out of the reactor, we put it into the spent fuel pool which is in effect a swimming pool that's inside the power plant and we let

it cool for a period of about 5 years before we then can transfer it either—the intent was to keep it in the pool for a period of time and then transfer it to the ultimate repository. That was the agreement that we reached with the government under the Atoms for Peace Program and into the Nuclear Waste Policy Act, as amended.

So the issue today is that many of the plants have been running out of space in the spent fuel pool as originally designed and in fact, by 2010, about 78 of the 103 units in the U.S. will have run out of that capacity. So even with the program moving forward with a date of 2010, the companies have had to, in fact, deal with this in alternate means that is typically a dry cask storage process which has been an additional cost to both the consumer and to the company, above that which we initially anticipated.

Mr. SHIMKUS. Thank you and I want to ask my final question to Mr. Dushaw on the whole national energy debate, job creation, low cost power needs. Moving forward, is it safe to say it's a net plus for an energy policy, economic development and growth and job creation?

Mr. DUSHAW. A net plus would be passage of the energy policy.

Mr. SHIMKUS. And moving this——

Mr. DUSHAW. Absolutely, keeping nuclear alive is an absolute for the United States at this point in time and to keep nuclear alive, we need to have Yucca Mountain or an alternative answer which does not appear to be in the offing.

Mr. SHIMKUS. Great. I will make one pass over to the minority side. We don't make expect any members to follow up and with that I appreciate your patience, I appreciate you all waiting until the afternoon and changing your statements to reflect that.

Mr. BARTON. Will the Chair yield briefly?

Mr. SHIMKUS. Sorry, Mr. Chairman.

Mr. BARTON. I just want to announce that we will have a markup of this resolution next Tuesday afternoon, I think at 4 p.m., but—4:30, all subcommittee members should be aware that the series of votes is going to begin on the floor at 6 so we'd like to convene at 4:30 for opening statements and if we have a quorum, we'll move to markup. If not, we'll recess until after the votes on the floor and then come back and mark the bill up.

Mr. SHIMKUS. And I'm correct to say no amendments will be——

Mr. BARTON. The rules of the law do not allow amendments to be in order on this particular resolution.

Mr. SHIMKUS. And with that information I call this hearing to adjournment.

[Whereupon, at 2:08 p.m., the hearing was adjourned.]

[Additional material submitted for the record follows:]

RESPONSES FOR THE RECORD OF HON. SPENCER ABRAHAM, SECRETARY, DEPARTMENT OF ENERGY

QUESTIONS FROM CONGRESSMAN MARKEY

Security of Nuclear Waste Shipments

Q1. After September 11, you halted all shipments of nuclear waste because of the security risks they pose. President Bush just warned on April 17, 2002 that he expects Al Qaeda to try to strike the U.S. again. Can you point to the sections of the site recommendation that address the additional consideration DOE has given since September 11th to the possibility that terrorists might attempt to attack a nuclear

waste shipment? What new security measures do you expect to take as a result of the events of September 11th?

A1. Additional consideration to possible sabotage scenarios as a result of the events of September 11, 2001, was given in the site recommendation documents. In the Final Environmental Impact Statement (EIS), Section 4.1.8.3 addresses sabotage at the repository, and Section 6.2.4.2.3 addresses the impacts of acts of sabotage for transportation. Appendix J of the EIS, Section 2.4.3.1, contains a post-September 11 analysis of radiological impacts related to sabotage. In the Comment-Response Document for the EIS, Section 7.4.1 addresses sabotage at the repository, and Section 8.10.1 addresses sabotage for transportation. In both the Site Recommendation Comment Summary Document and the Supplemental Site Recommendation Comment Summary Document, Sections 4.6.3 address sabotage at the repository, and Sections 4.8.7 address sabotage for transportation. In the "Recommendation by the Secretary of Energy Regarding the Suitability of the Yucca Mountain Site for a Repository Under the Nuclear Waste Policy Act of 1982," Section 8.6 (Assisting Anti-Terrorism at Home) addresses the events of September 11.

As a result of the events of September 11, 2001, the Nuclear Regulatory Commission (NRC), DOE, and other agencies are conducting a comprehensive security review that will include reexamining the protections built into our physical security and safeguards systems. If the results of this reexamination indicate enhancements are needed, the Department will modify its methods and systems as appropriate.

Q2. Are shipments of high-level waste undertaken with the same levels of security as shipments of nuclear weapons or weapons-grade materials?

A2. No. The Department and NRC have established a graded regulatory approach for physical protection of nuclear material shipments. The requirements for strategic special nuclear materials (e.g., weapons-grade) are more stringent, because they are more attractive for theft than irradiated reactor fuel.

The Department, NRC, and other agencies review their security requirements periodically to assess their adequacy and effectiveness. A comprehensive review has been ongoing as a result of the attacks on September 11. DOE will comply with all regulations applicable to the Office of Civilian Radioactive Waste Management (OCRWM) program.

Q3. Have force-on-force security exercises been conducted on shipments of high level nuclear waste? If so, what were the results? If not, why not, since these materials could be used to construct and detonate dirty bombs?

A3. The Department routinely conducts force-on-force security exercises on strategically significant nuclear materials (e.g., weapons-grade). Although DOE has not conducted force-on-force exercises for shipments of high-level wastes, it will continue to evaluate security needs for various shipments. In transporting high-level waste to a geologic repository, DOE will comply with any NRC physical protection requirements, including those concerning force-on-force security exercises.

Nuclear Waste Shipments

Q4. Your testimony states that there has never been a harmful radiation release associated with the shipment of nuclear waste. There have been an estimated 3,000 shipments of high-level nuclear waste in the past 50 years or so.

A. Isn't it true that this number would be exceeded within the first two years of shipments to the proposed Yucca Mountain repository?

B. Is it true that according to DOE's accident reports, there have been 72 "incidents" involving nuclear waste shipments since 1949? Is it true that four of these accidents involved "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?

A4. A. In the EIS for Yucca Mountain, DOE has stated its preference for mostly-rail transport of nuclear waste to Yucca Mountain. Under the mostly-rail scenario, DOE estimates about 175 shipments to Yucca Mountain per year over the 24 year shipping period.

B. As you cited, there have been 72 reported incidents involving nuclear waste shipments since 1949. In all the above reported incidents, there was never an injury as a result of the radioactive nature of the cargo.

Security of Nuclear Waste Shipments

Q5. The Transportation Security Division at DOE transports nuclear weapons and weapons-grade material from site to site within the DOE complex. It is my understanding that this group failed six out of seven force-on-force security simulations in December 1998.

A. If the shipments of nuclear weapons fail the security tests, how can we be assured that all of the many thousands of shipments of nuclear waste will be safe from terrorist attack?

B. Do you agree that in event of a real and successful terrorist attack on a shipment of high level nuclear waste, a suicidal and knowledgeable group of terrorists could quickly assemble and detonate a dirty bomb? If not, why not?

C. Are shipments of high level nuclear waste secure against armor piercing incendiary rounds? If so, how has this been verified? If not, why not, since a June 1999 General Accounting Office report entitled "Weaponry: Availability of Military .50 Caliber Ammunition" concluded that more than 100,000 rounds of Pentagon-surplus armor-piercing incendiary rounds have been sold on the civilian market?

D. I have been told of two separate tests, one done at Sandia National Laboratory, and one at Aberdeen Proving Grounds, that experimentally demonstrated that readily available munitions can breach a nuclear waste canister. Will you require whatever canisters are ultimately chosen to be capable of withstanding attacks using readily available munitions? If not, how will you assure that the nuclear waste canisters won't be successfully attacked, at great risk to the surrounding communities?

A5. A. In December 1998, the Office of Transportation Safeguards (OTS) (previously the Transportation Safeguards Division) conducted computer simulations, not force-on-force exercises. Force-on-force validation exercises were conducted in 1999, 2000, and 2001 and indicate that OTS is operating at "Low Risk." The objective of many security tests is to evaluate the effectiveness of plans and procedures. Many tests are designed to specifically identify vulnerabilities in security measures, which will result in a more effective security.

The Department conducts such exercises to learn about the strengths and weaknesses of its physical security systems and measures for safe transportation of strategic material. Therefore, these tests will actually benefit the security and safeguards of nuclear materials.

For current spent fuel shipments, NRC has imposed a security advisory that requires armed escorts to accompany the shipment. NRC is evaluating that advisory and is considering moving it to a regulation. Current shipments of spent fuel to DOE sites are following the NRC advisory. For shipments to a repository, NRC sets stringent physical security and safeguards requirements. NRC reviews its security regulations periodically to assess their adequacy and effectiveness. A comprehensive review has been ongoing as a result of the September 11 attacks. DOE will comply with any additional security requirements that are identified by NRC's review. With shipments not anticipated for at least eight years, DOE has time to fully analyze and prepare for any changing threat environment.

