
ANNUAL REPORT

**FEDERAL PROGRAMS FOR THE MANAGEMENT OF
HIGH-LEVEL RADIOACTIVE WASTE**

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Acronyms

ASLB	The NRC's Atomic Safety and Licensing Board
CFR	Code of Federal Regulations
DEIS	Draft Environmental Impact Statement
DOE	Department of Energy
DOT	United States Department of Transportation
IRP	Integrated Resource Plan
MPC	Multi Purpose Canisters, designed and certified for transportation, storage, and disposal.
MRS	Monitored Retrievable Storage
Metric Ton	Throughout this report, the term "metric ton" of spent fuel is used as a short-hand for a more technical measurement called metric ton of heavy metal (MTHM), which is DOE's traditional measurement of spent fuel mass. MTHM refers only to the mass of plutonium, uranium, and thorium in the spent fuel. The actual mass of spent fuel is always larger than the mass of its heavy metals.
NRC	Nuclear Regulatory Commission
NWPA	Nuclear Waste Policy Act
OCRWM	DOE: Office of Civilian Radioactive Waste Management
PFS	Private Fuel Storage
SNF	Spent Nuclear Fuel
Xcel	Northern States Power Company, d/b/a Xcel Energy Inc.

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I. Executive Summary

During this reporting period there have been a number of significant events relating to the evaluation of Yucca Mountain as a potential site for a permanent waste repository. The Secretary of Energy has announced his intention to make a determination regarding the suitability of the Yucca Mountain site by the end of February 2002. According to the framework set out in the Nuclear Waste Policy Act of 1982 (NWPA), if the Secretary recommends the site, then the President will make a determination regarding whether to recommend the site to Congress. If the President recommends the site to Congress, any state can object to the selection by submitting a notice of disapproval. It appears virtually certain that Nevada will object to the selection of the Yucca Mountain location.

Under the procedure enacted in the NWPA, Congress will have a 90 day opportunity to essentially override the state disapproval notice by passing a joint resolution of both houses by a simple majority vote in each house.

Specific activities that have occurred this reporting period that support a possible repository site recommendation include:

- DOE release of a “Yucca Mountain Science and Engineering Report” (DOE/RW-0539). This report summarizes scientific and engineering studies over the last two decades at Yucca Mountain, including those completed since the publication in 1998 of the Viability Assessment of a Repository at Yucca Mountain.
- DOE release of a Supplement to the Draft Environmental Impact Statement (DOE/EIS-0250D-S). This Supplemental DEIS was developed to include changes in the design approach that the DOE presented in its Science and Engineering Report.
- The U.S. Environmental Protection Agency (EPA) published Final Rules for Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada (40 CFR part 197). This work establishes radiation exposure guidelines necessary for the design work being done by the DOE, and is to be used by the NRC in its licensing reviews.
- The DOE announced the availability of a report called the “Yucca Mountain Preliminary Site Suitability Evaluation” (DOE/RW-0540)(PSSE). The PSSE indicates that the repository is expected to meet the EPA radiation protection standards under all preclosure and post closure scenarios examined in the ongoing study process. The PSSE report also states that no items were found that would preclude the continuation of consideration of the Yucca Mountain site for the location of the waste repository facility.

- The DOE published in the Federal Register the “General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories; Yucca Mountain Site Suitability Guidelines; Final Rule 10 CFR Parts 960 and 963. These Final Rules are intended to assist the Secretary of Energy in reaching a judgment on the suitability of Yucca Mountain as a repository location.
- The NRC announced new Final Rules for use in a possible licensing decision on a potential radioactive waste depository in Nevada. These new rules were developed consistent with EPA policy on radiation protection.

Other high level nuclear waste disposal activity in the reporting period includes continued progress in developing a record for a possible decision on a private fuel storage facility proposed for Toole County, Utah. In June 2000, the NRC issued its Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians. A Final Environmental Impact Statement was released by the NRC on January 3, 2002. The proposed schedule calls for the NRC to issue an initial decision on the license by September 9, 2002.

An increase in the total quantity of high level radioactive waste that will have to be managed emerged in this reporting period when existing power plants applied to the NRC for twenty year extensions to their existing forty year operating licenses. So far the NRC has received license-renewal applications from eight companies for 20 of the nation's 103 operating commercial nuclear reactors. Six reactors at three separate plants have already had licenses renewed by the NRC. At least 26 licensees have publicly announced their intention to apply for 20 year license extensions in the next few years. The owner of the two Minnesota facilities, Xcel Energy, has not made a decision about seeking a license extension for Minnesota's plants.

The nuclear industry has shown that it is being affected by competition in the wholesale markets. A recent emerging trend in the nuclear industry is the reorganization of ownership, operational, and management structures for existing facilities. Industry consolidation is occurring in the form of new multiple plant owning and/or management entities that are primarily nuclear industry focused. Xcel Energy (dba Northern States Power (NSP)), the owner of the Minnesota nuclear power plants at Monticello and Prairie Island, has entered into an agreement with Nuclear Management Company (NMC) for operational management of these two Minnesota facilities.

II. Introduction

In January, 1983, President Reagan signed into law the Nuclear Waste Policy Act of 1982 (NWPA). 42 U.S.C. sections 10101 – 10270. The Act directed the U.S. Department of Energy (DOE) to locate two sites in the country where radioactive wastes from nuclear

power plants could be placed deep within the earth. The NWPAs, as originally passed in early 1983, required the DOE to site one repository by 1987, with operation by 1998, and a second repository a few years later.

Although Minnesota was not considered a potential site for the first repository when the NWPAs were passed in 1983, Minnesota was on DOE's list as a possible location for the second repository. In 1984 the Minnesota Legislature passed laws providing for state and public involvement in the federal siting process (Minnesota Laws 1984, chapter 453). A number of amendments to the law followed in subsequent years. Minnesota Laws 1985, Special Session 1985, chapter 1 and Minnesota Laws 1986, chapter 444. The laws that remain in effect today are codified at Minnesota Statutes sections 116C.705 to 116C.76.

In 1985 the Legislature created the Governor's Nuclear Waste Council, whose job it was to monitor the federal high level radioactive waste disposal program under the Nuclear Waste Policy Act (Minnesota Statutes section 116C.711 and 116C.712). The Governor's Nuclear Waste Council was comprised of several agency commissioners, four citizens appointed by the Governor, one enrolled member of a Minnesota Indian tribe, the director of the Minnesota Geological Survey, and additional citizens from areas of the state under consideration by DOE. The Legislature directed the Office of Strategic and Long-Range Planning to provide staff support for the Council.

On December 22, 1987, Congress amended the NWPAs to designate the Yucca Mountain site in Nevada as the sole site to be characterized for possible development as a repository. The DOE was directed to call off all activities on the search for a second site (42 U.S.C. section 10172). Today, all efforts to find a repository site are directed to the Yucca Mountain site in Nevada.

By statute the Governor's Nuclear Waste Council terminated when Minnesota was eliminated by DOE from further consideration as a repository site (Minnesota Statutes section 116C.712, subdivision 2). With the elimination of Minnesota as a potential site for the repository with the amendments to the NWPAs, the Council stopped meeting in June 1986. Recently there has been some interest expressed in reactivating the Nuclear Waste Council to focus on security issues, nuclear waste management, and potential Yucca Mountain decision processes.

In 1988, Minnesota Statutes were amended to require the Office of Strategic and Long-Range Planning to report annually to the Legislature on activities by the federal government relating to the federal high level radioactive waste disposal program (Minnesota Statutes section 116C.712, subdivision 5). The Office of Strategic and Long-Range Planning has prepared an annual report since 1987. The last report was prepared in June 2000. These reports are all available at the Minnesota Legislative Reference Library.

In this report the Office has attempted to provide the reader with an overview of the nuclear power industry in the United States, including the status of Minnesota's two nuclear power plants – the one at Prairie Island and the one near Monticello. The report

also summarizes efforts by the federal government to locate and construct a national repository for high level radioactive wastes and addresses other issues related to management of such wastes. The report also contains a discussion of recent activities by the federal government related to Yucca Mountain and describes upcoming activities. Finally, the report contains a brief chronology of major nuclear industry-related events to assist the reader in understanding the history of nuclear power, and lists a number of references that the reader may consult for more detailed analysis of these matters.

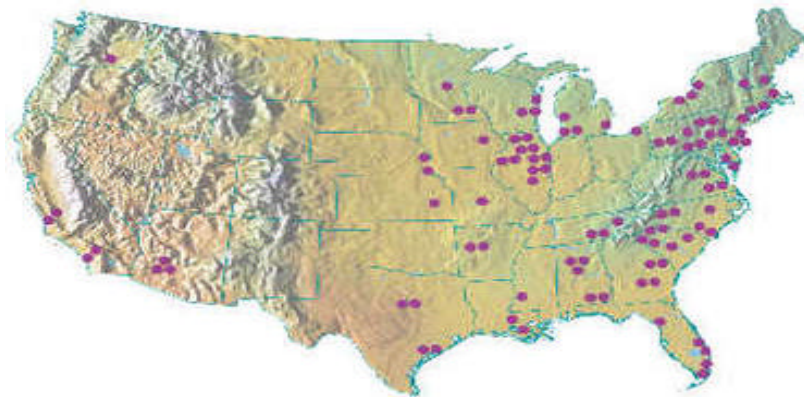
III. The U.S. Nuclear Power Industry

A. Nationwide Status

1. Number of Facilities

Currently there are 103 nuclear reactors operating in the United States at 64 sites in 31 states. The total rated electric output capacity of all these units is 95,301 MW. These plants represented 19.8% of total U.S. electrical energy generation in 2000. The map below shows the location of the nuclear reactors around the country.

LOCATION OF U.S. OPERATING NUCLEAR POWER REACTORS



From Nuclear Energy Institute website

On December 2, 1957, the first full-scale nuclear power plant went into service at Shippingport, Pennsylvania. The oldest operating plant in the U.S. is the Nine Mile Plant in New York state. Start up of that facility was in December of 1969. The newest plant in the country, the Watts Bar 1 reactor owned by the Tennessee Valley Authority, started operation in June of 1996. Licenses from the federal government for operation of a nuclear power plant are normally issued for a forty year period.

In the past few years, operators of nuclear power facilities have obtained approval from the NRC to upgrade the power capacity rating of 11 reactors, adding about 338 megawatts of capacity. Seventeen capacity rating upgrade applications are presently under review. The NRC expects that over the next five years, an additional 46 operators

will seek approval to upgrade the power capacity rating of reactors, potentially adding about 1,600 megawatts of generating capacity at existing nuclear power plants.

The capacity factors of operating nuclear facilities have been improving in recent years. The Nuclear Energy Institute reports the current industry average annual capacity factor is 89.6%.

2. Volume of Waste Generation

The process of generating electricity from a nuclear reaction involves the capture of heat released from the fission of elements contained in the fuel rods. Each fuel rod is about twelve feet in length and contains a large number of small pellets of uranium. The fuel rods are packaged in containers called fuel assemblies that contain a large number of fuel rods.

A controlled chain reaction in the reactor core transforms the uranium fuel in the fuel assemblies into other elements that are themselves radioactive. These radioactive byproducts of the chain reaction are “the waste” from the heat creating fission process that takes place in the reactor. In order to keep a continuous level of power generation, operating strategy at the plants typically involves replacing about 1/3 of the “burned up” fuel rods with new fuel during refueling shutdowns that take place at about fifteen month intervals. At refueling, a complete fuel assembly is replaced to avoid handling individual rods.

