THE AGING OF THE NUCLEAR STATE:

A SURVEY OF SOUTH CAROLINA'S NUCLEAR UTILITIES

An Issue Brief for South Carolina Citizens

Produced by the League of Women Voters of South Carolina
and the League of Women Voters of the Columbia Area

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ABSTRACT

This document describes South Carolina's publicly owned utilities, the status of their reactors, and their spent nuclear fuel management practices. It does not deal with other providers of electricity, such as cooperatives and municipalities from which many South Carolinians purchase electric service. Much of that electricity is generated by publicly owned utilities.

We have also included a brief history of South Carolina's nuclear involvement, an explanation of nuclear energy and nuclear fuel production, and information on some important emerging public policy issues affecting South Carolina's energy and economic future.

While a detailed discussion of deregulation is beyond the scope of this work, we have attempted to point out the main outlines of the meaning of deregulation, its statutory basis and some implications for consumers, especially those in areas served by nuclear utilities.

Citizens need information in order to participate in State and federal decisions affecting nuclear waste disposal and deregulation, and in the future of a deregulated utility industry. We hope that the information we are providing will assist citizens in becoming informed participants in the important dialogues of the near future and regarding the federal role in commercial spent nuclear fuel management. This document is an effort to clarify one important piece of South Carolina's nuclear mix - the status of commercial nuclear power plants and their needs with respect to spent nuclear fuel management.

INTRODUCTION AND ACKNOWLEDGMENT

This overview of South Carolina's commercial nuclear power reactors and spent fuel storage has been produced by the League of Women Voters of South Carolina and the League of Women Voters of the Columbia Area as part of a national League of Women Voters Education al Fund (LWVEF) project on nuclear waste education. It was funded by the U.S. Department of Energy Office of Civilian Radioactive Waste Management. Mary T. Kelly, Ph.D., has been the principal researcher and editor. The document was critiqued by Sharon Lloyd O'Connor with the LWVEF, former South Carolina Representative Harriet H. Keyserling, C. S. Hinnant Vice President of Carolina Power and Light Robinson Plant, Brian Costner Executive Director of Energy Research Foundation, and contacts in the utility industry and State government.

This document can be used in conjunction with and as a supplement to two other LWVEF publications: *The Nuclear Waste Primer - a Handbook for Citizens,* and *Transporting Radioactive Spent Fuel - an Issue Brief.* A bibliography of other useful publications is included.

The League intends to provide South Carolina citizens with a base of reliable and up-to-date information so that citizens may more effectively participate in pending State and national decisions regarding commercial nuclear storage and disposal. This is particularly significant in South Carolina where an estimated 63 percent of the State's electricity is derived from nuclear energy. In contrast, the national estimate is 22 percent.

Although some utilities have stated that they are not prepared to store their spent fuel, South Carolina's nuclear utilities have made adequate preparations to manage their fuel until about 2015, which is the date that a federal facility may be expected to accept commercial spent fuel.

As work on this report has progressed, it has become apparent that nuclear wast disposal cannot be examined without at least some consideration of other pertinent matters relative to nuclear utilities, such as the effects of deregulation on nuclear utilities and the effects of aging on the anticipated life and safety of nuclear reactors.

TABLE OF CONTENTS

THE EVOLUTION OF THE NUCLEAR STATE

On April 13, 1980, the Sunday combined edition of *The Columbia Record and The State* newspapers published a supplement entitled "The Nuclear State" describing in a comprehensive way the great extent of South Carolina's nuclear involvement. It was a revelation to most South Carolina readers, who were amazed to find what an important role this small state was playing in the very secret federal nuclear weapons program, how heavily the State was involved in commercial electric power production from nuclear energy, the prominent role played in low level radioactive waste disposal, and South Carolina's welcoming attitude, as evidenced by the South Carolina Atomic Energy and Radiation Control Act (passed and amended in the '60s and still State law). This Act directs the State Development Board to "promote and assist in the establishment of private atomic energy facilities" and to "assist the Governor, the General Assembly, and other agencies of State government in the development and promotion of atomic energy resources and industrial activities."

Many of the issues explored in the *State/Record* were just beginning to be examined nationally by a public made less trusting by the Three Mile Island nuclear power plant accident. For most South Carolinians, conditioned by the secrecy surrounding the Savannah River nuclear weapons plant, discussion of anything nuclear had been a forbidden topic. Now, for the first time, a comprehensive view of South Carolina's nuclear involvement was offered.

In the years since 1980, these same issues have been the subject of intense debate and sincere efforts on the part of the public, the nuclear industry, and Congress to arrive at good decisions. What to do with nuclear waste, where to put it, what is fair, and who should pay are all matters that must be decided.