B. The spent nuclear fuel is transported in heavy, robust casks that are designed to contain their contents under severe accident conditions. The weight of the casks, the robust metal shielding that protects the spent nuclear fuel, and the high radiation field of unprotected spent nuclear fuel all would inhibit the process of obtaining spent nuclear fuel and assembling a dirty bomb. Further, because the spent nuclear fuel itself is not explosive, it would have to be incorporated with a conventional explosive. Thus, even if a terrorist attack were successful in diverting spent nuclear fuel, law enforcement agencies would have adequate time to respond due to the difficulty in assembling a "dirty bomb" made of spent nuclear fuel.

C. Yes, shipments of high-level nuclear waste are secure against armor-piercing incendiary rounds. According to Army Field Manual FM 23-65, an M8 .50 caliber armor-piercing incendiary round is for use against "lightly armored vehicles." Data from field manuals suggest that this ammunition should not penetrate the thick walls of a transportation cask. Additionally, because the cask content material is not flammable, the incendiary part of the munition is not effective even were it to penetrate the cask body.

D. Casks are designed and built to prevent release of their contents in all but the most severe attacks or accidents. Transportation casks are already capable of withstanding attacks from "readily available" ammunition.

Tests of transportation casks for assault from "not readily available munitions" (e.g., anti-tank weapons) have been conducted to determine their robustness. In the case of an attack by a military anti-tank weapon, tests and analyses conducted at Sandia National Laboratories show that only a very small fraction of the radioactive material would be released to the environment if the shield wall of a spent fuel transportation cask were penetrated by a military anti-tank weapon. Such a scenario has been analyzed in the Final EIS.

In the case of attack using a simulated tube launched, optically tracked, wire guided (TOW) missile, a test performed at the Aberdeen Proving Grounds is often cited. It is important to recognize that the test at Aberdeen was not indicative of testing for NRC-licensed transportation casks. First, the Aberdeen demonstration

used a storage cask, not a transportation cask. Second, the explosive device was attached to the side of the storage cask, not fired at it. Third, the storage cask was made of a material, nodular cast iron, which NRC has steadfastly refused to certify for transportation casks for many years. The American Society of Mechanical Engineers also has refused to approve this material as suitable for containment structures in spent fuel shipping casks.

Q6. It is my understanding that as part of the DOE's transportation plans there might be as many as 3000 barge shipments of nuclear waste, into major ports throughout the Northeast, and other sites throughout the country. Why does the DOE plan on using barge shipment? How does the DOE plan on doing this safely without risking a terrorist attack?

A6. DOE has stated a preference for mostly-rail transport. The EIS assumes that sites being served by a railroad would use rail and that the 24 sites that do not have rail service, but that can handle large rail casks, would move the casks to the nearest rail facility using heavy-haul trucks. Of the 24 sites that do not have rail service, 17 are on navigable waterways, so the EIS also contains a sensitivity analysis to understand the impacts if all 17 of these sites shipped casks to nearby rail facilities via barge instead of heavy-haul truck.

As evaluated in this sensitivity analysis, there could be up to 1,575 barge shipments during the 24 years of shipments to a Yucca Mountain repository.

The sensitivity analysis for this limited use of barge in no way commits the OCRWM to using barge transport, nor does it indicate any current intention to do so, but was included to ensure that the Final EIS contained all reasonably foreseeable actions. Although OCRWM has expressed a preference for the use of rail for shipping, detailed decisions such as how to move casks from the 24 sites without rail access have not been made. These decisions would reflect agreements reached between OCRWM and the utilities and consultations with stakeholders, including representatives of States, tribes and local communities. In any event, because there would be limited use of barges over short distances, the likelihood of an accident would be small. In addition, because shipping casks are designed to withstand severe transportation accidents, an accident severe enough to release radioactive materials into a waterway is not reasonably foreseeable.

The safety of barge shipments, including consideration of sabotage, is addressed through requirements of the U.S. Coast Guard and NRC. In current barge or water shipments, the Coast Guard provides an exclusion zone, which prevents other ships from entering a space around a ship or barge. The Coast Guard has enforcement authority and can arrest or use force to prevent other ships from encroaching on that exclusion zone. Because of the attacks on September 11, 2001, Government agencies are reexamining the protections built into physical security and safeguards systems. The Department will meet requirements that result from this reexamination.

GAO Report

Q1. If Congress over-rides Nevada's disapproval of Yucca Mountain, DOE is required to submit a license application to the NRC within 90 days of the site recommendation becoming effective. You stated during the hearing that you would resolve all of the technical issues prior to submitting a license application.

A. Will DOE be prepared to submit a license application to the NRC for Yucca Mountain within the next several months?

B. If so, how, since the NRC has indicated that 293 complex technical issues must be resolved before it would be able to accept a license application?

C. Is it DOE's intention to submit a incomplete license application that cannot be accepted by the NRC, or is it your intention to submit the application once you have resolved all 293 of the outstanding technical issues?

D. Bechtel has indicated that at least 10 of the 293 technical issues will not even be resolved by 2004. Will you wait until all of the 293 technical issues are resolved prior to submitting the license application to the NRC?

A1. A. Our current plans call for filing a license application at the end of 2004, assuming that Congress acts to override the State of Nevada's notice of disapproval this summer. This schedule was presented in my comprehensive statement that accompanied my February 14, 2002, recommendation to the President and in my Fiscal Year 2003 budget submittal to Congress.

B. Many have misrepresented these "complex technical issues." I am happy to clarify them for you. NRC's November 2001 *Sufficiency Letter,* required by section 114(a)(1)(E) of the Nuclear Waste Policy Act, stated that, based on agreements and interactions with DOE, it believes that *"sufficient at-depth site characterization analysis and waste form proposal information, although not now available, will be available at the time of a potential license application such that development of an*

acceptable license application is achievable." NRC reached this conclusion through extensive consultation and review of our scientific and technical work.

This interaction identified nine "key technical issues" that we agreed to address by the time of license application. To address these nine issues, 293 technical agreements were made with NRC. These agreements are largely documentation and data confirmation that will be submitted to NRC within the next two years.

C. Much progress has been made to address these issues. When my recommendation was sent to the President, my staff completed one-third of the necessary work to fulfill these agreements, and closed 23 agreements. Today, just two months later, 21 additional agreements have been documented as closed. We have submitted the information to close an additional 10 agreements. By the end of this fiscal year, 58 agreements will be closed. We will continue working with NRC to close the remaining agreements and expect to submit a license application that will be accepted by NRC.

D. The 10 agreements that we expect to remain open involve efforts to monitor performance and to obtain additional scientific and technical data. NRC has agreed to our disposition plan for this work.

Q2. According to the GAO report, DOE stopped using the cost and schedule baseline for Yucca Mountain in 1997. For example, when the FY 2000 appropriation for Yucca Mountain was $57.8 million less than the request, DOE did not adjust the baseline costs and schedule, but instead deferred some planned technical work.

A. Isn't it typical for DOE to require program managers to alter the baseline for a large project when it substantially changes? If so, why haven't you done so for this project?

B. When will the baseline costs and schedule been adjusted to reflect shortfalls in the expected appropriations levels and other unexpected changes?

C. What would the new schedule for submitting the license application have been if the baseline had been changed appropriately?

D. If you don't adjust the baseline to reflect major changes, how can you know when you will be ready to submit the license application? Are you just planning on submitting whatever you have completed at the time your original baseline estimated you'd be ready, even if that baseline no longer applies?

E. My understanding is that because of the uncertainties in the baseline, cost estimates for Yucca Mountain range from $54 billion to a high of hundreds of billions if you factor in costs such as transportation and security factors. How can you provide Congress with an accurate cost estimate if you don't make the necessary changes in the baseline?

A2. A. The Program has not had substantial changes. Since 1989, we have forecasted a 2010 date for waste acceptance at a repository at Yucca Mountain. The Director of OCRWM submits quarterly project performance reports to the Office of the Secretary that measure performance against the original baseline. These quarterly reports describe congressional and other external impacts on cost and schedule performance including forecasts of both schedule slips and cost overruns. Since 1997 these quarterly project performance reports have accurately forecasted cost and schedule for the site recommendation decision and license application submittal.

B. We are awaiting Congress' decision on overriding the State's disapproval. If a decision to proceed is made, I expect a revised baseline for the Civilian Radioactive Waste Management Program to be completed in early FY 2003.

C. When a projected milestone completion date slips, it is common practice to report a variance against the previously forecast milestone date prior to revising the baseline. The Program has been reporting variance against the baseline on a quarterly basis. The current forecast milestone completion date is not affected by the procedural step of revising the baseline. The Program will revise the baseline for the Yucca Mountain repository design and licensing phase once a decision to proceed is made by Congress.

D. As stated above, the Director of OCRWM submits quarterly project performance reports to the Office of the Secretary that measure performance against the original baseline. These quarterly reports describe congressional and other external impacts on cost and schedule performance including forecasts of both schedule slips and cost overruns. Since 1997 these quarterly project performance reports have accurately forecasted site recommendation and license application cost and schedules.