Originally, nuclear power plants were designed to store spent fuel at the reactor site in pools of water. This allowed for extended cooling of the fuel removed from the reactor and for radiation shielding of the continuing radioactive decay of the fuel. The pools at reactor sites have been gradually filling up with the spent nuclear fuel (SNF) as the operating time at each reactor increases.

As the pools fill up, various facilities have utilized dry cask storage technologies at the reactor locations to store the SNF. As of September 2001, there were 31 locations in the United States that have dry cask storage, and another 23 locations where dry cask storage options were under construction, or in planning and licensing activities (Status of Used Nuclear Fuel Storage at U.S. Commercial Nuclear Plants, www.nei.org).

The total amount of SNF currently in inventory at nuclear power plants in the United States, both stored in pools and in dry storage, is approximately 43,000 metric tons (Nuclear Waste News,, October 18, 2001). The storage capacity of the Yucca Mountain facility is capped by law at 70,000 metric tons of spent fuel (NWPA, 42 U.S.C. section 10134).

The repository is also required by statute to reserve a portion of its capacity for storage of waste from nuclear weapons facilities and Navy nuclear reactors. This defense-related volume is currently estimated to be about 7,000 metric tons of waste. That leaves about 63,000 metric tons of storage capacity for civilian reactor SNF. A total of 80,000 metric

tons is expected to be generated and needing storage by the year 2010 when the Yucca mountain facility is earliest available. Considering the known present plans for relicensing of existing plants, the DOE projects a total of 105,000 metric tons of commercial spent fuel is to be generated by the end of the additional 20 year relicense operating time period (Nuclear Waste News, October 18, 2001).

3. Role of the States

The federal government has generally pre-empted the states from regulating the health and safety aspects of nuclear power plants. Minnesota attempted in the early 1970s to set radioactive effluent limits for the Monticello plant. Northern States Power Company challenged the state in court, and in 1971, the United States Court of Appeals held that safety regulations fell squarely within federal jurisdiction and that the state was pre-empted (*Northern States Power Company v. Minnesota*, 447 F.2d 1143 (8th Cir. 1971)). The next year the U.S. Supreme Court upheld the decision (405 U.S. 1035 (1972)).

In 1983 the U.S. Supreme Court held that while Congress had pre-empted the states from regulating nuclear power plants with regard to safety and health, the states were not precluded from determining questions of need, reliability, cost, and similar state concerns. In *Pacific Gas & Electric Co. v. State Energy Resources Conservation & Development Commission*, 461 U.S. 190 (1983), the Supreme Court upheld a California statute imposing a moratorium on nuclear power plants until a permanent method of waste storage became available.

In 1994, the Minnesota Legislature passed a statute providing that the Minnesota Public Utilities Commission was precluded from issuing a certificate of need for a nuclear power plant (Minnesota Laws 1994, Ch. 641, art. 2, sec. 2, codified at Minnesota Statutes section 216B.243, subd. 3b). That statute reads, “The [public utilities] commission may not issue a certificate of need for the construction of a new nuclear-powered electric generating plant.”

4. Security Issues

The events of September 11, 2001, focused attention on the security of the nation’s nuclear facilities regarding the threat of possible terrorist attacks. The NRC put all nuclear plants on a level three security alert and initiated a “top to bottom” review of plant security needs shortly after the attacks. In a September 21, 2001, press release, they stated that “the NRC did not specifically contemplate attacks by aircraft such as Boeing 757s or 767s and nuclear power plants were not designed to withstand such crashes. Detailed engineering analyses of a large airliner crash have not yet been performed.”

Air space was restricted for a time above all nuclear facilities in the country. National Guard troops were deployed by some state governors at some plant locations. A survey conducted by the National Governors Association in November 2001 indicated that states had spent \$58 million in the first six weeks after September 11th on additional nuclear plant security.

On December 20, 2001 the NRC announced it would purchase potassium iodide and make it available to the states that request it. Potassium iodide, if taken in time, blocks the thyroid gland's uptake of radioactive iodine and thus would help prevent thyroid cancers and other thyroid diseases that might be caused by exposure to radioactive iodine that could be dispersed in a severe nuclear accident. The NRC has found that potassium iodide is a reasonable, prudent and inexpensive supplement to evacuation and sheltering for specific local conditions. The Commission left it to the states to make a final decision on whether to use it in their emergency preparedness program. In Minnesota, the Department of Health is reviewing this matter.

B. Minnesota's Nuclear Facilities

Minnesota has three operating commercial power reactors. Two reactors are located near Red Wing, Minnesota, at the Prairie Island facility owned by Xcel Energy, and one reactor is located near Monticello, Minnesota, also owned by Xcel Energy. All three reactors initially received a forty year operating license from the NRC.

Northern States Power Company, now a subsidiary of Xcel Energy, originally built and operated the facilities. The Monticello facility began operations in 1970. The Prairie Island units became operational in 1973 and 1974. In August of 2000, Xcel Energy entered into an agreement that allowed Nuclear Management Company to assume operating authority of both plants.

1. Prairie Island

The Prairie Island facility is a Westinghouse pressurized water reactor design. The plant houses two reactors, totaling 1,060 megawatts of capacity. Prairie Island Unit 1 began commercial operation in December 1973; Unit 2 in December 1974. In 2000, combined unit availability and annual capacity factor were 93 and 95 percent, respectively. The present NRC operating licenses expire in 2013 for Unit 1, and 2014 for Unit 2. As of the date of the company's last Integrated Resource Plan (July 2000), NSP had not made a decision about whether or not to relicense the Prairie Island facility. The amount of currently authorized on-site spent fuel storage will allow the plant to operate only until 2007.

The Westinghouse design includes the use of heat exchange equipment to transfer heat between the radioactive and non-radioactive portions of the power generation system. These exchangers are called steam generators. NSP projects that the steam generators at Unit 1 at Prairie Island will need replacement before 2009. Other plants of this Westinghouse design have required steam generator replacement prior to the end of the forty year license cycle.

Prairie Island was originally designed to handle up to 198 fuel assemblies in the spent fuel pool. It was anticipated that the storage would be only short term. However, with the absence of reprocessing facilities in the country, the pool quickly began to fill up, and

in 1977, the Minnesota Environmental Quality Council (the predecessor to the EQB) granted approval to Northern States Power Company to expand the pool capacity to 687 assemblies. In 1981, the Minnesota Department of Energy, which by then had jurisdiction over the matter, authorized NSP to expand again to 1386 fuel assemblies

In 1991, NSP applied to the Minnesota Public Utilities Commission for a Certificate of Need authorizing the construction of a dry cask storage facility at the Prairie Island reactor site. NSP asked for approval to install up to 48 casks, which would provide enough capacity to carry the plant through the end of its licensing period in 2013. The PUC authorized NSP to install 17 casks, and after legal skirmishes in the appellate courts, the Minnesota Legislature authorized NSP to install up to 17 casks under certain conditions (Minnesota Laws 1994, Ch. 641).

As of December 2001, Xcel Energy has 560 fuel assemblies stored in 14 dry casks on the pad at the on-site Dry Cask Storage Facility at Prairie Island. Xcel indicated in the July 2000 Integrated Resource Plan report that the plant can operate until 2007 with the combination of the existing pool storage and authorized dry cask storage.

Xcel estimates that a potential third reracking would create storage space in the pool for a total of 1920 storage spaces. The company projects that additional storage to provide a total of 2623 on-site fuel assembly storage spaces, in the form of a combination of reracking and/or dry casks, is necessary to allow operation to the end of the license period and to decommission.

The Public Utilities Commission has required Xcel Energy to secure contingent arrangements for additional capacity to replace the Prairie Island plant's energy in 2007, if no other spent fuel storage becomes available. (PUC Order Approving Xcel Energy's 2000-2014 Resource Plan, as modified, Issue Date: August 29, 2001, Docket No. E-002 /RP-00-787) On November 8, 2001, Xcel distributed a Contingency Request for Proposals to Replace the 1100 Megawatts of Capacity at Prairie Island.

2. Monticello

The Monticello facility is a General Electric boiling water reactor design. The date of first commercial operation was June 30, 1971. The plant has a single reactor, rated at 553 megawatt capacity. In 2000, the unit's availability and annual capacity factor were 84 and 93 percent, respectively. The existing operating license from the NRC expires in 2010. As of July 2000, the date of the last IRP filing, Xcel had not made a decision about whether or not to relicense the Monticello facility. The status of waste disposal issues will be a factor in the decision. In its 2000 Integrated Resource Plan filing, Xcel indicated that it will need to make a decision regarding whether to relicense Monticello in 2002-2003. The company expects that it will have to file an extension request at the NRC in 2004 for any Monticello relicense effort.

Monticello has seen no major design modifications since its start up in 1971. Between 1984 and 1987, NSP shipped 1058 spent fuel assemblies from the Monticello plant to the

Morris, Illinois, facility. NSP anticipates that there is enough pool storage capacity remaining at the facility to allow operation through the end of its existing operating license in the year 2010. In 1984 NSP began the first of several shipments of spent fuel assemblies from the Monticello plant to a General Electric facility waste storage pool in Morris, Illinois.

C. Reactor Relicensing Activities

Activity regarding relicensing of existing nuclear power plants has increased in this reporting period. Original licenses were for 40 years. NRC license extensions are being granted for an additional 20 years of operation. So far the NRC has received license-renewal applications from eight companies for 20 of the nation's 103 operating commercial nuclear reactors. The first, an application from Baltimore Gas & Electric, was submitted in April 1998, and to date six reactors at three separate plants have had their licenses renewed. At least 26 licensees have publicly announced their intention to apply for 20 year license extensions.

D. New Reactor Technologies

The NRC has approved three standardized advanced reactor designs. Two are large 1,350-megawatt "evolutionary" designs, and one is a smaller 600-megawatt design. The 600-megawatt design employs conventional reactor and power generation technology, but uses features such as stored water and gravity for safety functions as opposed to systems that use pumps and motors to move the water. A 1,000-megawatt version of the 600-megawatt design is undergoing a design review that may lead to certification.

The larger units are "evolutionary" nuclear plants. The NRC issued design certification for these plants in 1997. These are called "evolutionary" designs because the new designs build on previous designs, and on the experience and lessons learned from plants already operating around the world.

The third and smaller design is Westinghouse's AP600. This is called a "passive" design that relies on natural forces to increase safety. The AP600 is quite different from today's large plants; it uses proven technology and tested systems and components as much as possible. Its design relies on natural forces like convection and gravity flow of emergency cooling water, reducing or minimizing reliance on pumps, valves, emergency diesel generators and other components that ensure safety in today's plants.

Another new reactor technology, the Pebble Bed Modular Reactor (PBMR), is being introduced in an industry effort to revive nuclear power technology. The PBMR basic design concept, the high-temperature gas-cooled reactor (HTGR), has been commercially tried and abandoned over the past thirty years in England, France, Germany, and also in the U.S. at the now-closed Peach Bottom Unit 1 in Pennsylvania, and the Fort St. Vrain reactor in Colorado. Small HTGR non-power research reactors currently operate in

Japan and China. The concept has been offered by its proponents as an "inherently safe" design.

The current PBMR pilot project is a hybrid design based on these past HTGR efforts and is piloted by an international conglomerate created by U.S.-based Exelon Corporation (Commonwealth Edison, PECO Energy, and British Energy), British Nuclear Fuels Limited and South African-based ESKOM as a design basis for "merchant" nuclear power plants. This group plans to begin construction in 2002 of a full-size prototype of a 110 MW modular unit in Koeberg, South Africa. If the effort is successful, commercial operation would begin in 2006.