Throughout the 1980s, South Carolina government officials and citizens, alarmed by the State's heavy burden of nuclear waste, were instrumental in securing passage of federal laws designed to ensure safe and environmentally sound nuclear waste disposal. However, in light of missed deadlines, changing public perceptions and various new developments, Congress and the public are once again evaluating basic premises and working on ways to accommodate old needs and new realities.

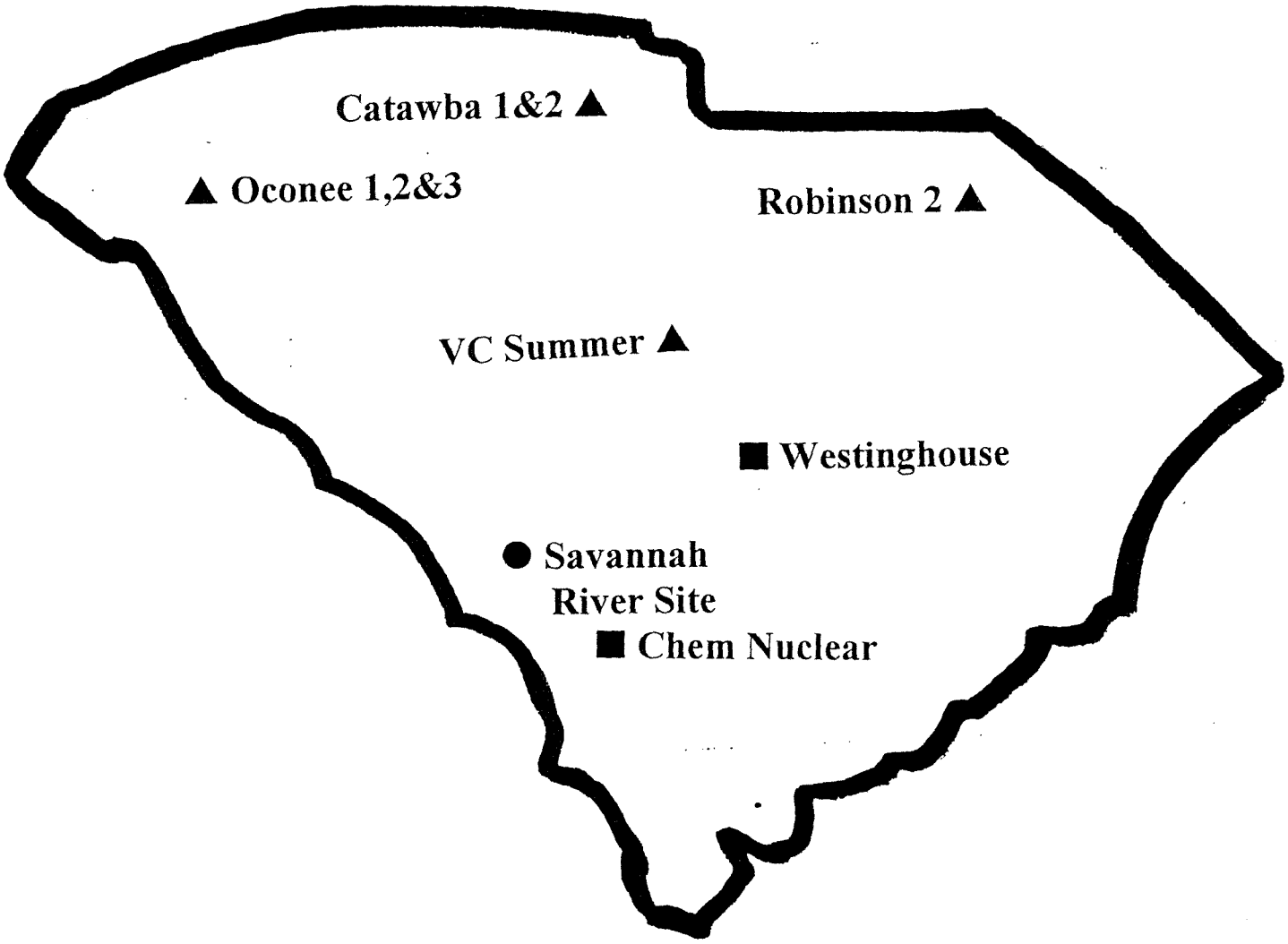
This document is an effort to clarify one important piece of South Carolina's nuclear mix - the status of commercial nuclear power plants, and their needs with respect to spent nuclear fuel waste management.