E. The current Analysis of the Total System Life Cycle Cost, published in May 2001 (Document #DOE/RW-0533), presents a $57.5 billion cost estimate for the Civilian Radioactive Waste Management Program. This estimate includes repository, waste acceptance, storage and transportation, program integration, and institutional costs over the life of the Civilian Radioactive Waste Management Program from inception in 1983, site recommendation in 2002, through repository construction and start of operations by 2010, to decommissioning in 2119.

Q3. According to the GAO report, NRC's Advisory Committee on nuclear waste has raised concerns about the models that DOE is using to predict how water and radionuclides might travel through the repository and therefore how quickly radioactivity would be released to the environment. The Advisory Committee believes that DOE has used inconsistent assumptions and assumptions that are not supported by experimental evidence.

A. Do you plan to redo these models to correct the problems prior to submitting a license application to the NRC? If not, why not, since the rate at which radioactivity is released into the environment is central to whether the Yucca Mountain site can be operated in a manner that is consistent with protecting public health and the environment?

B. How long will it take to develop accurate models?

A3. A. In its November 2001 letter, NRC stated that existing work and work that is planned to be completed would be sufficient for inclusion with a license application. We do not agree with the assertion that there is a problem that needs to be corrected. The process models used by the Yucca Mountain Project to predict water movement and radionuclide transport employ a mixture of conservative and realistic (i.e., supported by experimental data) assumptions. As additional information and experimental data becomes available, DOE plans to incorporate these refinements into the models for the Total System Performance Assessment (TSPA) for the License Application (LA). The TSPA-LA will provide a range of predicted responses that will cover the range of expected system behavior.

B. As indicated above, we do not agree that the models are inaccurate. Additional data inputs and model refinements to the updated TSPA-LA will be completed in the Spring of 2003. The final TSPA-LA shall be included with the LA scheduled for submittal in December 2004.

Nuclear Waste Technical Review Board Reports

Q1. You recommended Yucca Mountain to the President on January 10th. The Nuclear Waste Technical Review Board (NWTRB) submitted its comments on the DOE's scientific and technical work on January 24th.

A. Isn't it true that the NWTRB told DOE it was nearly ready to submit its comments on December 11, 2001?

B. Why did you make your recommendation prior to receiving the NWTRB's comments? Weren't the independent scientific advisory board's comments important to consider prior to recommending the Yucca Mountain site?

A1. A. Yes. In a December 11, 2001, letter, the NWTRB informed DOE that comments would be submitted within a few weeks. Those comments were received on January 24, 2002.

B. In fact, the Secretarial decision to recommend the site was provided to the President on February 14, 2002. In their letter of January 24, 2002, the NWTRB recognized "The Board makes no judgment 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."

Q2. In your testimony you state that the DOE's scientific inquiries and modeling clearly demonstrates that a repository at Yucca Mountain can meet the EPA radiological exposure standards. However the January 24th report of the NWTRB notes that the DOE has not published updated calculations of radiological doses based on the recent travel time estimates in the Technical Update Impact Letter report.

A. Have these calculations been done?

B. If so, why haven't they been published? Have they been independently reviewed? By whom?

C. If not, when will they be completed? Without these calculations, how can we know that Yucca Mountain can meet the EPA standard?

A2. A-B. Updated calculations of the expected impact of radiological dose will be included in the License Application-Total System Performance Assessment.

C. The travel time calculations presented in the Technical Update Letter Report indicate that refinements to the transport model result in longer travel times. As a result, Yucca Mountain would still meet the EPA standard because longer travel times delay and reduce the expected radionuclide dose due to an increased potential for matrix diffusion and sorption. Consequently, performance of the calculations would result in a decreased dose, not an increase, and so confidence in the ability of the site to still meet the EPA standard would not be compromised. Updated dose calculations will be part of our preparation for submittal of a license application to NRC and these calculations will include refinements to the transport model.

Q3. You have expressed great confidence in the ability of the canisters to contain the radioactive waste over long periods of time. Peak temperatures in the repository could reach 350 degrees but, as the NWTRB report notes, DOE has essentially no data on canister corrosion for temperatures above 275 degrees. Why have these studies not been undertaken prior to recommendation? Isn't it true that without this data we really have no idea how the engineered barriers will perform in the repository?

A3. The Yucca Mountain Project has conducted extensive testing and modeling of these waste packages and engineered barriers and has a strong technical basis for understanding their behavior. DOE has conducted corrosion tests on both spent fuel and waste package containment barrier materials at relevant temperatures. Peak temperatures in the repository will occur in the spent nuclear fuel rods contained within the waste packages. We have used temperature limits for waste disposal system design so that the spent fuel rod cladding cannot exceed 350 °C to maintain cladding integrity. For the reference Site Recommendation waste disposal system design, peak spent fuel rod cladding temperatures are expected to be about 285 °C. A much lower peak temperature of 180 °C is expected in the waste package containment barriers that surrounds the spent fuel assemblies. This peak temperature of 180 °C is the relevant value for the waste package containment barrier surface.

Consistent with these anticipated peak temperatures, we have conducted corrosion performance tests on spent fuel specimens, including the cladding, at temperatures from 175 °C to 325 °C. In addition, we have conducted corrosion tests on waste package containment barrier materials at temperatures under which corrosion is most likely (60 °C to 120 °C). At temperatures above 120 °C, a significant amount of corrosion is not expected because liquid phase water is not anticipated. Even for conditions where salts would facilitate the formation of water on the waste package surface, this would most likely occur below 120 °C. We are continuing short-term and long-term corrosion tests to improve our understanding and decrease uncertainties about how the engineered barriers will perform in the repository.

Q4. In your testimony, you state that the geology of Yucca Mountain provides natural adsorption, retarding any potential radionuclide movement. But a 1999 study at the Nevada Test Site by scientists from Lawrence Livermore National Laboratory has shown that plutonium can migrate in a short amount of time (50 years or less) and a 2001 study from Los Alamos National Laboratory has shown that the zeolite minerals adsorb only a few of the radioactive elements and that these are the elements with the shortest half-lives. In light of these studies, how can you be sure that the radionuclides will be contained in the geological barriers?

A4. The results reported by the Lawrence Livermore scientists regarding the detection of plutonium at the Nevada Test Site must be considered in their proper context. The study deals with the detection of plutonium in association with colloids following sampling of groundwater down-gradient from a large nuclear weapons test detonated "beneath the water table." However, the portion of the down-gradient distance that can be attributed to the effects of "prompt injection" is unknown.

It was never expected that all radionuclides would adsorb on minerals at Yucca Mountain. However, the natural system would indeed provide potential retardation through adsorption for many radionuclide species.

The Project has considered the potential effects discussed above and addressed the impact of colloid-facilitated transport through its unsaturated zone and saturated zone transport modeling. The results indicate that, even when conservative assumptions (i.e., those tending to promote the most rapid transport) are applied, the site still performs satisfactorily and the EPA radiological dose standard can be met.

QUESTION FROM CONGRESSMAN ED MARKEY

General Question

1. A November 2001 report by the DOE Inspector General reported that Winston and Strawn was simultaneously employed as counsel to the DOE working on the Yucca Mountain project, and as a lobbyist working for the Nuclear Energy Institute. Winston and Strawn has since resigned from their DOE role due to the obvious conflict-of-interest. What have you done to independently verify the work Winston and Strawn did for DOE on Yucca Mountain?

A1. In its report, the Office of Inspector General did not reach any final conclusion as to whether Winston and Strawn's representation of the Nuclear Energy Institute constituted a conflict-of-interest. Moreover, the report did not find any indication that Winston and Strawn's activities for, or relationships with, the Nuclear Energy Institute caused it to compromise the contract on the Yucca Mountain Project or in any way influenced the legal advice it provided to the DOE. As the inquiry report states: "Department officials did not identify to the Office of Inspector General any

evidence of compromise" and in fact "stated that Winston and Strawn had urged the Department to be more thorough than it had been concerning the Yucca Mountain Project." On November 29, 2001, there was a mutual agreement between the DOE and Winston and Strawn to discontinue the contract.

DOE does not believe that the information developed during the period of time of Winston and Strawn's services is suspect or should be discarded as potentially biased. The scientific and technical activities associated with the characterization of the Yucca Mountain site were performed by leading scientific and technical experts in their respective fields, including numerous representatives of national laboratories and the U.S. Geological Survey. These activities and the results thereof were reviewed by numerous independent oversight agencies and peer groups, including the Nuclear Waste Technical Review Board and the Nuclear Regulatory Commission (NRC), and were made available for public review and comment during the site recommendation consideration process.

Winston and Strawn had a limited and indirect involvement in the entire site recommendation process. Key factors in the site recommendation decision involved scientific and technical judgments, not legal interpretations. In any event, the Department's Office of General Counsel supervised Winston and Strawn's work for the Department very closely and would, I am confident, have detected any effort to misrepresent the law had it occurred.