Exelon hopes to apply for a NRC license to begin construction of seven new reactors on an unspecified site in the U.S. by the summer of 2004. The PBMR is proposed as a standardized design that can be built in as little as two years, with multiple modular units combined onto a single site.

E. Nuclear Management Companies

A recent emerging trend in the nuclear industry is the reorganization of ownership, operational, and management structures for existing facilities. Industry consolidation is occurring in the form of new multiple plant owning and/or management entities that are primarily nuclear industry focused. In July, 1999, AmerGen Energy Inc. (a joint venture of the Philadelphia-based utility company PECO Energy Co. and British Energy PLC) agreed to buy the nuclear facility at Three Mile Island.

The Entergy Company has expanded into the competitive power market in the Northeast by purchasing Pilgrim Nuclear Power Station in Plymouth, Mass. (1999), Indian Point 3 in Westchester County, N.Y. (2000), James A. Fitzpatrick in Oswego County, N.Y. (2000), and Indian Point Units 1 & 2 in Westchester County, N.Y. (2001). Indian Point Unit 1 has been shut down and in safe storage since the early 1970s.

Constellation Nuclear of Baltimore has agreed to purchase Nine Mile Point. PSEG Nuclear LLC (PSEG) and PECO Energy Company (PECO) have purchased part interest in the Peach Bottom (PA) and Salem (DE) plants. Also, a nuclear facility operating consortium called Stars has emerged in the Western states.

Xcel, the owner of the Minnesota nuclear power plants at Monticello and Prairie Island, has entered into an agreement with Nuclear Management Company (NMC) for operational management of these two facilities. The corporate headquarters for NMC are located in Hudson, Wisconsin.

NMC operates six nuclear plants: Duane Arnold Energy Center in Palo, Iowa; Kewaunee in Kewaunee, Wis.; Monticello in Monticello, Minn.; Palisades in Covert, Mich.; Point Beach in Two Rivers, Wis.; and Prairie Island in Welch, Minn.

Under NMC's business model, each plant owner continues to own and market power produced by each nuclear unit. Each owner also remains financially responsible for each nuclear units' operating and maintenance costs. NMC expects that through its management structure, employees are better able to collaborate to improve operational performance and sustain long-term safety and reliability levels at the sites.

NMC-operated plants employ about 3,250 individuals and provide 4,500 megawatts of electricity. NMC operates nuclear units with existing employees, while a small headquarters staff in Hudson provides strategic direction and oversight for the site-based employees.

The NMC structure is unique among U.S. nuclear plant operators. Companies can join or contract with the organization to manage their plants without selling their nuclear assets (see www.nmcco.com).

IV. High Level Radioactive Waste Management

A. Nuclear Waste Policy Act

Under the Nuclear Waste Policy Act of 1982 (NWPA) and the 1987 amendments, the Department of Energy (DOE) is now limited to studying only the suitability of Yucca Mountain, Nevada, for housing a deep underground repository for spent nuclear fuel and other highly radioactive waste. The State of Nevada has fought DOE's efforts on the grounds that the site is unsafe, pointing to potential volcanic activity, earthquakes, underground flooding, nuclear chain reactions, and fossil fuel and mineral deposits that could be mined in the future. The proposed Yucca Mountain repository is not expected to open until 2010 at the earliest, more than a decade later than the 1998 goal for DOE to begin accepting waste as specified by NWPA amendments.

The safety of geologic disposal of highly radioactive waste, as planned in the United States, depends primarily on the characteristics of the geology surrounding the site from which a repository would be excavated. Because many geologic formations are believed to have remained undisturbed for millions of years, it appeared to the NWPA framers that it would be technically feasible to isolate radioactive materials from the environment until the materials decayed to safe levels.

But, as the Yucca Mountain situation indicates, scientific confidence about the concept of deep geologic disposal has turned out to be difficult to apply to specific sites. Much of the problem results from the inherent uncertainty involved in predicting geologic behavior for the 10,000-year period (or even longer) that nuclear waste is to be isolated. Opponents of geologic disposal have urged greater emphasis on new or alternative technologies that might allow entirely different approaches to high-level radioactive waste management. Both reprocessing and transmutation have been advanced as alternative methods to manage the waste (These waste management Strategies were described in more detail in the 1998 annual report prepared by EQB staff).

1. Yucca Mountain

a. Past Activities

In January 1998, the DOE officially defaulted on its 1987 NWPA Amendment directive to begin accepting spent fuel from electric utilities. This date and obligation had been the focus of legal challenges by states and utilities for several years, see *Indiana Michigan Power Co. v. Department of Energy*, 88 F.3d 1272 (D.C. Cir. 1996) and *Northern States Power Co. v. U.S. Department of Energy*, 128 F.3d 754 (D.C.Cir. 1997), and the driving basis for legislative efforts to develop an interim storage facility. The DOE default set off a new round of lawsuits and calls for legislative solutions. The suitability of the proposed Yucca Mountain, Nevada site was still being studied. A Nuclear Waste Reform Bill (S. 1287) that would have given DOE authority to build a temporary storage facility at Yucca Mountain failed to become law in the year 2000. Several utility companies have filed suit against the federal government for breach of contract.

In December 1998 the DOE released a “Viability Assessment of the Yucca Mountain Site”. This assessment was required by the 1997 Energy and Water Development Appropriations Act (Public Law 104-206-Sept.30, 1996). The Viability Assessment summarized all the study work done to date, and summarized work still remaining to be completed. The conclusion of this assessment was that the scientific and technical assessment of the Yucca Mountain facility should proceed.

In July 1999, the U.S. DOE issued a Draft Environmental Impact Statement (DEIS) on the Yucca Mountain repository proposal. The purpose of the DEIS is to consider the possible environmental impacts that may result from the construction, operation and monitoring, and eventual closure of a geologic repository at Yucca Mountain, Nevada. The DEIS evaluated the possible impacts of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain, as well as the possible impacts of not developing a geologic repository and continuing to store these materials at commercial and DOE sites.

The NRC staff, in its February 2000 formal comments to DOE on the DEIS, raised concerns about the completeness of the DEIS document. The NRC staff comments addressed the lack of an integrated and clearly defined proposed action, noted the DEIS failure to address fully the cumulative impacts, including whether non-radiological impacts of transportation within Nevada has been fully considered, and pointed out that measures to mitigate impacts were not thoroughly discussed. The NRC indicated that the DOE did not thoroughly discuss its strategies to mitigate potential impacts of the repository, and it recommended that the final EIS discuss the use of environmental monitoring to assess the effectiveness of mitigation.

The DOE's nuclear waste management program has been aimed at opening the repository no sooner than 2010. If the site appears acceptable, under the existing DOE plan schedule, DOE would recommend approval to the President in 2001 and, with Presidential and congressional approval, submit a license application to NRC in 2002.

DOE then hopes to receive the necessary NRC construction permit and operating license in time to allow waste disposal in the repository to begin in 2010. The repository is expected to be permanently closed and decommissioned by 2119. The most recent DOE estimate (May 2001) of the costs for the waste management program indicate that \$8.3 billion dollars have been spent so far (1983-2000), and an additional \$49.3 billion will be spent in the period between 2001-2119 (year 2000 dollars).

b. Significant DOE Activities In Reporting Period

In May of 2001, two significant milestones in the repository development process occurred with the release of two major study documents by the DOE.

On May 4, 2001, the DOE published notice of the availability of a “Supplement to the Draft Environmental Impact Statement” (DOE/EIS-0250D-S). This Supplemental DEIS was developed giving consideration to changes in the design approach that the DOE presented in its Science and Engineering Report (DOE/RW-0539). This supplement to the DEIS analyzed a “flexible design” scenario that focused on controlling temperatures in the rock between the drifts. The DOE announced in the May 4, 2001, Federal Register (Vol. 66, p 22540), that the Final EIS would limit its scope to only evaluate the facility using this “flexible design” analysis. Public hearings on the Supplement were held in May and June of 2001. A public comment period on the supplement ended on June 25, 2001.

On May 7, 2001, the DOE released its “Yucca Mountain Science and Engineering Report” (DOE/RW-0539). This report summarized scientific and engineering studies over the last two decades at Yucca Mountain, including those completed since the publication in 1998 of the Viability Assessment of a Repository at Yucca Mountain.

On August 21, 2001, the DOE announced in the Federal Register (Vol. 66 FR 43850) the availability of a report called the “Yucca Mountain Preliminary Site Suitability Evaluation” (DOE/RW-0540)(PSSE). The DOE notice also announced public hearing dates and a comment period ending September 20, 2001. The comment period was extended to October 19, 2001. On November 14, 2001, the DOE further extended the comment period another 30 days. The PSSE indicates that the repository is expected to meet the EPA radiation protection standards under all preclosure and post closure scenarios examined in the ongoing study process. The PSSE report section on preclosure activities states:

“The results of the preliminary safety assessment support a conclusion that the repository can operate in a range of preclosure periods within proposed public and repository worker dose limits and would be in compliance with the proposed standards for protection against radiation exposures and releases of radioactive material. Therefore, the criterion specified in proposed 10 CFR 963.14(a), the ability to contain radioactive material and to limit releases of radioactive materials during the preclosure period, has been considered.”

The main thrust of this statement is that the DOE analysis found that the repository should be able to operate during the period when waste is being put in place at the site in a manner that conforms to expected standards for worker safety and protection from radiation releases. The PSSE report stated that no items were found that would preclude the continuation of consideration of the Yucca Mountain site for the location of the waste repository facility, and that the DOE will continue its effort to reach a conclusion about the suitability of the Yucca Mountain site for a permanent waste repository facility.

The next steps for the DOE, based on results from the PSSE report, are presented in the Executive Summary:

“Based on the results of this preliminary suitability evaluation, which has been conducted in accordance with the DOE's proposed site suitability guidelines, DOE is continuing the process of determining whether to recommend the Yucca Mountain site for the location of a repository. The Yucca Mountain Science and Engineering Report and the Yucca Mountain Preliminary Site Suitability Evaluation provide information for public review and comment in advance of public hearings to inform the public, elected officials, affected units of government and Indian tribes, regulatory agencies, review groups, and other interested parties of the Secretary's consideration of a possible recommendation of the Yucca Mountain site and to receive their comments.”

On November 14, 2001, the DOE published in the Federal Register the “General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories; Yucca Mountain Site Suitability Guidelines; Final Rule 10 CFR Parts 960 and 963 (FR Vol. 66, p 57298). These Final Rules are intended to assist the Secretary of Energy in reaching a judgment on the suitability of Yucca Mountain as a repository location. The Draft Proposed Siting Guidelines were originally released for comment by the DOE on November 30, 1999. The revised Draft DOE guidelines, which are contained in 10 CFR Part 963 of DOE's regulations, focus on the criteria and methodology to be used for evaluating relevant geological and other related aspects of the Yucca Mountain site. They are based on NRC's recently revised 10 CFR Part 63 regulations for licensing a nuclear waste repository

On January 10, 2002, DOE Secretary Abraham notified the Governor of the State of Nevada that he intends to make a positive recommendation to the President about the suitability of Yucca mountain as a permanent repository in not less than 30 days.

c. EPA And NRC Activity In Reporting Period

Another milestone in the repository development process was achieved on June 13, 2001, when the U.S. Environmental Protection Agency (EPA) published in the Federal Register (Vol. 66 p 32073) Final Rules for Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada (40 CFR part 197). This work established radiation exposure guidelines necessary for the design work being done by the DOE and is to be used by the NRC in its licensing reviews.