The facilities listed by the *State/Record* back in 1980 and their current statuses are listed below:

*The federally owned ***Savannah River Plant*** **(SRP)**, known locally "as the bomb plant," was a top secret facility built in the '50s to produce radioactive materials for use in nuclear weapons. The Plant has been renamed the Savannah River Site (SRS). The actual weapons were manufactured elsewhere. Operated for most of its history by DuPont, more recently by Westinghouse, it is located on a 300-square mile site on the Savannah River near Aiken. Five production reactors, similar to commercial power reactors but with some important operating and construction differences, produced tritium and plutonium during the cold war and into the 1980's when this country was building arsenals to meet a perceived Soviet threat.

By 1980, only three of those reactors were operating; two were on standby. None of the reactors has operated since 1988. Today, four are shut down permanently with plans underway for decontamination and decommissioning. Attempts to restart the fifth

Figure 1: Major nuclear facilities in South Carolina:



reactor in the early nineties ran into major difficulties. It is currently on cold standby, with no plans to restart it because the ending of the Cold War has changed the nation's need for nuclear weaponry. Today no reactors are operating at SRS.

Safety and environmental problems at SRP didn't come to the public's attention until the mid '70s. In 1976, the Energy Research and Development Administration released a report, the first to be publicly available, detailing SRP's effect on its surroundings. The public began to demand more stringent standards and monitoring for all nuclear reactors. Critics were calling the Savannah River operation obsolete, unsafe and lagging behind commercial reactor standards.

At the same time, South Carolina health officials were becoming increasingly concerned about off-site contamination of surface and ground water stemming from on-site activities, but lacked jurisdiction to do anything about it. SRP was treated as a "black box" with neither state nor federal environmental protection officials having entry to or jurisdiction over federal weapons facilities. Passage of some major federal laws changed that. The 1969 National Environmental Policy Act established the Environmental Protection Agency (EPA) and gave it the mandate of setting standards for radiation affecting the public health and for administering federal environmental laws. However, it took the 1976 Resource Conservation and Recovery Act (RCRA) and the Superfund law, the 1980 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), to give EPA authority over federal weapons facilities for mainly non-radiological matters. The South Carolina Department of Health and Environmental Control (DHEC) has been delegated by EPA to carry out regulatory duties with respect to environmental laws at the Savannah River weapons complex.

Regulation of mixed waste - hazardous waste mixed with radiological waste - has been added to DHEC's jurisdiction under provisions of the 1992 Federal Facilities Compliance Act. The Department of Energy and the Nuclear Regulatory Commission continue to have principal jurisdiction over radiological matters.

The Department of Energy is now engaged in expensive upgrading and environmental cleanup measures. Despite an ambitious ten-year plan, it is estimated that environmental restoration will require from ten to thirty years to accomplish. The environmental restoration has to a great extent offset economic losses in the Aiken area due to cessation of production. According to the SRS Environmental Report for 1995, approximately 16,000 workers were employed at SRS in 1995. Seventy percent of that number lived in South Carolina, mainly in the Aiken area. Another 30 percent lived in Georgia.

According to an official site representative, at the end of January 1997, a total of 15,669 workers was employed - 13,782 of whom worked for Westinghouse. Throughout most of its history, SRS has been the state's largest employer.

DOE is currently evaluating various possibilities for replenishing the supply of tritium needed to maintain the nation's weapons stockpile. Among the proposals is the building of a linear accelerator at SRS. Use of a commercial reactor has also been proposed, with the tritium to be extracted at a federal facility. Most recently, use of a mothballed reactor at a federal laboratory in Washington State has been suggested as allegedly a much faster and cheaper method of obtaining tritium. In the short term, tritium is being recovered from existing weapons stocks, but as this short half-life element (12.5 years) decays, more will be needed. Reprocessing of depleted tritium has been going on at SRS's new underground Replacement Tritium Facility since 1994.

SRS is now receiving and storing spent fuel from foreign research reactors, in fulfillment of treaty agreements, as well as from domestic research reactors (universities and national laboratories). The State of South Carolina has sued the Department of Energy to prevent the importation of the foreign fuel and lost.

It is highly possible that waste from other federal installations will come to SRS as many federal sites are cleaned up and closed.

Currently both Department of Energy and foreign fuels are stored at SRS and fuel volumes can be expected to increase. Reprocessing of the spent fuel has been suggested. However, reprocessing generates large volumes of liquid radioactive wastes. SRS has only begun to solidify the large volumes of liquid reprocessing waste dating back to the '50s.

The Defense Waste Processing Facility at SRS, built to solidify SRS's forty year accumulation of dangerous high level liquid reprocessing waste, became operational in 1996. Through a separation procedure, a large volume with a lesser radiological activity is removed, incorporated in a concrete-like mixture and buried on site. The remaining highly radioactive material is being incorporated in glass and placed in stainless steel canisters which will be transported to an out-of-state permanent repository when one becomes available. Meanwhile, the casks containing the glass solid will be stored on site. As technology is developed some of the excess of plutonium from dismantled nuclear weapons could be incorporated with the glass waste as one way of keeping it out of terrorist hands.