QUESTIONS FROM CONGRESSMAN RADANOVICH

Nuclear Waste Shipments

Q1. Can you explain how the number of sites at which nuclear waste is stored will be reduced from 131 to 1 with the opening of Yucca Mountain, and under what time-frame this might happen?

A1. It has never been the intent that 131 sites would be eliminated. Rather, the question is whether these commercial and DOE sites should continue storing spent nuclear fuel (SNF) on site, even after operations cease, thus providing no benefit while continuing to be burdened with storing waste near our population centers and waterways.

For commercial power reactors, all spent nuclear fuel (SNF) cannot be removed from the site until all reactors on that site are shut down. At the present time, there are 10 such sites from which SNF removal can begin shortly after the opening of Yucca Mountain. As additional reactors reach the end of their operating lives and are shut down, the operation of Yucca Mountain will allow the SNF to be removed from those sites as well. Substantial amounts of SNF would also be removed from operating reactors, allowing continued safe operations while limiting the need for on-site dry storage.

Similarly, SNF and high-level waste (HLW) would be removed from DOE sites such as Savannah River, the Idaho National Environmental and Engineering Laboratory, and Hanford for consolidation at Yucca Mountain, reducing costs for operation and maintenance and allowing cleanup to be completed at those sites. Disposition of some DOE SNF and HLW could begin soon after Yucca Mountain is scheduled to open, and DOE's current plans are to disposition all DOE SNF and HLW to a geologic repository by 2040. DOE is continuing to look at ways to expedite this schedule. Operation of Yucca Mountain would provide a destination for the SNF generated through beneficial operation of the numerous research and isotope production reactors in the United States and final removal of SNF after final reactor shutdown, allowing those sites to be shut down.

Nuclear Waste Storage

Q2. If we assume that DOE's most optimistic predictions are realized (and that it transports 4,000 tons to Yucca Mountain by 2014 and 3,000 tons a year thereafter), it will be 2038 when Yucca Mountain is filled to capacity. Do you agree that, using DOE's own projections, the amount of waste left at nuclear power plants around the country in 2038—when Yucca Mountain is filled to capacity—will be almost identical to the amount currently stored at those locations?

A2. The Nuclear Waste Policy Act currently limits the licensable capacity of Yucca Mountain to 70,000 MTU. However, the actual physical capacity of the mountain is believed to be considerably larger than this statutory limit.

We provided our projection of 105,000 MTU of civilian spent fuel by 2038 in the Final Environmental Impact Statement (EIS) for the Yucca Mountain repository. This is how others have derived how an amount equivalent to the 45,000 MTU present today would still be stored on site in 2038. However, these simplistic analogies ignore the reality that would exist without a repository at Yucca Mountain. The

entire inventory of 105,000 MTU would be stored at these sites, and many of these sites would have been permanently shut down by that point in time.

Rail Transportation

Q3. According to the Federal Railroad Administration, there were 176 train accidents last year in my state of California alone. This is an alarming number. We have a struggling industry that is starving for revenue to maintain its trains and tracks. At the same time, we want to increase by thousands the number of freight trains, carrying high-level radioactive waste, throughout the country. This is an important contradiction. Mr. Secretary, DOE's Environmental Impact Statements predicts that there will be 10 additional train accidents carrying spent fuel. Does the EIS statement assume that current problems with train infrastructure will be resolved?

A3. Our Final EIS estimated that there could be eight train accidents over a 24-year shipping campaign using the mostly rail option preferred by DOE. Over a 24-year shipping campaign for the mostly rail option, there would be approximately one rail shipment every other day.

In calculating the likelihood of accidents under a mostly rail scenario, we incorporate data on railway safety from the Federal Railroad Administration (FRA). The FRA is the agency responsible for enforcing Federally mandated safety standards for ensuring railroad safety throughout the Nation. According to FRA, the U.S. rail system experienced an accident rate of less than 4.2 accidents per million train miles in 2001.

The FRA establishes safety standards concerning the design, maintenance and inspection of our Nation's rail track. The FRA reviews the railroads' inspection records on both a routine, random, and programmed basis to ensure the integrity and effectiveness of the railroads' own inspection program. DOE expects that its accident experience with rail operations will be at least as good as that experienced in commercial rail service under the FRA's standards and enforcement.

RESPONSES FOR THE RECORD OF HON. GRETA JOY DICUS, COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION

QUESTIONS BY HON. EDWARD J. MARKEY

Question 1. How long, and at what temperature, can a transportation cask withstand exposure to fire before it fails? Has this been determined experimentally? If not, why not?

(A) The Baltimore Tunnel fire that occurred last summer burned for more than 3 days and reached temperatures of 1500 degrees. Do you plan on conducting experiments that subject casks to hotter and longer burning fires before certifying them? If not, why not?

Answer. NRC requires that all Type B radioactive materials transportation packages, such as those used to transport spent nuclear fuel, be evaluated for a fully engulfing fire accident with an average flame temperature of no less that 1475°F (800°C) for a period of no less than 30 minutes (10 CFR 71.73). Transportation casks must be subjected to an open pool fire test or analyzed for a fire event meeting the aforementioned criteria. Casks must maintain shielding and criticality control functions throughout the fire event and post-fire cool down. The basis for these requirements is a postulated transportation accident. While an analysis or experiment has not been performed to determine precisely when and at what temperature a transportation canister would fail, analyses have been undertaken to examine spent fuel cask behavior in severe fire environments resulting from transportation accidents.

The NRC has evaluated the Baltimore tunnel fire to see whether changes to these requirements are needed. Based on media reports on the Baltimore tunnel fire, and information provided by the National Transportation Safety Board (NTSB), the fire in the tunnel was fueled by a derailed tanker car carrying liquid tripropylene (car #52). When fire fighters were able to enter the tunnel, approximately 12 hours after the fire started, they observed that the tripropylene tanker car was no longer burning. This indicates that the most severe portion of the fire in the tunnel could not have lasted more than 12 hours.

In addition, the fire in the tunnel was most likely oxygen starved, due to the fact that the tunnel is poorly ventilated. This means that the fire did not have enough oxygen to burn efficiently. Therefore, the fire in the tunnel most likely burned longer and at a lower temperature than a well ventilated (open air) fire would have. For a comparable (open air) pool fire of 27 feet in diameter (the tunnel is 32 feet wide), the amount of tripropylene in the tanker car (28,800 gallons) would have

burned for approximately 6¼ hours, achieving a maximum temperature in the range of 1475°-1830°F.

The time-to-failure of a spent fuel transportation cask due to a fire exposure is heavily dependent on the temperature of the fire exposure and whether the fire is fully engulfing or not. The information that the staff has received on the Baltimore tunnel fire has provided a time (duration) of fire exposure, but has not provided the maximum temperature, temperature distribution, or how the temperature changed with time. The staff is currently pursuing an analysis to determine the temperatures in the Baltimore tunnel fire.

A preliminary analysis by the staff has sought to bound the Baltimore tunnel fire by assuming a uniform temperature of 1500°F. The spent fuel transportation cask used in the analysis is an NRC approved cask design that utilizes a welded stainless steel canister. The analysis assumed that the cask was immersed in a 1500°F fully engulfing fire for 12 hours, followed by a 20 hour cool-down period, and determined the maximum temperatures of the cask and fuel. Based on the maximum canister temperatures (which occurred during the cool-down period following the fire), the staff calculated the maximum stresses in the canister. The calculated stresses were below the failure limits for the stainless steel canister. The staff concluded that the analyzed transportation cask would have survived a 12 hour, 1500°F fully engulfing fire with no failure of the canister and no release of radioactive material. The staff will continue to investigate cask performance under severe accident conditions, and will determine whether a time-to-failure analysis is necessary.

Question 2. Are shipments of high level nuclear waste secure against armor piercing incendiary rounds? If so, how has this been verified? If not, why not, since a June 1999 General Accounting Office report entitled, "Weaponry: Availability of Military .50 Caliber Ammunition" concluded that more than 100,000 rounds of Pentagon-surplus armor-piercing incendiary rounds have been sold on the civilian market?

Answer. Various types of weapons that would produce damage much larger than expected from .50 caliber ammunition have been evaluated by NRC and DOE. The specific types of weapons and the results are considered sensitive information. These experiments demonstrated that military-type weapons that might possibly be available to a terrorist could produce a small hole in a single side wall of the cask such that a small fraction of the contained fuel might be released in a respirable form. The calculation indicated that this would be a relatively small release and that it would not result in any early fatalities. The consequences of such release would roughly parallel a severe transportation accident involving spent fuel.