On September 7, 2001, the NRC announced its decision on new Final Rules for use in a possible licensing decision on a potential radioactive waste depository in Nevada. These new rules created a new 10 CFR Part 63 to the Commission's rules that is only applicable to a licensing process for a Yucca Mountain location facility. These new rules were developed consistent with EPA policy on radiation protection. The Final Rules were published in the Federal Register on Nov 2, 2001 (66 Fed Reg 55732).

On October 23, 2001, the NRC announced its concurrence with the Department of Energy's draft general siting guidelines for evaluating the suitability of Yucca Mountain as a site for development of a possible nuclear waste repository. This concurrence was made conditional on DOE's agreement to notify NRC of any changes to the draft final guidelines, including any changes to the supplemental information, and its agreement to retransmit the revised rulemaking package to the Commission, if any substantive changes are made, for a determination as to whether re-concurrence is needed.

On November 30, 2001 the NRC released a draft of a review plan that it would use to review any application for a repository at Yucca Mountain. The NRC released the draft for information purposes only and indicated that the draft was undergoing a complete revision to bring it up to date. The NRC expects to release a revised plan at a later date for public comment. The November 30, 2001, notice of the release of the plan also indicates that the NRC Inspector General is investigating whether a draft of the plan was improperly released to the DOE.

d. Federal Budget

The DOE cannot spend the nuclear industry's contributions to the nuclear waste fund without congressional approval. Each year DOE requests, and Congress authorizes, funds for the High level Nuclear Waste Disposal program.

The Department of Energy requested \$437.5 million in its Fiscal Year (FY) 2001 budget proposal. A total of \$391 million was made available by Congress in September, 2000, for program activities in Fiscal Year 2001. The FY 2000 funding level was set at \$351.2 million dollars.

The DOE budget request for the High Level Nuclear Waste Disposal program in FY 2002 is \$445 million dollars. The activity specified in this budget request includes a decision timetable for the Secretary of the DOE to determine suitability and make a

recommendation to the President in early 2002. On November 1, 2001, a Conference Report on the FY 2002 Energy and Water Development Appropriations Bill (H.R. 2311, H. Rept. 107-258) approved a budget of \$375 million for the program. The conference report did not contain a more controversial item that would have taken the nuclear waste storage program off budget.

e. Other Activities

On December 21, 2001, the Government Accounting Office (GAO) released a report prepared at the request of Nevada Senator Harry Reid, titled “Nuclear Waste, Technical Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project.” The report recommends that Secretary Abraham postpone a decision on whether to recommend a repository at Yucca Mountain. The study indicates that Bechtel SAIC, the DOE contractor on the repository project, recently reported to DOE that it would take until January 2006, to complete the necessary research and cost estimates regarding site suitability.

On December 17, 2001, the State of Nevada filed suit against DOE in the United States Court of Appeals for the District of Columbia Circuit claiming that the Preliminary Site Suitability guidelines do not comply with the NWPA requirement that the geology of the repository site alone must ensure the safe storage of the SNF.

2. Monitored Retrievable Storage

The 1987 NWPA amendments authorized construction of a Monitored Retrievable Storage (MRS) facility to store spent fuel and prepare it for delivery to the repository. The facility was intended to allow utilities to ship spent fuel from full reactor pools and to store it temporarily while the permanent repository was being built. But because of fears that the MRS would reduce the need to open the permanent repository and become a de-facto repository itself, the law prohibits the DOE from building an interim facility until it is certain that the permanent repository will be built.

Delays in the repository program have prompted continued interest in an away-from-reactor site temporary storage facility that would be available earlier than the MRS. Without such interim storage, large amounts of additional storage space must be constructed at nuclear power plant sites. Current law sharply limits the usefulness of the MRS facility as an interim storage site, because the longer the repository is delayed, the longer the MRS must be delayed as well. Responses to the perceived need for interim storage as soon as possible have been in the form of legislative campaigns to amend the NWPA to require federal interim storage immediately at Yucca Mountain, and utility initiatives to develop a private interim storage facility. To date, no federal legislative initiative has been successful in amending the NWPA to allow for a DOE-owned central interim storage facility before a final repository is approved.

3. Nuclear Waste Fund

The Nuclear Waste Fund (NWF) is a separate account, established in the Treasury of the United States by the Nuclear Waste Policy Act. It consists of receipts, proceeds and recoveries realized by the U.S. Department of Energy (DOE) under the NWPA, any appropriations made by the Congress into the NWF, and any unexpended balances that were transferred to the NWF on the date of enactment of the NWPA. Fees paid by owners and generators of civilian spent nuclear fuel are deposited directly into the NWF. The fee is 1 mill (0.1 ¢) per kilowatt-hour of electricity generated and sold.

a. Total Waste Fund Contributions

The NWPA set up a payment procedure whereby utilities operating nuclear plants would contribute funds to pay for the disposal of the waste. The table on the next page summarizes the status of the Nuclear Waste Fund as of March 31, 2001. Of the total of \$18.3 billion contributed by all nuclear utilities, Xcel (NSP) has paid \$333,600,000. The most recent DOE estimate (May 2001) of money spent so far on the Yucca Mountain waste management program indicate that \$8.3 billion dollars have been spent (1983-2000).

Since the 1999 annual report, the DOE produced a review of the adequacy of the Nuclear Waste Fund for financing the waste disposal process. This report "Nuclear Waste Fund Fee Adequacy: An Assessment" May 2001, concluded that the fees collected from power plants are adequate to support the costs of disposal of SNF from civilian power plants. This analysis does not assume any service life extensions, which would increase projected quantities of SNF and fee revenues. Future DOE analyses will evaluate the impact of reactor life extensions on the adequacy of the fee.

NUCLEAR WASTE FUND
RATEPAYER PAYMENTS BY STATE
THROUGH 3-31-01 (MILLIONS OF DOLLARS)

STATE	PAYMENTS (1 mill/kwh, One Time+Int)	RETURN ON INVESTMENTS (9/3000)	TOTAL (PAY+RETURN)	DEBT*	FUND ASSETS** (TOTAL + DEBT)
AL	378.3	175.2	553.5	0	553.5
AR	195.2	90.4	285.6	141.2	426.8
AZ	149.3	69.1	218.4	0	218.4
CA	653.0	302.3	955.3	0	955.3
CO	0.2	0.1	0.3	0	0.3
CT	185.6	85.9	271.5	289.3	560.8
DE	28.3	13.1	41.4	0	41.4
FL	571.8	264.7	836.5	0	836.5
GA	393.2	182.1	575.3	0	575.3
IA	161.8	74.9	236.7	36.6	273.3
IL	1041.5	482.2	1523.7	784.8	2308.5
IN	136.4	63.2	199.6	186.1	385.7
KS	79.1	36.6	115.7	0	115.7
KY	92.3	42.7	135.0	0	135.0
LA	177.2	82.0	259.2	0	259.2
MA	221.4	102.5	323.9	131.8	455.7
MD	257.9	119.4	377.3	0	377.3
ME	44.7	20.7	65.4	94.5	159.9
MI	167.9	77.7	245.6	160.2	405.8
MN	228.0	105.6	333.6	0	333.6
MO	154.4	71.5	225.9	5.1	231.0
MS	107.9	50.0	157.9	0	157.9
NC	964.6	446.7	1411.3	0	1411.3
ND	11.6	5.4	17.0	0	17.0
NE	131.4	60.8	192.2	0	192.2
NH	43.7	20.2	63.9	19.4	83.3
NJ	430.4	199.3	629.7	159.2	788.9
NM	43.5	20.1	63.6	0	63.6
NY	474.1	219.5	693.6	409.2	1102.8
OH	272.2	126.0	398.2	26.5	424.7
OR	75.1	34.8	109.9	0	109.9
PA	791.9	366.6	1158.5	53.7	1212.2
RI	3.5	1.6	5.1	5	10.1
SC	431.7	200.0	631.7	0	631.7
SD	2.6	1.2	3.8	0	3.8
TN	273.6	126.7	400.3	0	400.3
TX	386.2	178.8	565.0	0	565.0
VA	467.5	216.5	684.0	0	684.0
VT	65.9	30.5	96.4	114.6	211.0
WA	94.3	43.7	138.0	0	138.0
WI	303.8	140.7	444.5	0	444.5
SUBTOTAL	10693.0	4951.0	15644.0	2617.2	18261.2
FEDERAL	19.8	9.2	29.0	0	29.0
INDUSTRY	16.8	7.8	24.6	0	24.6
TOTAL	10729.6	4968.0	15697.6	2617.2	18314.8

* Funds owed for fuel burned before 1983 but not yet paid by utilities (as allowed by DOE contract)

** before withdrawals for expenditures by DOE

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b. Litigation

When it became apparent that the January 31, 1998, date for the federal government to begin accepting waste would pass without any action by the federal government, a series of lawsuits by various utility companies, requesting the DOE to meet their contractual obligations to remove the fuel, ensued. (The NWPA required contractual agreements between a nuclear power plant owner and the DOE regarding waste removal). None of the suits has as yet been successful in getting waste removed from the reactor site.

In a number of different decisions, the courts have concluded that DOE has both a statutory and a contractual obligation to begin to remove the fuel from commercial reactors by January 31, 1998, the deadline specified in the NWPA. Some utilities are litigating the amount of money they are to receive as damages for failure to perform on contractual obligations to remove the waste. The courts have directed that utilities need to resolve the issue of damages through the process set up in its standard contract for handling disputes with the DOE. (See *Wisconsin Electric Co. v. Department of Energy*, 211 F.3d 646, D.C.Cir. May 19, 2000).

In 1996, an out-of-court settlement between Public Service Company of Colorado and the DOE for management of the waste fuel from the shut down Fort St. Vrain facility was completed. Under terms of the settlement agreement, the DOE has taken title to, and operation of, the plant's independent spent fuel storage installation in Colorado and title to the fuel stored in it.

On July 19, 2000, the DOE also signed a settlement agreement with PECO Energy. The agreement allows PECO to keep up to \$80 million in nuclear waste fee revenues during the next ten years as compensation for the continuing costs to PECO for storage of waste at the PECO plant sites. The agreement may result in DOE eventually taking title to the waste and storage facilities at the Peach Bottom plant in Pennsylvania.

B. Private Fuel Storage Option

Private storage initiatives have been discussed in several contexts, but the most prominent proposal has been one put forth by a consortium of eight nuclear utilities, led by Xcel Energy. The group, Private Fuel Storage, Inc. (PFS), applied to the NRC in 1997 for a license to build a commercial spent fuel storage facility on the Utah reservation of the Skull Valley Band of Goshutes. Privately owned central storage facilities would require NRC licensing under the same regulations that would apply to a DOE-owned MRS facility.

The PFS proposal would create 500 storage pads on 100 acres of land with a total design storage capacity of 40,000 metric tons. The contract with the Goshutes requires that the facility accept only sealed SNF canisters, and never open or repackage fuel on-site.

Status

In December 1999, the NRC released the non-cask portion of the Draft Safety Evaluation Report for the PFS proposal on the Skull Valley Goshute Reservation in Utah. The scope of this report included the site design and operation of the facility. The cask portion, analyzing the Holtec dual-purpose (transport and storage) design intended to be used at the facility, will be issued later.

On May 1, 2000, the NRC approved the HI-STORM 100 spent fuel dry storage system. The HI-STORM 100 is a Multi-Pack Canister (MPC) design. PFS specified this Holtec company design as one of two systems to be used at its Skull Valley, Utah, facility. (For more information see: <http://www.holtecinternational.com/drylicensing.html>)

In June 2000, the NRC issued its Draft Environmental Impact Statement for the "Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah." The NRC held public comment meetings in late July 2000, and received comments on the DEIS through September 21, 2000.

The NRC's Atomic Safety and Licensing Board (ASLB) held evidentiary hearings in July 2000 on the PFS license application. At the time of the hearings, the public was invited to make "limited appearance statements" before the ASLB.

On September 29, 2000, the NRC released its completed Safety Evaluation Report (SER), which analyzes all safety-related aspects of the proposed facility design and operation under normal, unusual, and accident situations. Included in the report is an analysis of various hazards during normal, unusual, and accident conditions. The report concludes that the facility and the casks that would store the spent fuel would be safe and meet regulatory requirements.

The NRC staff issued a supplement to the project's Safety Evaluation Report covering aircraft crashes on Nov 13, 2001, and a supplement on geotechnical issues is also expected soon. The Final Environmental Impact Statement on the Utah facility, prepared by the NRC, was released on January 3, 2002. The final report considers written and oral comments received from the public, government officials and agencies.

A second set of hearings before the ASLB is now scheduled for April 8-26, 2002. The proposed schedule calls for the NRC to issue an initial decision on the license by September 9, 2002. (For more information on the PFS project see: <http://www.privatefuelstorage.com/whatsnew/status.html>)

The Utah Governor's Office has opposed the PFS plan. The governor has said he would: "Actively oppose the license application and will seek complete and exhaustive reviews, and reconsideration and appeals if necessary." (http://www.deq.state.ut.us/no_high_level_waste/index.htm).

C. Transportation Issues

Unless spent fuel is to be kept permanently at reactor sites, it will have to be transported elsewhere along specific transportation routes, for long-term storage and disposal, a prospect that continues to generate considerable controversy.

The amount of high level waste that will need to be transported can be seen in estimates of SNF production. More than 80,000 metric tons of SNF are expected to be produced by the year 2020. A total of 105,000 metric tons of spent nuclear fuel are expected to be generated by today's nuclear power plants during their scheduled operating lives, considering present plans for re-licensing existing facilities.

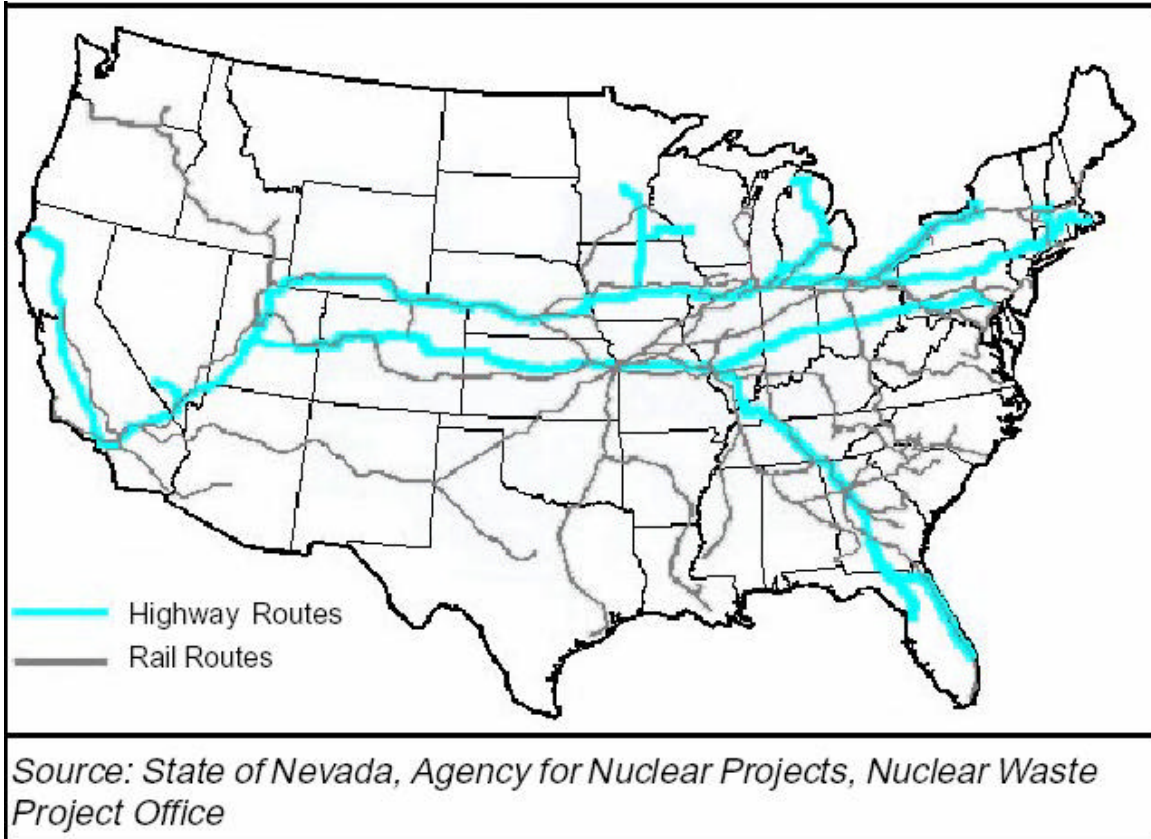
As was reported in the June 1999 annual report, in addition to commercial waste from utilities, DOE itself plans to ship 4,169 high-level radioactive waste casks by 2035. This represents waste generated by various federal programs. Of those, 1,008 casks will be from research reactors and will be shipped through the Charleston and Concord naval weapons stations and from Canada and Mexico under the Foreign Research Reactor program. The Navy will have 580 shipments of spent fuel from nuclear submarines and surface ships. Segregation of aluminum-clad fuel from non-aluminum-clad fuel at DOE's Savannah River and Idaho facilities will require 235 shipments. Non-weapons waste transfers from Hanford and Oak Ridge to both Savannah River and Idaho will involve 524 shipments. Up to 300 shipments are planned from New York's West Valley Demonstration Project (reprocessing) to Savannah River. DOE also plans 600 tritium production shipments to Savannah River, related to tritium production in commercial reactors. The remaining 800 shipments will be composed of spent fuel from non-governmental university and research reactors across the country. DOE plans to ship an average of 110 highly radioactive casks per year during the next 35 years (For further information see: "Routing Issues Related to U.S. Department of Energy Radioactive Materials Transportation: Discussion and Analysis", The U.S. Department of Energy (DOE) Transportation External Coordination Working Group 1998).

Major issues in the transportation debate are the extent of the risks posed by a national shipping campaign for spent fuel, the adequacy of federal regulation of transportation safety, and the possible concentration of shipments along certain major east-west transportation routes. The transportation of radioactive materials is regulated jointly by the Nuclear Regulatory Commission (NRC) and the U.S. Department of Transportation (DOT).

Preliminary plans to ship waste to the Yucca Mountain location indicate that spent fuel transportation through Minnesota to a Nevada facility will involve only waste from Minnesota's and Wisconsin's reactor sites (see figure below). The waste would be shipped to Yucca Mountain according to a DOE prearranged acceptance schedule. The proposed schedule time sequences shipments from many existing nuclear facilities. The DOE estimates that it will accept 8,200 metric tons during the first ten years of operation of the Yucca Mountain Repository. Xcel is allocated to be able to ship 318.9 metric tons

during this time (Acceptance Priority Ranking & Annual Capacity Report DOE/RW-0457).

PROBABLE NUCLEAR WASTE TRANSPORTATION ROUTES



The possibility of a privately owned interim fuel storage facility expands the need for total shipments, as fuel would also eventually need to be shipped from an interim facility to a final repository with all shipments potentially along one primary shipping route.

The states' interest in route selection for radioactive materials shipments derives from their responsibility to protect public health and welfare, as well as property, from the possibility and effects of accidents. This responsibility exists regardless of whether there are few or many shipments, and regardless of the mode. Therefore, states have an obligation on behalf of their citizens to become involved in route selection for all types and modes of radioactive materials shipments.

1. The DOE Plan

The DOE continues to plan on using private contractors to provide the necessary services and equipment required to accept and transport commercial spent fuel to a DOE facility. These services and equipment will be procured by awarding one or more contracts, with each contract covering utility reactor sites in four regions in the continental United States.

Each contractor will be responsible for all activities and services in its region, including the provision of transportation and storage cask/canister systems, storage modules, and ancillary equipment, as required, to accept commercial spent fuel and transport it to a designated federal facility for storage or disposal. Specific performance requirements for each contractor will be set forth in detail in the procurement documents.

Transportation will be carried out using commercially available equipment and approved routes in compliance with Nuclear Regulatory Commission and Department of Transportation regulations. Cask/canister systems to be used for transportation and storage will not be specified by DOE. The cask/canister systems will be developed by industry, certified by the Nuclear Regulatory Commission, and deployed to meet the waste delivery schedules. Standard cask physical characteristics needed for handling will be specified by DOE to ensure that the casks and canisters will be compatible with cask handling facilities proposed for the federal facility.

These systems differ in whether they employ casks or canisters; whether their functions include transportation, storage, and/or disposal; and how they are transported. In canister systems, spent fuel is sealed inside a canister and the sealed canister is placed into an overpack for transportation, storage, or disposal. The use of canisters may reduce the number of times individual fuel assemblies have to be handled during transport, storage and disposal. Casks/canisters designed and certified for a single use only, such as for transportation or storage, are known as single purpose systems. Casks/canisters designed and certified for both storage and transportation are referred to as dual purpose canisters or transportable storage casks. Canisters designed and certified for transportation, storage, and disposal are known as multi-purpose canisters (MPCs).

The mix of casks and canisters to be deployed is largely unknown at this time. It will depend on the availability of technologies that are certified by the Nuclear Regulatory Commission prior to the start of DOE transportation operations.

2. DOE Plan Status

Back in 1981 the NRC made a determination regarding the existing regulations, general transportation licenses under 10 CFR, Part 71. The NRC determined that “present regulations are adequate to protect the public against unreasonable risk from the transport of radioactive materials”. This determination was based on the 1977 “Final Environmental Impact Statement on the Transportation of Radioactive Material by Air and Other Modes” (NRC: NUREG-0170).

Chapter 6 of the Yucca Mountain DEIS issued in July of 1999 by the DOE included an analysis of the environmental impacts of various truck and rail transportation scenarios. The analysis focused on potential health and safety impacts to workers and populations exposed along expected transportation routes from loading, incident free transportation and from accident scenarios. The supplemental DEIS issued in May 2001 did not address any additional transportation issues.

In June 2000, the NRC issued the report “Reexamination of Spent Fuel Shipment Risk Estimates” (NUREG-6672), summarizing the results of a study conducted by Sandia National Laboratory for the NRC. The study concludes that risks associated with anticipated truck and rail transport of spent nuclear fuel under both routine and accident conditions are likely to be small. The NUREG-6672 report states at Ch 9, p. 9-4:

“Since the NUREG-0170 (the 1981 study) dose and risk estimates were not large enough to require regulatory action, the fact that the incident-free doses estimated by this study are significantly smaller than the NUREG-0170 estimates and the accident dose risks estimated by this study are orders of magnitude smaller than those estimated by NUREG-0170 confirms that spent fuel transportation regulations adequately protect public health and safety.”