The extensive security measures required by the NRC minimize the likelihood of sabotage events. First, the NRC currently has in place a set of regulatory requirements specifically for the physical protection of irradiated reactor spent nuclear fuel in transit (10 CFR 73.37). These regulations specify security requirements to protect these shipments. The NRC maintains a threat assessment capability that includes close and ongoing contacts with the Federal law enforcement and intelligence agencies. In addition, since the events of September 11, 2001, the NRC has issued several advisories to augment physical protection measures such as a need for armed guards throughout a shipment, not just in populated areas. The Commission is currently preparing Orders that will place these requirements in our normal regulatory framework.

Question 3. A test conducted at Sandia National Laboratory, and another conducted at Aberdeen Proving Grounds, experimentally demonstrated that readily available munitions can breach a nuclear waste canister. Will you require whatever canisters are ultimately chosen to be capable of withstanding attacks using readily available munitions? If not, how will you assure that the nuclear waste canisters won't be successfully attacked, at great risk to the surrounding communities?

Answer. Readily available munitions do not breach nuclear waste canisters. Antitank munitions of the type needed to breach a canister are not widely available. Nonetheless, as discussed previously, canisters have been tested against these types of weapons and the consequences were not severe.

Following the events of September 11, the NRC has recognized the need to reexamine basic assumptions underlying the current NRC security and safeguards programs. The NRC Chairman, with full agreement of the Commission, has directed the staff to undertake a thorough review of these programs. As the NRC completes these reviews, we will consider whether changes to our regulations are needed.

Physical protection consistent with NRC requirements for spent nuclear fuel in transit serves to minimize the possibilities for radiological sabotage. The Commission will supplement or revise its requirements, as warranted.

Question 4. The drop test used to test whether the casks can survive a crash reportedly use a crash speed of 35 miles per hour. Will you repeat these tests at

speeds of 65-70 miles per hour, the speed at which the trucks are likely to drive, prior to licensing?

Answer. NRC requires that casks be designed to survive a sequence of tests including a 9-meter (30-foot) free drop onto an unyielding surface in the most damaging orientation. The speed of a falling object after a 30-foot free fall from rest is 30 miles per hour. In an impact with an unyielding surface, essentially all of the impact energy is transferred to the cask, which maximizes the cask damage. In contrast, during real transportation collision accidents, much of the energy of the impact is not transferred to the cask, but absorbed by the vehicle and the impacted object. The free drop test, therefore, results in damage that would be expected in a vehicle crash at a much higher speed. NRC believes these tests do not need to be repeated at higher speeds because earlier studies have encompassed an extremely high fraction (over 99%) of realistic accident scenarios involving vehicle impacts.

Question 5. The puncture test used to certify casks reportedly tests a 40 inch drop of a cask onto a spike. Wouldn't a cask that, for example, fell off a bridge, be expected to drop further than 40 inches? Will you be testing a more realistic scenario before certifying any cask design, and if not, why not?

Answer. The hypothetical accident test sequence defined in NRC regulations (10 CFR Part 71) includes a 1-meter (40-inch) drop onto a 15 centimeter (6-inch) diameter puncture bar. This test is conducted for a cask design after the analysis of the results of dropping the same cask design, 9-meters (30-feet) onto an unyielding surface. The free drop and puncture tests must be performed in sequence and must consider the most damaging drop orientation. In addition the puncture test is designed to compound the damage from the drop test. Risk and accident analyses support NRC's conclusion that the regulatory test sequence for spent fuel casks encompass an extremely high fraction (over 99%) of realistic accident scenarios involving vehicle impacts.

Question 6. If Congress over-rides the state of Nevada's disapproval of Yucca Mountain as the permanent waste repository, DOE is required to submit a license application to the NRC within a few months of the site recommendation becoming effective. In your testimony, you state that it must be a "high-quality application." NRC has indicated that 293 complex technical issues must be resolved before it would be able to accept a license application, and the GAO report said that it would be years before this could be completed.

Would NRC accept a license application that was incomplete?

Answer. If the license application lacked information needed to begin a licensing review, we would regard the application as incomplete and would not accept and docket it. However, based on our interactions with the Department of Energy (DOE), it is our understanding that DOE has no intention of submitting an application which we would regard as incomplete.

Question 6. If Congress over-rides the state of Nevada's disapproval of Yucca Mountain as the permanent waste repository, DOE is required to submit a license application to the NRC within a few months of the site recommendation becoming effective. In your testimony, you state that it must be a "high-quality application." NRC has indicated that 293 complex technical issues must be resolved before it would be able to accept a license application, and the GAO report said that it would be years before this could be completed.

Would NRC act upon a license application that was incomplete?

Answer. As noted in response to the prior question, we would regard an application that lacked necessary information as incomplete and would not accept and docket it.

Question 6. If Congress over-rides the state of Nevada's disapproval of Yucca Mountain as the permanent waste repository, DOE is required to submit a license application to the NRC within a few months of the site recommendation becoming effective. In your testimony, you state that it must be a "high-quality application." NRC has indicated that 293 complex technical issues must be resolved before it would be able to accept a license application, and the GAO report said that it would be years before this could be completed.

For the unresolved technical issues for which the NRC and DOE have agreed about what information still needs to be submitted, would the NRC ever act upon a license application that did not include that information, even if that information was not going to be available until after 2004?

Answer. The Department of Energy (DOE) will need to provide enough information on the agreements for the Nuclear Regulatory Commission (NRC) to be able to commence a licensing review. For example, portions of a few agreements concern long-term studies related to performance confirmation, and as such, we expect that DOE will continue to collect certain information supporting these agreements for

some time after license application, should an application be filed. In these cases, initial test results, together with DOE's plans, procedures and schedules for the longer-term collection and review of such confirmatory information should suffice for us to begin a meaningful review and analysis of the license application. We expect that, in addition to the information included in the potential license application, DOE would continue to provide additional confirmatory information before NRC reaches a licensing decision.

Question 7. The Nuclear Waste Policy Act, as amended, allows the NRC 3 to 4 years in which to decide whether to license the repository after receiving the license application from DOE. If DOE submits an incomplete license application, how much longer than the 3 or 4 years allotted do you think it will take the NRC to complete its work?

Answer. The procedural regulations that govern submission of a license application for a potential high-level waste repository are contained in Subpart J (Procedures Applicable to Proceedings for the Issuance of Licenses for the Receipt of High-Level Radioactive Waste at a Geologic Repository) in 10 CFR Part 2. The 3-4 year schedule outlined in 10 CFR Part 2, Appendix D (Schedule for the Proceeding on Application for a License to Receive and Possess High-Level Radioactive Waste at a Geologic Repository Operations Area), would not start until the NRC's Director of Nuclear Material Safety and Safeguards determines that the application is complete and acceptable for docketing.

Based on our technical reviews and pre-licensing interactions, we believe that sufficient information can be provided at the time of a license application. The Department of Energy (DOE) and Nuclear Regulatory Commission (NRC) have reached and documented numerous agreements regarding the submission of additional information. Based on these agreements, DOE has committed to assemble the information necessary for an application that NRC can accept for review.

QUESTIONS BY HON. GEORGE RADANOVICH

Question 1. Under the Nuclear Waste Policy Act, the DOE shall file its license application with the NRC within 90 calendar days after the selection of the Yucca Mountain site (assuming Congress were to override Governor Guinn). Are you aware that DOE has now acknowledged that it will not be able to file a license application until at least December 2004? Do you believe that NRC may legally accept an application after expiration of the 90 days and must this application be complete, or may it be a partial application?

Answer. As noted above, the Nuclear Regulatory Commission (NRC) is aware that the Department of Energy (DOE) does not plan to submit a license application for a high-level waste repository until December 2004.

The Nuclear Waste Policy Act (NWPA) does not prohibit the NRC from considering an application after expiration of the 90 days. The NWPA states that in §114(d) the Commission "shall consider an application for a construction authorization for all or part of a repository in accordance with the laws applicable to such applications."

Question 2. You stated in your testimony that DOE must complete actions necessary to fulfill a large number of agreements with NRC for scientific work as well as back up information for prior assumptions. Will NRC require all of these agreements to be fulfilled prior to the submission of a license application by DOE?

Answer. No. The Department of Energy (DOE), however, will need to provide enough information on all the agreements for the Nuclear Regulatory Commission (NRC) to commence a licensing review. Portions of a few agreements concern longer-term studies related to performance confirmation, and as such, we expect that DOE will continue to collect certain information supporting these agreements for some time after submitting the license application. In these cases, initial test results, together with DOE's plans, procedures and schedules for the long-term collection and review of such confirmatory information should be sufficient for us to begin a review of the license application. We expect that, in addition to the information included in the potential license application, DOE would continue to provide additional confirmatory information before NRC reaches a licensing decision.

RESPONSES FOR THE RECORD OF GARY L. JONES, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT. U.S. GENERAL ACCOUNTING OFFICE

QUESTIONS FROM CONGRESSMAN ED MARKEY:

Question 1. Your report states that it will take until 2006 for DOE to be able to submit an acceptable license application to the NRC. DOE's response is that it will

submit a "shell" NRC license application, filling in the missing information in the years to come.