Some concerned parties such as Public Citizen, and the State of Nevada disagree with this risk assessment regarding transportation of spent nuclear fuel.

Current Issues

The risk of transporting highly radioactive spent fuel from nuclear power plants to a central storage site or permanent underground repository is a major factor in the current nuclear waste debate. Casks/canisters used for transportation of spent fuel are to be certified by the Nuclear Regulatory Commission under 10 CFR Part 71, *Packaging and Transportation of Radioactive Material*. Controversy over the transportation of spent fuel and other highly radioactive nuclear waste has focused on the adequacy of NRC standards for shipping casks, the potential consequences of transportation accidents, and the routes that nuclear waste shipments are likely to follow.

NRC requires that spent fuel shipping casks be able to survive a sequential series of tests intended to represent severe accident stresses. The tests are a 30-foot drop onto an unyielding flat surface, a shorter drop onto a vertical steel bar, engulfment by fire for 30 minutes, and, finally, immersion in three feet of water. An undamaged sample of the cask design must be able to survive submersion in the equivalent pressure of 50 feet and 200 meters of water.

Although it is generally expected in the NWPA that spent fuel will be transported from nuclear power plants eventually, opponents of the Yucca Mountain interim storage plan point out that extended on-site storage would allow for radioactive decay in spent fuel before it was shipped. Radioactive materials diminish their intensity of radiation as the material decays over time. One half of the radioactive material decays in the period of time known as the material’s “half life.” Spent nuclear fuel contains a number of radioactive elements that decay at different rates. After 100 years, total radioactivity in spent fuel would drop by more than 99 percent, although it still would contain more than 10,000 curies per metric ton, and long-lived radioactive elements such as plutonium would not have decayed significantly.

Significant Activities In Reporting Period

The NRC has approved additional storage cask designs for use with spent nuclear fuel. The total number of approved cask types now includes 27 different cask designs. The number of approved casks for use with spent nuclear fuel has almost doubled since the date of the 1999 annual report (see list of approved casks at: 10 CFR § 72.214, on the web at: <http://www.nrc.gov/docs/cfr/part072/part072-0214.html>).

V. Upcoming Activities

A. DOE

Site Recommendation Process

The U.S. Department of Energy is soliciting public and stakeholder comments on the scientific and technical information that will be considered in potential site suitability and site recommendation decisions. This information was presented in two reports: the Yucca Mountain Preliminary Site Suitability Evaluation and the Yucca Mountain Science and Engineering Report. The Secretary will consider the public's comments when making a decision on whether to recommend Yucca Mountain as a suitable site for a repository. The public comment process had an October 19, 2001, deadline for comments but on November 14 the DOE announced an extension until December 14, 2001, for the submission of comments.

The Secretary of Energy will make a decision on whether to recommend Yucca Mountain to the President as the repository site for highly radioactive materials. The Secretary will base this decision on the site characterization studies performed at Yucca Mountain since 1987. The Secretary also will issue to the President (and to the public) a comprehensive statement that describes the scientific basis for the recommendation. This statement will include a Final Environmental Impact Statement. The DOE, in its FY 2002 Budget Request, indicated DOE's intention to complete its recommendation process by February 28, 2002.

If, after recommendation by the Secretary, the President considers Yucca Mountain a suitable location for a repository, the president would recommend the site to Congress. According to the NWPA, the State of Nevada, or any other state, would then have 60 days to submit a notice of disapproval to Congress. If Nevada, or any other state, does not submit a notice, Yucca Mountain would automatically become an approved site for a repository. If Nevada submits a notice, and it is certain they will do so, the site would be disapproved (NWPA Sec 115 [42 U.S.C. Section 10135]).

NWPA specifies subsequent actions that Congress could take if the site is disapproved. According to the act, Congress has the option to propose and pass a joint resolution for repository siting approval within the first 90 calendar days of continuous congressional session after receiving a notice of disapproval. The President would then have to sign

this joint resolution into law to grant site approval (For a description of the timeline see: <http://www.ymp.gov/timeline/sr/index.htm>).

If the Yucca Mountain site should survive this process, and the President and Congress provide a positive recommendation for the Yucca Mountain location for the facility, then the project will need a license from the NRC. A three or four year detailed NRC review of the construction license application will then begin.

If the Congress fails to act to certify the Yucca Mountain site for a permanent repository, there will then be no national plan for management of the disposal of high level nuclear waste. In that event, what public policy position regarding the waste disposal issue the Congress may adopt is unknown.

B. NRC

The NRC expects to release for public comment a draft of its proposed plan for its process to review any application for a repository at Yucca Mountain. No specific schedule was available for this activity.

C. Federal Legislation

Every year there are attempts in Congress to pass legislation relating to nuclear waste. In the year 2000, a Nuclear Waste Bill containing provision for a Yucca Mountain interim storage site in advance of a determination of the suitability of the location as a permanent repository passed both the House and Senate (H.R. 45, H. Rept. 106-155), but in the Senate there were not enough votes to override a threatened presidential veto. Differences in the House and Senate bills were never resolved and the bill was allowed to die.

This year is no exception, and there are a number of legislative initiatives in play. The release by the Bush Administration of a National Energy Policy report on May 17, 2001, has set the stage for focused discussion of a national energy policy in Congress. The House has passed energy legislation this session. On August 3, 2001, the House passed H.R. 4, the Securing America's Future Energy Act of 2001, (H.R. 4) by a vote of 240-189. The bill provides incentives for energy production and includes funding for conservation and alternative energy sources. The legislation also would establish a nuclear waste recycling research and development program. For FY 2002 the funding for this research program would be \$10 million. The bill specifies that the technologies pursued by the program should be "proliferation resistant". The Senate has not yet taken up the matter and is expected to consider energy issues in early 2002.

Perhaps the most significant specific nuclear legislative issue in the 107th Congress is the consideration of whether or not to extend the liability protections that were originally provided the nuclear industry in the Price-Anderson Act. Realizing that the potential risks and damages from a nuclear power accident were beyond the ability of the private insurance industry to cover, Congress in 1957 created the Price-Anderson Act (P.L. 85-

256; 42 U.S.C. section 2210) as an amendment to the Atomic Energy Act, to provide liability coverage to commercial nuclear facilities. Amended several times, most recently in 1988, the statute covers both military contractors and civilian nuclear power and provides the basis for exclusionary clauses in other US. property and liability policies, which preclude recovery for damages from nuclear releases, accidents, and nuclear war.

On November 27, 2001, the House passed H.R. 2983, "The Price-Anderson Reauthorization Act of 2001." The legislation extends for another 15 years a limit on the liability the nuclear industry would incur in the case of a catastrophic accident. The Senate has not yet acted on a companion bill (S. 472). The legislation establishes a liability plan that pools the resources of the nation's 103 nuclear power plants. If one plant has an accident, it would pay up to about \$200 million, and the other plants would contribute up to about \$88 million each, The total liability cap for the industry is set at \$9.5 billion. If costs of an accident exceed \$9.5 billion, taxpayers would pay the difference. Nuclear plants depend on the plan because private insurance companies will not insure nuclear plants. The insurance plan paid out about \$187 million after the Three Mile Island accident in 1979. The Price-Anderson Act will expire in August 2002 if not renewed.

Other pending legislation includes H.R. 2072 (Berkley) that redirects the Nuclear Waste Fund into research, development, and utilization of technologies for on-site nuclear waste storage and reduction of radiation levels. This was introduced June 6, 2001, and was referred to the Committee on Energy and Commerce, and also to the Committees on Science, and Ways and Means. In the Senate, activity includes S. 388 (Murkowski), the National Energy Security Act of 2001. This bill includes provisions on nuclear waste strategy and research. Introduced on February 26, 2001, it was referred to the Committee on Energy and Natural Resources. A third bill in the Senate is S. 472 (Domenici), The Nuclear Energy Supply Assurance Act of 2001. The bill includes provisions for nuclear waste strategy research. The bill was referred to the Committee on Energy and Natural Resources.

Since the events of September 11, 2001, there have been numerous security-related activities affecting the nuclear power industry. It remains to be seen what action Congress might take regarding security issues relating to commercial nuclear power plants. For example, on November 20, 2001, Senator Clinton announced her intent to introduce legislation to federalize security at the nation's nuclear power plants. This legislation is co-sponsored by Senator Reid from Nevada.

While the House passed energy legislation in H.R. 4 last August, the Senate has yet to take up action on the Presidents proposed National Energy Policy program as outlined in the May 17, 2001, report. Current expectations are that this will be on the Senate agenda early in 2002.

Other possible legislative activity in 2002 includes consideration of actions the NWSA directed that Congress could take following a site recommendation from the President. According to the Act, Congress has the option to propose and pass a joint resolution for

repository siting approval within the first 90 calendar days of continuous congressional session after receiving a state's notice of disapproval of the presidential recommendation. The President would then have to sign this joint resolution into law to grant site approval.

APPENDIX A

NUCLEAR WASTE MANAGEMENT A CHRONOLOGY

1954

On August 30, President Eisenhower signs the Atomic Energy Act of 1954, creating the Atomic Energy Commission (AEC) and directing the federal government to promote the peaceful use of atomic energy, with the understanding that disposal of high level radioactive wastes produced would be the responsibility of the federal government (P.L. 83-703; 42 U. S. Code section 2011 et seq).

1955

The Atomic Energy Commission (AEC) asks the National Academy of Sciences (NAS) to study disposal methods for radioactive wastes from nuclear weapons production in the United States.

1957

A National Academy of Sciences report to the AEC recommends that transuranic and high-level radioactive wastes be buried in deep geologic formations and suggests that buried salt deposits and other rock types be investigated for permanent repositories.

On September 2, President Eisenhower signs into law the Price-Anderson Act, a law designed to protect the public, utilities and contractors financially in the event of an accident at a nuclear power plant (P.L. 85-256; 42 U.S.C. section 2210).

On December 2, the first full-scale nuclear power plant goes into service at Shippingport, Pennsylvania, generating 60 megawatts of power.

1960s

In 1960 a high-level nuclear waste reprocessing facility begins operation in Morris, Illinois.

Throughout the 1960s the federal government assures the utilities that there will be commercial reprocessing facilities available to handle spent nuclear wastes from nuclear power plants.

During this same period, the Atomic Energy Commission assumes that high-level radioactive wastes will be disposed of in deep geologic burial sites and in salt domes, and the AEC begins the task of finding a suitable site for such a facility. The AEC begins to investigate buried salt beds of the Salina Basin in Michigan and Ohio, but when state and local officials become aware of the studies, they force the AEC to abandon the investigation.

1965

Northern States Power Company begins a search for sites for nuclear power plants, resulting in Monticello being chosen for the first plant and Prairie Island for a second.

1967

Northern States Power Company receives a construction permit from the AEC for the Monticello plant and files an application for a permit for the Prairie Island Nuclear Generating Plant.

1968

Northern States Power Company receives a construction permit from the AEC for the Prairie Island Plant.

1970

On New Year's Day, President Nixon signs into law the National Environmental Policy Act, requiring environmental review of major federal actions (P.L. 91-190; 42 U.S.C. sections 4321 – 4370e).

Northern States Power Company obtains a license from the Atomic Energy Commission for its nuclear power plant at Monticello and begins operation of the facility early in 1971. The facility is licensed to operate until the year 2010.