A. Do you believe that submitting a "shell" application that is missing hundreds of technical details that relate directly to whether the repository can be safely constructed is legal under the Nuclear Waste Policy Act?

Response: The Nuclear Waste Policy Act of 1982, as amended, sets out the timing of DOE's submission of a license application to the Nuclear Regulatory Commission (NRC), but does not specify the information that must be included. NRC has issued regulations establishing the requirements for a license application for the Yucca Mountain site, including a detailed list of the information that must be included in the application. The regulations state that information to be provided to NRC by a license applicant must be "complete and accurate in all material respects" and "must be as complete as possible in light of the information that is reasonably available at the time of docketing." In this regard, NRC commented on November 13, 2001, on its expectations for a license application. In its preliminary comments to DOE, NRC stated that, although significant additional work is needed prior to the submission of a possible license application, the 293 agreements reached between DOE and NRC staff regarding the collection of additional information and analysis provided the basis for concluding that development of an acceptable license application is achievable. When DOE submits the license application, it will be up to NRC to determine whether the application is acceptable under the Nuclear Waste Policy Act and NRC's regulations.

B. Do you believe that it will be possible for NRC to consider such an application, or are the unresolved issues just too fundamental?

Response: If the Congress approves the Yucca Mountain site for a repository license application this summer, DOE would then have 90 days to submit a license application to NRC. However, on the basis of NRC's comments, discussed above, it does not appear that DOE could provide an application that would be acceptable to NRC in that time frame. By the end of September, for example, NRC's staff expects that only about 60 of the 293 agreements with DOE on additional information needed for an acceptable license application may be complete. DOE recognizes that it would not be ready to submit an acceptable license application by the end of this year. In fact, DOE and its management contractor for the repository program—Bechtel SAIC Company, LLC—are attempting to develop a new baseline for the repository project that would result in submission of a license application in December 2004. According to the contractor's draft baseline proposal, and assuming adequate funding, DOE would complete the work required for all but 10 of the 293 agreements by that time. DOE is reviewing, but has not approved, the contractor's latest proposal. Under this scenario, it would be up to NRC to determine if the license application is sufficiently complete for NRC's acceptance and initiation of its formal review of the license application.

Question 2. Testimony that has been submitted by the Nuclear Energy Institute states that there is a "fundamental lack of understanding by the GAO about the repository siting process" because GAO reported that there are 293 technical issues that DOE should resolve prior to making a site recommendation. However, my understanding is that GAO did not say that a site recommendation could not be made without resolution of those 293 issues, but that a license application could not be submitted. Can you please clarify this matter for me?

Response: In our December 2001 report, we recommended that the Secretary of Energy consider (1) deferring a site recommendation for the Yucca Mountain site until DOE could meet the express statutory time frames that are triggered by a site recommendation by the President to the Congress and (2) including the results of DOE's ongoing technical work for NRC and the results of analyses of alternative approaches to the proposed repository in the Secretary's comprehensive statement of the basis for a site recommendation. Although we explicitly recognized that a site recommendation to the president was within the Secretary's discretion, we also concluded that such a recommendation at that time might be premature because of statutory timing requirements, the work remaining to be completed for an acceptable license application, and the relationship between the information required to support a site recommendation and a license application. Specifically, once the President, on the basis of the Secretary's recommendation and comprehensive statement, finds the Yucca Mountain site qualified for a license application and recommends the site to the Congress, the Nuclear Waste Policy Act requires DOE to submit a license application to NRC within about 5 to 8 months (assuming final approval of the site). DOE was not, and is not, in a position to meet that statutory timing requirement. Also, DOE was gathering and analyzing technical information required to satisfy 293 agreements with NRC. Completion of this work, according to NRC, was essential for it to accept a future license application from DOE. Fi-

nally, while a site recommendation to the president and a license application to NRC are separate processes, under the Nuclear Waste Policy Act and DOE's guidelines for determining if the Yucca Mountain site is suitable for a repository, DOE will need to use essentially the same data for both processes.

QUESTIONS FROM CONGRESSMAN GEORGE RADANOVICH:

Question 1. In your report on the Yucca Mountain program, the GAO recommends that DOE defer a site recommendation until it has completed the work needed to submit a license application. Can you give some indication of the nature of the work that remains to be done in the view of GAO?

Response: As discussed in our December 2001 report, DOE and NRC have negotiated 293 areas of study within the repository program where NRC's staff has determined that DOE needs to collect more scientific data and/or improve its technical assessment of the data before DOE could submit an acceptable license application. As of March 2002, according to NRC, DOE had satisfactorily completed work on 38 of these agreements. These 293 agreements generally relate to uncertainties about three aspects of the long-term performance of the proposed repository:

- The expected lifetime of engineered barriers, particularly the waste containers. DOE currently expects that the waste 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 physical properties of the Yucca Mountain site. 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 supporting information for the mathematical models used to evaluate the performance of the planned repository at the site. The NRC staff's concerns primarily relate to presentation of information that would provide confidence that the models are valid for their intended use, as well as verification of 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.

The 293 agreements on work that DOE would complete before submitting a license application provided, from NRC's perspective, one of the bases for the Commission to state, in its preliminary comments on the sufficiency of DOE's investigation of the Yucca Mountain site, that the development of an acceptable license application is achievable.

Question 2. The report prepared by GAO concludes that DOE cannot meet its longstanding goal of opening a repository in 2010. What, in your view, is a more realistic estimate for the opening of a repository?

Response: In our view, a more realistic estimate of an achievable date for opening a repository at Yucca Mountain is as early as 2012 to as late as 2015—assuming that adequate funding is provided each year to make this estimate achievable. Our estimate is based on the following three factors

- submission by DOE of a license application to NRC in January 2006, as estimated by DOE's managing contractor in its September 2001 detailed reassessment of the repository program;
- issuance of a construction license by NRC after the 3- to 4-year licensing period specified in the Nuclear Waste Policy Act;
- construction of enough of the repository to open it in the 4-year period projected by DOE or the 5-year period estimated by a DOE contractor that independently reviewed the cost and schedule for the project; the potential effect on the repository schedule of future annual appropriations.

Furthermore, our estimate could be optimistic for several reasons. First, the repository project is the first of its kind, and thus subject to relatively high levels of technical, cost, and schedule uncertainties. Second, according to DOE's managing contractor, its September 2001 detailed reassessment, the proposed schedule for completing outstanding work and submitting a license application in January 2006 did not include any cost and schedule contingencies. Finally, if DOE does not re-

quest and obtain funds in the amounts that it projects will be required to complete future site investigation, licensing, and construction activities on its schedule. In this regard, DOE stated, in an August 2001 report (*Alternative Means of Financing and Managing the Civilian Radioactive Waste Management Program,* DOE/RW-0546), that unless the program's funding is increased, the budget might become the "determining factor" in whether DOE will be able to accept wastes in 2010.

More recently, DOE and its managing contractor have developed another preliminary reassessment of the cost, schedule, and technical baseline for the repository program that, if approved and followed, could result in submission of a license application to NRC in December 2004, or 13 month earlier than the contractor's September 2001 preliminary reassessment. Achievement of this timing objective could, all other conditions remaining the same, lead to operation of the repository in the 2011 to 2014 time period.

NUCLEAR WASTE TECHNICAL REVIEW BOARD
May 22, 2002

Honorable JOE BARTON
Chairman
Subcommittee on Energy and Air Quality
Committee on Energy and Commerce
U.S. House of Representatives
2125 RHOB
Washington, DC 20515-6115

DEAR MR. BARTON: Thank you very much for the opportunity to present the views of the Nuclear Waste Technical Review Board at a hearing before the Subcommittee on Energy and Air Quality on April 18, 2002. Enclosed are responses to questions from Representatives Ed Markey and George Radanovich that were enclosed in your letter of April 22, 2002. The questions follow up on issues raised during the hearing.

As you know, the Board is charged by Congress with conducting an ongoing and independent review of the technical and scientific validity of activities undertaken by the Secretary of Energy associated with the management of the country's commercial spent nuclear fuel and defense high-level radioactive waste. The Board provides its technical views to help inform the larger consideration of issues that face the Department of Energy and Congress related to nuclear waste disposal.

Please do not hesitate to contact me or have your staff contact Bill Barnard, Board Executive Director, if you have questions related to the Board's responses or any other issue related to the Board's technical and scientific review.

Sincerely,

JARED L. COHON
Chairman

Enclosure

QUESTIONS FROM CONGRESSMAN ED MARKEY:

Question 1. In addition to the Nuclear Waste Technical Review Board (NWTRB), the International Atomic Energy Agency/Nuclear Energy Agency has reviewed the scientific and technical work of the DOE. They state in their review that "In general, the level of understanding of the hydro-geology of the site . . . is low, unclear and insufficient to support an assessment of the realistic performance." They continue "Until these questions are answered, it is not possible to develop a realistic conceptual model of the site, or to build a probabilistic saturated zone local model.' Do you agree with their assessment? Is the DOE's model unrealistic because of lack of data and basic understanding of physical process?