The AEC tentatively selects a nuclear waste repository site in salt deposits near Lyons, Kansas.

1971

The AEC announces that perhaps high-level radioactive wastes will have to remain at the sites where the waste is generated.

The United States Court of Appeals holds that Minnesota's attempt to set radioactive effluent limits for the Monticello plant falls squarely within the field of safety regulations reserved by federal regulation and is pre-empted by federal law. The Supreme Court upholds the decision in the following year (*Northern States Power Company v. Minnesota*, 447 F.2d 1143 (8th Cir. 1971), *aff'd*, 405 U.S. 1035 (1972)).

1972

The federal government withdraws the Lyons, Kansas, site from consideration for the repository because of concerns that drilling in the vicinity had compromised the salt deposits' geologic integrity.

1973

Northern States Power Company obtains a license from the AEC for Unit No. 1 for the Prairie Island Nuclear Generating Facility and commences commercial operation of the facility in December. The license expires in the year 2013.

During the course of the year, U.S. utilities order 41 nuclear power plants, a one-year record.

1974

Northern States Power Company obtains a license from the AEC for Unit No. 2 for the Prairie Island Nuclear Generating Facility and commences commercial operation of the facility. The license expires in the year 2014.

The Nuclear Regulatory Commission (NRC) is established by the Energy Reorganization Act of 1974 to regulate civilian use of nuclear materials (P.L. 93-438; 42 U.S.C. section 5801). The NRC is a five member commission. The 1974 Act splits the two functions of the AEC, assigning to the Energy Research and Development Agency the responsibility for the development and production of nuclear weapons, the promotion of nuclear power, and other energy-related work, and assigning to the Nuclear Regulatory Commission the regulatory work, which does not include regulation of defense nuclear facilities.

1975

The Energy Research and Development Agency (the AEC successor) begins to search for a possible permanent repository for the nation's nuclear waste. A multiple site survey emphasizing buried salt deposits and federal nuclear facility sites is conducted in 36 states, including Nevada, but lack of funds and local opposition reduce the scope of the investigation.

1976

Northern States Power Company applies to the Minnesota Environmental Quality Council (the previous name for the Environmental Quality Board) for a certificate of need to increase storage capacity for the Prairie Island spent fuel pool.

1977

On April 7, President Carter announces a new policy banning the reprocessing of spent nuclear fuel.

On April 11, the Minnesota Environmental Quality Council grants Northern States Power Company a certificate of need to rerack the assemblies in the fuel pool at Prairie Island to provide up to 687 assemblies (the initial authorization was for 198 assemblies). The EQC determines that no EIS is required.

On August 4, President Carter combines the Energy Research and Development Administration with the Federal Energy Administration, creating the Department of Energy. DOE announces that it is shifting its waste management strategy from reprocessing to permanent underground storage.

1978

The U.S. Court of Appeals holds that the Nuclear Regulatory Commission may issue licenses for nuclear power plants without first making a determination that high-level radioactive wastes can be permanently disposed of safely. *Natural Resources Defense Council v. Nuclear Regulatory Commission*, 582 F.2d 166 (2nd Cir. 1978).

1979

On March 28, a major accident occurs at Unit 2 of the Three Mile Island nuclear plant near Harrisburg, Pennsylvania. More than half the reactor core melts.

In a lawsuit brought by the State of Minnesota, the U.S. Court of Appeals remands to the Nuclear Regulatory Commission the matter of the expansion of the Prairie Island spent fuel pool to consider the probability of an offsite storage facility being available when it would be needed in 2007 – 2009. *State of Minnesota v. Nuclear Regulatory Commission*, 602 F.2d 412 (D.C. Cir. 1979).

Northern States Power Company applies for a second certificate of need to increase the storage capacity of the Prairie Island spent fuel pool. This time the agency with authority over the expansion of the pool is the Minnesota Energy Agency.

1980

In September, the Minnesota Environmental Quality Board determines that no EIS is required on NSP's request for a second expansion of the pool.

The U.S. Department of Energy issues an Environmental Impact Statement that selects deep geologic disposal as the preferred alternative for permanent disposal of commercial high level nuclear waste.

1981

The Minnesota Energy Agency issues a certificate of need to Northern States Power Company to expand the number of fuel assemblies at Prairie Island a second time, to 1386 assemblies.

On October 26, President Reagan lifts the ban on reprocessing spent nuclear fuel and announces a policy that anticipates the need for a high-level radioactive waste storage facility. (No reprocessing facilities were ever built in the United States.)

1982

The Nuclear Waste Policy Act of 1982 (NWPA) is passed by the U.S. Congress. President Reagan signs it into law on January 7, 1983 (P.L. 97-425; 42 U.S.C. sections 10101-10270). The law establishes a site screening process, requires two repository sites to assure regional equity, establishes a schedule leading to a national repository by 1998, creates a Nuclear Waste Fund to pay for the development of the repositories with fees imposed on generators of electricity from nuclear power plants, and requires that repositories be licensed by the Nuclear Regulatory Commission using environmental protection standards set by the Environmental Protection Agency.

1983

DOE selects nine sites in six states for study as potential sites for a first repository. In accordance with the NWPA, DOE identifies sites in 17 eastern states as potential locations for a second repository. DOE identifies several areas in Minnesota as potential sites for a national repository.

On April 26, Governor Perpich signs Executive Order 83-2 creating the Governor's Task Force on High-Level Radioactive Waste, which spearheads a state effort to monitor DOE activities.

The United States Supreme Court holds that while Congress has pre-empted the states from regulating the safety and health, the states are not precluded from determining questions of need, reliability, cost, and similar state concerns. The Supreme Court upholds a California statute imposing a moratorium on nuclear power plants until a permanent method of waste storage becomes available as a valid exercise of state power. The Supreme court says "the states retain their traditional responsibility in the field of regulating electrical utilities for determining questions of need, reliability, cost and other related state concerns." (*Pacific Gas & Electric Co. v. State Energy Resources Conservation & Development Commission*, 461 U.S. 190, 204 (1983).

1984

The Minnesota Legislature passes the Radioactive Waste Management Act (Minnesota Laws 1984, chapter 453; Minnesota Statutes sections 116C.705 to 116C.76).

NSP begins the first of several shipments of spent fuel assemblies from the Monticello plant to storage pools in Morris, Illinois. Between 1984 and 1987, NSP ships 1058 spent fuel assemblies from the Monticello plant to this General Electric facility.

DOE issues Guidelines for the Recommendation of Sites as required by the Nuclear Waste Policy Act and continues its investigation of potentially acceptable sites.

1985

President Reagan determines that highly radioactive wastes from nuclear weapons production will be disposed of with commercial high-level radioactive wastes.

On June 19, in special session, both houses of the Minnesota Legislature pass a resolution declaring “Minnesota to be in opposition to the siting of a high-level radioactive waste repository within the boundaries of the state because of concern over the effect of radiation releases from a repository on the headwaters and downstream of our three major North American watersheds and on the economy, health, safety, and general welfare of the citizens of Minnesota.”

The Legislature amends state law to create the Governor’s Nuclear Waste Council (Minnesota Laws 1985, First Special Session, chapter 13, section 241, codified at Minnesota Statutes section 116C.711).

1986

In January, the Department of Energy issues a draft Area Recommendation Report in which it identifies sites in 11 states, including eight separate sites in Minnesota, as possible sites for a second repository.

The Governor’s Nuclear Waste Council leads the effort to oppose selection of Minnesota as a potential site for a repository. DOE hearings in the state draw 10,000 people. Governor Perpich vows to withhold investigative permits.

In April, the world’s worst nuclear power plant accident occurs at Chernobyl in the former Soviet Union.

On May 28, the Secretary of Energy announces that the DOE is essentially abandoning its efforts to find a second site and nominates five of nine possible sites for further consideration. President Reagan approves three sites (Hanford, Washington; Deaf Smith County, Texas; and Yucca Mountain, Nevada) for further study (i.e., site characterizations).

On June 4, the Chair of the Governor’s Nuclear Waste Council announces that in light of the Secretary’s decision, further meetings of the Governor’s Council will be held in abeyance.

In 1986, the Perry plant in Ohio becomes the 100th U.S. nuclear power plant in operation.

1987

Based in part on a desire to keep costs down, in December Congress amends the Nuclear Waste Policy Act to direct DOE to study only Yucca Mountain (P.L. 100-23; 42 U.S.C. section 10172). The Act also authorizes the DOE to construct a Monitored Retrievable Storage (MRS) facility to store spent fuel and prepare it for delivery to the repository (42 U.S.C. sections 10161 – 10169).

Northern States Power Company conducts a fuel rod consolidation demonstration project at Prairie Island. The project involves the consolidation of fuel rods from 36 assemblies into 18 assemblies.

The U.S. Court of Appeals upholds a challenge to the rules promulgated by the Environmental Protection Agency for the long-term disposal of high level radioactive wastes in a case in which Minnesota was a party (*Natural Resources Defense Council v. United States Environmental Protection Agency*, 824 F.2d 1258 (1st Cir. 1987)).

1988

The DOE holds public hearings on the site characterization plan for Yucca Mountain.

The Secretary of the Department of Energy announces that DOE would not be able to have a national waste repository in operation by the 1998 statutory deadline and that it would be 2003 before a facility would be available to accept wastes.

1990

On August 31, Northern States Power Company files an application with the Nuclear Regulatory Commission for approval of a dry cask storage facility at Prairie Island. NSP seeks approval for 48 casks, enough to store wastes through the year 2013, when Prairie Island is up for relicensing.

1991

Northern States Power Company applies to the Minnesota Public Utilities Commission for a certificate of need to construct a facility at the Prairie Island plant for the above-ground storage of spent nuclear fuel in casks. NSP asks for approval to construct 48 casks.

In April, the Minnesota Environmental Quality Board issues a Final Environmental Impact Statement on NSP's proposal for a dry cask storage facility at Prairie Island. The EQB found the EIS to be adequate on May 16, 1991.

1992

On August 10, the Minnesota Public Utilities Commission issues its Order Granting Limited Certificate of Need authorizing NSP to construct the Prairie Island Independent Spent Fuel Storage Facility (ISFSI) and to store up to 17 casks. The Prairie Island Mdewakanton Dakota Tribe and the Prairie Island Coalition Against Nuclear Storage appeal the PUC decision to the Minnesota Court of Appeals.

On October 24, President Bush signs into law the Energy Policy Act, requiring EPA to develop site-specific public health and safety standards for Yucca Mountain, Nevada (P.L. 102-486).

1993

On June 8, the Minnesota Court of Appeals issues its decision holding that NSP must receive authorization from the Minnesota Legislature before it can store spent nuclear fuel above ground at Prairie Island. The Minnesota Supreme Court decides not to hear the matter (*In the Application for Certificate of Need for Independent Spent Fuel Storage Installation (ISFSI)*, 501 N.W.2d 638 (Minn. Ct. App), *rev. denied* (Minn. July 15, 1993)).

DOE begins grading work on the first phase of construction of an Exploratory Studies Facility at Yucca Mountain. DOE also formulates a new schedule that calls for waste acceptance by 2010.