Answer: We agree generally with the concerns expressed by the International Atomic Energy Agency/Nuclear Energy Agency Peer Review Panel (International Panel) but would like to make several observations to put their comments in perspective. The International Panel comment cited above includes three elements: (1) an assessment of the realistic performance, (2) a realistic conceptual model of the site, and (3) a saturated zone local model. (In the context of this question, realism may be viewed as the set of models and assumptions that most nearly describes the natural and engineered repository system and produces neither overly pessimistic nor overly optimistic predictions of waste isolation.) The three elements are interlinked: A realistic performance assessment requires a realistic saturated zone site-scale model, and that requires a realistic conceptual model. Although the general concepts of the Yucca Mountain hydrogeologic system are understood, important details remain unresolved. Consequently, the performance estimates for the saturated zone in the Total System Performance Assessment for Site Recommendation (TSPA-

SR) may not be realistic. The TSPA-SR was the sole focus of the International Panel. Since that time, results released by the DOE in subsequent documents indicate that some progress has been made in addressing questions raised by the International Panel and in developing a credible conceptual model of the site. Those results have not been incorporated in performance assessments, however, and substantial work remains to be done to develop a realistic saturated zone site-scale model on which a realistic assessment of performance attributable to site hydrogeology could be based.

In answer to your question on the DOE's model, the Board stated in its January 24, 2002, letter report to Congress and the Secretary of Energy that it has limited confidence in current DOE performance estimates because of uncertainties created by gaps in data and basic understanding of the proposed repository system (including the saturated zone). The Board has recommended that, if policy-makers decide to approve the Yucca Mountain site, the DOE should continue a vigorous, well-integrated scientific investigation to increase its fundamental understanding of the potential behavior of the repository system. Increasing understanding could show that components of the repository system, including the saturated and unsaturated zones, 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.

Question 2. The DOE is relying heavily on the ability of the canisters to withstand corrosion and contain the radioactive waste for long periods of time. The NWTRB report states that essentially no corrosion data exists for conditions above 275 degrees (120° C), despite the fact the repository could reach temperatures as high as 350 degrees (165° C). In your opinion, can the DOE make any real assessment of the engineered barriers above 275 degrees? What are some of the effects that elevated temperatures could have on the canisters?

Answer: To answer your second, more general, question first: The severity of corrosion tends to increase with increasing temperatures. In fact, some forms of corrosion are not even observed unless the temperature exceeds a certain threshold value. This applies to essentially all alloys and metals used as construction materials, including Alloy 22, the material that the DOE has chosen to provide corrosion resistance for its waste package. In addition, and perhaps more important, predicting the chemistry (composition and strength) of salt solutions contacting the waste packages becomes more difficult and more uncertain with increasing temperature. The type and severity of corrosion depend on the makeup of those solutions.

Regarding your first question, data on the chemistry of salt solutions that may contact the waste package as well as data on corrosion of Alloy 22 exposed to such waste package environments are both essentially nonexistent for temperatures above 120° C. These key data needed to assess the likelihood that corrosion could penetrate waste packages during the 10,000-year regulatory period. This absence of information weakens the technical basis of the DOE's performance estimates for its high-temperature, base-case repository design. Uncertainty about waste package performance decreases, however, with lower repository temperatures because more corrosion data and more data on the chemistry of salt solutions that may contact waste package surfaces are available. Uncertainty also is reduced with low temperatures because corrosion severity generally decreases as temperatures decrease. The Board believes, therefore, that confidence in waste package and repository performance potentially could increase if the DOE adopts a low-temperature repository design. However, a full and objective comparison of high- and low-temperature repository designs should be completed before the DOE selects a final repository design concept.

Question 3. The DOE only has 2 years of corrosion data for alloy 22 based canisters, yet they are extrapolating this data to 10,000 years. Is this acceptable? Is there currently any way to adequately determine the integrity of these canisters 10,000 years in the future?

Answer: Alloy 22 relies on the formation of an ultrathin passive (i.e., nonreactive) film for its corrosion resistance. The DOE's models predict that corrosion will not penetrate Alloy 22 waste packages for at least 10,000 years, perhaps for longer than a million years. However, experience with Alloy 22 and comparable alloys spans only several decades, and experience with alloys that rely on passive films for corrosion resistance spans only about a century. Although a few natural or man-made materials have been identified that might provide insights into the long-term passivity of metals, none has been confirmed yet as a suitable analogue. Thus, this type of corrosion resistance over many thousands of years can be extrapolated only by using theories and assumptions. At this point, on the basis of the information developed by the DOE and others, Board members believe that claims of minimum waste

package durability of a few thousand years to a few tens of thousands of years are not out of the question. Underlying this belief are the following suppositions: that temperatures and chemical conditions on the waste-package surface will be no more severe or uncertain than those in the DOE's preliminary analysis of the low-temperature operating mode; that supporting research will be continued to fill in data gaps and to rule out unexpected modes of failure; that research, development, and demonstration of waste-package welding, fabrication, and inspection are completed successfully; and that no major "surprises" are found.

Question 4. The Chlorine-36 "fingerprints" of above ground nuclear testing have been found in the interior of Yucca Mountain, suggesting that water from the surface can migrate 1000 feet to the repository level of the mountain within 50 years. What are the implications of this data for contamination of the ground water below the repository? What are the implications for corrosion of the canisters?

Answer: The discovery of elevated amounts of chlorine-36 (a product of nuclear testing in the 1950's) at the depth of the proposed repository at Yucca Mountain would provide direct evidence of the existence of "fast paths// through which rainwater could travel from the surface of Yucca Mountain to the repository horizon within about 50 years. However, questions have been raised about the validity of the results of the original chlorine-36 study that showed evidence of such fast paths. In 1999, the DOE sought to validate the original tests. Scientists using different testing procedures have shown differing estimates of the amount of chlorine-36 present in the underground rocks. The validation study is still under way, and the DOE has not reached any conclusions. The DOE's current models of repository performance are based on the general assumption that some fast-flow paths do exist in Yucca Mountain.

To answer the question on the effects of possible fast paths on groundwater contamination, it would be necessary to verify that they exist and to estimate the volume of water being transported along the pathways under current and future climate conditions. The chlorine-36 validation study may resolve the question of the presence or absence of fast pathways for water flow. Estimation of the volumetric flux associated with fast pathways requires additional investigations, some of which are ongoing and some of which are planned.

In terms of the effects of fast paths on waste package corrosion rates, if the assumption is (as the DOE's is) that corrosion proceeds as rapidly under high-humidity conditions as under dripping conditions (a reasonable assumption), whether fast paths are present or absent has essentially no effect on waste package corrosion rates. However, larger fluxes of water generally result in shorter times of radioactive waste isolation. Current models, based on multiple lines of evidence, do not allow for large volumes of water to flow through these fast pathways. If the current thinking is found to be incorrect, then radionuclide transport predictions may need to be revised.

Question 5. Secretary Abraham said in his testimony that Yucca Mountain will meet the EPA radiological exposure standard. But the NWTRB report notes that DOE has not published updated calculations of radiological doses based on the recent travel time estimates. Is the Secretary's statement premature? Can DOE be confident that Yucca Mountain will meet the EPA's standard without having completed these calculations?

Answer: The DOE's performance calculations should be updated to take into account new information on travel-time estimates. However, because many things, in addition to groundwater travel times, affect the DOE's projections of compliance, the effect of revised travel-time estimates on judging compliance with the EPA standard may not be large. For example, current DOE models show that the waste package will last longer than the 10,000-year compliance period.

The Board believes that the technical basis for the DOE's current repository performance estimates is weak to moderate. The question of whether the Secretary's statement is premature depends on how much uncertainty one finds acceptable at this decision point. That is a policy question, which is outside the Board's technical and scientific mandate.

Question 6. Spent fuel—uranium dioxide—will be the majority of the stored waste in Yucca Mountain. What will happen to the fuel rods as they sit in the repository? Will they rust? Has the DOE considered the effect of rusting in their assessment of Yucca Mountain and containment of the radioactive waste?

Answer: The spent-fuel rods consist of uranium dioxide pellets enclosed in metallic cladding. The cladding for the vast majority of the rods is zircaloy, a very corrosion-resistant alloy of zirconium. Once the cladding is exposed to aqueous or high-humidity environments (e.g., after penetration of the waste package), the cladding will begin to corrode. Eventually, corrosion will cause the cladding to fail after thousands of years. The DOE has considered cladding corrosion in its performance as-

sessment models. However, the Board believes that the DOE's current level of understanding of cladding performance is incomplete and should be improved.

QUESTIONS FROM CONGRESSMAN GEORGE RADANOVICH:

Question 1. Would you agree with the statement "Geologic isolation cannot and will not play any significant role at the Yucca Mountain repository?"

Answer: No, the statement is too strong. Although the DOE's current estimates of repository performance rely heavily on components of the engineered barrier system, the natural barriers do play a role. Further analysis and the reduction of uncertainties will permit a more realistic assessment of the relative significance of the contribution of the engineered and natural barriers in the proposed repository system.

Question 2. What is the NWTRB opinion of the ability of the man-made containers to meet the NRC and EPA standards for radioactive release into the environment?

Answer: At this point, on the basis of the information developed by the project (and others), Board members believe that claims of minimum waste package durability of a few thousand years to a few tens of thousands of years are not out of the question under relatively mild and less uncertain (lower temperature) in-drift conditions. Underlying this belief are the following suppositions: that temperatures and chemical conditions on the waste-package surface will be no more severe or uncertain than those in the DOE's preliminary analysis of the low-temperature operating mode; that supporting research will be continued to fill in data gaps and to rule out unexpected modes of failure; that research, development, and demonstration of waste-package welding, fabrication, and inspection are completed successfully; and that no major "surprises" are found.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAY 21 2002

OFFICE OF
AIR AND RADIATION

The Honorable Joe Barton
Chairman
Subcommittee on Energy and Air Quality
Committee on Energy and Commerce
U.S. House of Representatives
Washington, DC 20515-6115

Dear Mr. Chairman:

Thank you for your letter of April 22, 2002, regarding followup questions to the hearing of the Subcommittee on Energy and Air Quality on the proposed nuclear waste repository at Yucca Mountain, Nevada The response to the question you forwarded from Congressman Markey is enclosed.

Again, thank you for your letter. If you have further questions, please contact me or your staff may contact Lora Strine, in the Environmental Protection Agency's Office of Congressional and Intergovernmental Relations, at (202) 564-5711.

Sincerely,

Jeffrey R. Holmstead
Assistant Administrator

Enclosure

Enclosure

EPA Response to Congressman Markey's Follow-up Question
from the
U.S. House of Representatives
Committee on Energy and Commerce
Subcommittee on Energy and Air Quality
April 18, 2002 Hearing on
the Proposed Nuclear Waste Repository at Yucca Mountain

Congressman Markey
The EPA's standard for Yucca Mountain calls for compliance at a point 11 miles from the repository. The EPA's generic standard for disposal of radiological waste, which is used at the WIPP, requires compliance 3 miles from the boundary of the waste repository. Why is there a stricter standard for the low-level radioactive waste repository than for the high-level waste repository at Yucca Mountain?

EPA Response:
The difference in the point of compliance for EPA standards stems from the enabling legislation for the two facilities. While the point of compliance is different for Yucca Mountain and the Waste Isolation Pilot Plant (WIPP), the result is to provide protection to the nearest inhabitant to each facility.

EPA developed its generally applicable standards pursuant to the Nuclear Waste Policy Act of 1982 (and its 1987 amendments) (NWPA). These standards were intended to apply to any land disposal of spent nuclear fuel (SNF), high-level radioactive waste (HLW), or transuranic radioactive waste (TRU). As directed by the Waste Isolation Pilot Plant Land Withdrawal Act (WIPP LWA), EPA applied its generally applicable standards to the DOE TRU facility at the WIPP. These standards allowed a compliance point no greater than 5 kilometers (3 miles) in any direction from the facility. The nearest inhabitant to the WIPP facility resides about 6 kilometers from the WIPP facility, resulting in approximately a 1 kilometer buffer between the nearest inhabitant and the compliance point.

However, the WIPP LWA and the Energy Policy Act of 1992 exempted Yucca Mountain from EPA's generally applicable standards and directed EPA to set standards to apply specifically to the Yucca Mountain site. In fulfilling this mandate, EPA considered the features of Yucca Mountain that would influence radionuclide movement and public exposure patterns. EPA identified the nearest existing population in the likely path of contamination at approximately 20 kilometers south of the repository. Near-term land use plans indicate some industrial and residential use slightly north of this location, but expansion would be limited for two reasons. First, the Nevada Test Site (NTS) is and will likely remain under government control and unavailable for habitation for the foreseeable future. Second, the depth to ground water increases sharply as one moves a short distance toward the repository, making it less economically feasible to live much closer than the current population. Given these conditions, assuming a future population closer to the repository would have been exceptionally speculative. Therefore, EPA's standards permit the point of compliance to extend as far south as the NTS boundary, approximately 18 kilometers from the repository, which is protective of the current and reasonably expected future population. This location actually provides a 2 kilometer buffer between the current population at 20 kilometers and the compliance point.

THE PRESS DEMOCRAT • SATURDAY, APRIL 20, 2002

Energy policy primed by politics

Developments involving two desolate places and one lush one — the fertile Midwest — demonstrate how Congress plays with energy policy. Herewith a story of sexually ardent caribou, a governor vetoing a presidential decision in order to defend the sweetness of rural Nevada, and the political imperatives behind putting corn in your gas tank.

Although there is drilling for oil and gas in 29 wildlife refuges, the most fiercely contested question about the energy bill was about drilling on one-hundredth of 1 percent of the Arctic National Wildlife Refuge, which is described, by people more passionately devoted to preserving it than visiting it, as "pristine." Yes, and the moon's surface is pristine. Except ANWR is less so, because the moon does not have — as ANWR's coastal plain, where the drilling would have occurred, does — roads, military installations, an airstrip, a school, houses, stores.

GEORGE F. WILL

ANWR could produce at least 1.3 million barrels a day for 25 years, almost what we import from Saudi Arabia. The House of Representatives voted for drilling, but it lost in the Senate, which is the habitat of Democratic presidential candidates who burnish their environmental credentials by jumping through the hoop of opposition to ANWR drilling.

Some senators said that drilling would interfere with the reproduction of caribou. However, the herds have tripled in the three decades since opponents of the Trans-Alaska Pipeline said it would interfere with the caribou's reproduction. Many caribou even cluster around the heated pipeline, perhaps just for warmth, perhaps to do things from which a gentleman would avert his gaze.

Many opponents of ANWR drilling favor mandating higher fuel-efficiency for cars and trucks, which means lighter and less-safe vehicles. The National Academy of Sciences says existing standards contribute to 1,300 to 2,600 deaths — and 10 times that many serious injuries — every year. Nevertheless, stricter standards are favored by many people who were scandalized when President Bush temporarily suspended implementation of new regulations requiring even more reduction of arsenic in water. The Environmental Protection Agency estimated the regulations might save 28 lives a year.

Saving Nevada for the next Democratic presidential candidate (Bush carried it by 21,597 out of 608,970 votes cast), and perhaps winning two House seats this year are the Democrats' goals in opposing the use of Nevada's Yucca Mountain facility for storing nuclear waste. Nevadans are opposed to this use. A lot more

Americans are not: 160 million of them live within 75 miles of one of the 131 locations in 39 states where nuclear waste is stored.

For 50 years the government has studied what to do with nuclear waste, which now amounts to 77,000 tons. For 15 years it has studied Yucca Mountain, which is 90 miles northwest of Las Vegas, which fears that President Bush's decision to use Yucca Mountain will . . . what? That city's business is the satiation of various cravings of visitors who are not apt to avoid the city because nuclear waste is buried 90 miles away, 1,000 feet underground and resting on 1,000 feet of rock.

However, 20 years ago Congress provided a mechanism by which governors of states to which a president directs nuclear waste can conduct a minuet of defiance by vetoing a presidential directive.

Majorities in both houses of Congress can then override the veto.

Among Nevada's allies are Democrats interested in making Nevada feel put-upon by Bush. Also, people phobic about things nuclear, who stress putative dangers of transporting nuclear waste to Nevada, understand that the failure to solve the problem of waste disposal is one reason why no nuclear power generating plant has been built in a quarter of a century.

In the autumn of 2000 the price of gasoline went up a bit, an inconvenience for candidate Al Gore, so the Clinton administration, which felt the pain of a nation that has a low pain threshold when in the proximity of gasoline pumps, pumped oil out of the Strategic Petroleum Reserve, which exists to protect the nation against major interruptions of supply, not to knock a few nickels off the price of gasoline during a presidential election. For this election season, Senate Majority Leader Tom Daschle of corn-producing South Dakota proposes substantially increasing requirements for putting corn-based ethanol, for spurious clean-air reasons, in gasoline sold in various parts of the country.

Democrats are trying to hold hotly contested Senate seats in South Dakota, Minnesota, Missouri and Iowa. And a regularly recurring mental illness, Iowa Caucuses Dementia, which caused candidate Bush to become an ethanol subsidy enthusiast, afflicts the herd of Democratic presidential aspirants, which probably includes Daschle.

Absent an energy crisis, this is how energy policy is made. And this is how an energy crisis is made more likely.

George F. Will is a columnist for the Washington Post.

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