1994

The Minnesota Legislature considers the matter of dry cask storage at Prairie Island and passes what is called the “1994 Prairie Island Legislation” (Minnesota Laws 1994, chapter 641, codified at Minnesota Statutes sections 116C.77 to 116C.80, 216B.2423 to 216B.244, and 216C.051). The legislation authorizes NSP to store wastes in up to 17 casks, but the law also directs NSP to obtain certain amounts of wind power and biomass power and to search for a second site for above-ground storage in Goodhue County. The law allows NSP to rerack the spent fuel storage pool a third time to accommodate the number of fuel assemblies that could be stored in 17 casks (Minnesota Statutes section 116C.778).

1995

In May, the Nuclear Regulatory Commission authorizes NSP to load the first cask at Prairie Island, and NSP begins the loading process immediately.

In July, Northern States Power Company submits an application to the Minnesota Environmental Quality Board for a site certificate for a second dry cask storage site in Goodhue County. NSP identifies two possible sites for the facility, both located south of Red Wing, Minnesota, in Florence Township.

DOE begins tunneling into Yucca Mountain. Five miles of tunnel are planned for the study area by 1996.

1996

In July, the United States Court of Appeals for the District of Columbia holds that the Nuclear Waste Policy Act (“NWPA”) imposes on the Department of Energy (“DOE”) an unconditional obligation to begin disposing of high-level radioactive waste and spent nuclear fuel by January 31, 1998 (*Indiana Michigan Power Co. v. Department of Energy*, 88 F.3d 1272 (D.C. Cir. 1996)).

On August 8, Northern States Power Company submits a license application to the U.S. Nuclear Regulatory Commission for the Goodhue County Alternate Spent Nuclear Fuel Storage Facility.

On October 2, the Minnesota Environmental Quality Board issues its Order denying NSP's request for a certificate of site compatibility for the Goodhue County dry cask storage facility.

On October 28, the Prairie Island Indian Community challenges the EQB's decision and files an appeal in the Minnesota Court of Appeals.

On November 13, Northern States Power Company files a motion with the Nuclear Regulatory Commission asking the NRC to suspend further adjudicatory proceedings with regard to NSP's license application until the Minnesota courts resolve the appeal. The Atomic Safety and Licensing Board of the NRC suspends further proceedings by order dated December 3, 1996.

The Tennessee Valley Authority's Watts Bar 1 nuclear reactor, which was ordered in 1970, was finally licensed to operate, the last U.S. nuclear unit to be completed.

A proposal by the Mescalero Indian Tribe to construct a waste storage facility in New Mexico is withdrawn.

1997

On May 13, the Minnesota Court of Appeals upholds the EQB decision to deny a certificate of site compatibility for a second dry cask storage facility in Goodhue County (*In the Matter of the Northern States Power Company Application for a Certificate of Site Compatibility for the Goodhue County Independent Spent Nuclear Fuel Storage Facility*, 563 N.W.2d 302 (Minn. Ct. App. 1997), *review denied* [Minn. July 10, 1997]).

The Energy and Water Development Appropriations Act, P.L. 104-206, directs that by September 30, 1998, the Secretary of Energy provide to the President and Congress a Yucca Mountain Viability Assessment.

On November 14, in a case brought by Northern States Power Company and numerous other utilities and states as a follow-up to the 1996 *Indiana Michigan Power* case, the United States Court of Appeals in Washington D.C. refuses to order the DOE to begin accepting wastes in January 1998 (*Northern States Power Co. v. U.S. Department of Energy*, 128 F.3d 754 [D.C.Cir. 1997]).

In 1997 a private group called Private Fuel Storage, Inc., applies to the Nuclear Regulatory Commission for a license to build a commercial spent fuel storage facility on the Utah reservation of the Skull Valley Band of Goshutes. The site is about 45 miles southwest of Salt Lake City.

DOE begins thermal testing at Yucca Mountain. The work is scheduled to take eight years.

1998

In January, the DOE officially defaults on its statutory directive to begin accepting spent fuel from electric utilities. Utilities challenge DOE in a number of lawsuits. *See Wisconsin Electric*

Co. v. Department of Energy, 211 F.3d 646 (D.C.Cir. May 19, 2000), which denied monetary relief to the utilities, relying in part on a post-judgment order in the 1997 *NSP v. DOE* case.

On April 10, Baltimore Gas & Electric Co. submits an application to the NRC to renew the license of its two-unit Calvert Cliffs nuclear power plant in New York, the first U.S. company to apply for a 20-year renewal of its license.

In December, the Department of Energy issues the Yucca Mountain Viability Assessment, addressing the design of the repository, how it would work, what would be required to license it, and its expected cost. It did not include a formal site recommendation.

1999

In April, NSP loads its ninth cask at the Prairie Island dry cask storage facility.

In August, the Department of Energy issues its Draft Environmental Impact Statement for the Yucca Mountain facility.

Also in August, the U.S. Environmental Protection Agency proposes site-specific environmental radiation protection standards for Yucca Mountain.

2000

On March 23, the NRC issues the first ever license renewal for a nuclear power plant, when the Calvert Cliffs Nuclear Power Plant in New York is relicensed for an additional 20 years of operation. On May 23, the NRC approves a 20-year extension for the three unit Oconee Nuclear Station in North Carolina owned by Duke Energy.

In June, the NRC issues its “Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah.”

On September 29, the NRC releases its completed Safety Evaluation Report (SER) for an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah, which analyzes safety-related aspects of the facility design and operation.

2001

On May 4, the DOE publishes notice of the availability of a Supplement to the Draft Environmental Impact Statement on Yucca Mountain.

On May 7, the DOE releases its “Yucca Mountain Science and Engineering Report”. This report summarizes scientific and engineering studies over the last two decades at Yucca Mountain.

On June 13, EPA finalizes its environmental radiation protection standards for Yucca Mountain. Federal Register (Vol. 66 p 32073).

On August 21, the DOE announces the availability of a report called the “Yucca Mountain Preliminary Site Suitability Evaluation”.

On September 7, the NRC announces new Final Rules for use in a possible licensing decision on a potential radioactive waste depository at Yucca Mountain in Nevada. The Final Rules were published in the Federal Register on Nov 2, 2001 (FR Vol. 66, p 55732).

On October 23, the NRC concurs with the DOE’s proposed final siting guidelines for Yucca Mountain.

On November 8, Northern States Power Company distributes the 2001 Prairie Island Contingency Request for Proposals, in which NSP seeks contingent proposals for up to 550 MW of firm capacity and energy beginning in 2007 and another 550 MW in 2008 to replace Prairie Island.

On November 13, the NRC Staff issues a supplement to the Safety Evaluation Report for an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah, covering aircraft crashes.

On November 14, the DOE publishes in the Federal Register the “General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories; Yucca Mountain Site Suitability Guidelines; Final Rule 10 CFR Parts 960 and 963.

On December 17, the State of Nevada files suit against DOE claiming that the new Site Suitability Guidelines do not meet the requirements of the NWPA that the repository geologic characteristics alone must ensure the safe storage of the waste.

On December 21, the Government Accounting Office (GAO) releases a report done at the request of Nevada Senator Harry Reid, titled “Nuclear Waste, Technical Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project.” The report recommends that Secretary Abraham postpone a decision on whether to recommend a repository at Yucca Mountain.

As of December 2001, there are fourteen casks on the storage pad at Prairie Island.

APPENDIX B

Principal Resources

Web Pages

DOE: The Yucca Mountain Project website: <http://www.ymp.gov/>

Michigan PSC staff report: Nuclear Waste Fund Payments by State
<http://www.cis.state.mi.us/mpsc/lic-enf/nuclear/>

Nuclear Energy Institute: <http://www.nei.org/>

Nuclear Management Company: <http://www.nmcco.com/>

Nuclear Regulatory Commission: www.nrc.gov

Office of Civilian Radioactive Waste Management (OCRWM) <http://www.rw.doe.gov/>

Private Fuel Storage L.L.C.: <http://www.privatefuelstorage.com/>

State of Nevada, Office of the Governor, Agency for Nuclear Projects, Nuclear Waste Project Office <http://www.state.nv.us/nucwaste/>

Utah Department of Environmental Quality
http://www.deq.state.ut.us/no_high_level_waste/index.htm

DOE Reports

“Acceptance Priority Ranking & Annual Capacity Report”. (DOE/RW-0457), Office of Civilian Radioactive Waste Management, March 1995.

“Analysis of the Total System Life Cycle Cost of the Civilian Radioactive Waste Management Program”, Office of Civilian Radioactive Waste Management, (DOE/RW-0533), U.S. DOE, May 2001. <http://www.rw.doe.gov/tslccr1.pdf>

“Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High Level Radioactive Waste at Yucca Mountain, Nye County, Nevada”, U.S. DOE, July 1999.

“Monthly Summary of Program Financial and Budget Information” Office of Civilian Radioactive Waste Management, August 31, 2001.

“Supplement to the Draft Environmental Impact Statement” (DOE/EIS-0250D-S) U.S. DOE, May 2001. http://www.ymp.gov/documents/sdeis_a/pdf/titlepg.pdf

“Yucca Mountain Preliminary Site Suitability Evaluation” (DOE/RW-0540)(PSSE), U.S. DOE, August 2001. http://www.ymp.gov/documents/psse_a/index.htm

“Yucca Mountain Science and Engineering Report” (DOE/RW-0539), U.S. DOE, May 2001. http://www.ymp.gov/documents/ser_a/

Other Reports

“Annual Nuclear Waste Management Report” Xcel Energy report to the Minnesota Public Utilities Commission, August 10, 2001, (Docket No. E-002-CN-91-19).

“A Reporter’s Guide to Yucca Mountain”, Environmental Health Center, National Safety Council, June 2001. (www.nsc.org/ehc.htm)

“Civilian Nuclear Waste Disposal”, Congressional Research Service, Issue Brief for Congress, July 30, 2001. (IB 92059) <http://www.cnie.org/nle/waste-2.html>

“Civilian Nuclear Waste Disposal”, Congressional Research Service, Issue Brief for Congress, Updated November 9, 2001. (IB 92059)

"Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah". NRC, June 2000. www.nrc.gov/NRC/NUREGS/SR1714/index.html.

“Final Rules for Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada” (40 CFR part 197), U.S. EPA June 2001. Federal Register (Vol. 66 p 32073).

Minnesota Public Utilities Commission “Order Approving Xcel Energy’s 2000-2014 Resource Plan, as modified”, August 29, 2001, Docket No. E-002/RP-00-787)

NRC News: “NRC Concurs on DOE’s Proposed Final Siting Guidelines for Yucca Mountain”, No. 01-126, October 23, 2001.

NRC News: “NRC Releases Draft Review Plan For Yucca Mountain”, No. 01-133, November 30, 2001.

NRC News: “NRC Revises Regulations for a Possible Licensing Decision on a Potential Radioactive Waste Repository in Nevada”, No. 01-108, September 7, 2001.

Preliminary Comments of the NRC regarding a possible repository at Yucca Mountain. Letter from Richard A. Meserve, NRC, to Robert G. Card, DOE, November 13, 2001.

“Nuclear Waste News”, Vol. 21, Jan-Dec 2001.

“Nuclear Waste Technical Schedule, and Cost Uncertainties of the Yucca Mountain Project”, United States Government Accounting Office, December 2001. (GAO-02-191).

“Reexamination of Spent Fuel Shipment Risk Estimates”, (NUREG-6672) NRC, June 2000.

“Reliable, Affordable, and Environmentally Sound Energy for America’s Future” Report of the National Energy Policy Development Group, May 17, 2001.

Xcel Energy 2000 Integrated Resource Plan Application, July 10, 2000 (PUC Docket No: E-002/RP-00-787).