*The ***Chem-Nuclear Systems, Inc.,*** low level radioactive waste disposal facility on State-owned land at Barnwell is adjacent to the Savannah River Site. It buries low level nuclear waste from commercial sources (primarily from commercial reactors, with smaller amounts coming from hospitals, research laboratories, and various businesses using radioactive materials) from all parts of the United States. By definition low level waste is waste that is not "high level" (liquid reprocessing waste, mainly military waste or spent fuel rods) or transuranic (containing radioactive elements with atomic numbers greater than uranium). Included in the waste are such items as parts from reactors and parts of reactors as they are decommissioned, clothing, filters, tools, machinery that became contaminated by coming in contact with radioactive materials during operation and maintenance of facilities.

Chem-Nuclear Systems, Inc. became a regional facility as host state for the Southeast Radioactive Waste Compact after passage of the Low Level Radioactive Waste Act of 1982. Deadlines were set to allow other regions to site facilities, for the exclusion of out-of-state waste, and for closure to in-region waste to allow time for North Carolina, the designated southeastern second host state, to bring a new site on line. The Barnwell site was to have closed to out-of-state waste July 1, 1994, and to out-of-region waste at the end of 1995. These dates represent the last of several deadline extensions.

After a hard fought legislative battle the site was kept open to all states except North Carolina, and South Carolina withdrew from the Southeastern Radioactive Waste Compact. Advocates of keeping the site open included local Barnwell residents and others who viewed the facility as a source of significant revenue promised as funds for education. Opponents argued that closure was a reversal of well thought out public policy designed to force other states to deal with their own low level waste obligations. As reported by *The State* newspaper, income has fallen short of projections and the Barnwell operation continues to be a controversial matter.

*The mothballed ***Carolina's-Virginia Tube Reactor***, located at Parr in Fairfield County was an experimental reactor undertaken as a joint venture of SCE&G, Carolina Power and

Light, Duke Power, and Virginia Electric and Power Company. It began operating in March of 1963 and was decommissioned in 1967.

It was South Carolina's first step into commercial nuclear power production, built at the urging of the Atomic Energy Commission. The purpose was to explore the feasibility of nuclear fission as a source of electricity at a time when commercial power production was a new technology. The Parr plant was a pressure tube reactor, cooled and moderated with heavy water - water enriched with deuterium oxide, a heavier isotope of hydrogen, possessing an enhanced ability to slow down, or thermalize, neutrons. This heavy water was supplied by the Savannah River Plant. The reactor was licensed to operate from 1963 until it was decommissioned in 1967. Its nuclear fuel was sent to West Valley, New York, where the fuel was used in a reprocessing venture that failed. During its operating years the Parr plant was subsidized to the extent of $10 million by the AEC.

The Parr design has since been adopted by Canadian utilities with access to cheap natural uranium, but the design was considered too costly by the cooperating utilities. Each went on to build nuclear reactors of other designs. Today the mothballed Parr plant still stands in Fairfield County.

* In 1980 four ***commercial nuclear reactors***, one in Hartsville and three at Oconee, were operating. In 1997, a total of seven commercial reactors located on four plant sites are operating in South Carolina and provide approximately two-thirds of the State's electricity needs. All are pressurized light water reactors. Although CP&L and Duke Power own and operate nuclear plants in North Carolina, details are provided for South Carolina reactors only.

The first plant to begin operation was Carolina Power and Light's H. B. Robinson Plant located near Hartsville, in 1971. This was followed by Duke Power Company's Oconee Plant (three units) in 1974 and SCE&G's V. C. Summer Plant at Jenkinsville in 1984. The newest plant is Duke's Catawba Plant (two units) in York County. Three more, planned by Duke Power for Cherokee County, were canceled. Economic realities make it unlikely that more will be built. (The storage pool of one of the partially built Cherokee reactors was used as a set for an underwater movie.)

*The highly controversial aborted ***Allied General Nuclear Services*** (AGNS) nuclear fuels reprocessing facility located near Barnwell adjacent to SRS. It was built to operate as a commercial facility, but was never licensed or operated, and has been mothballed. The AGNS plant was designed to reprocess commercial spent fuel, and to recover uranium and plutonium for use in a new generation of reactors. The plant's design, however, did not address what to do with liquid high level radioactive reprocessing wastes, a problem which has plagued this country's military reprocessing activity. President Carter's nuclear nonproliferation policy called for a halt to reprocessing of commercial spent fuel to prevent terrorist access to plutonium.

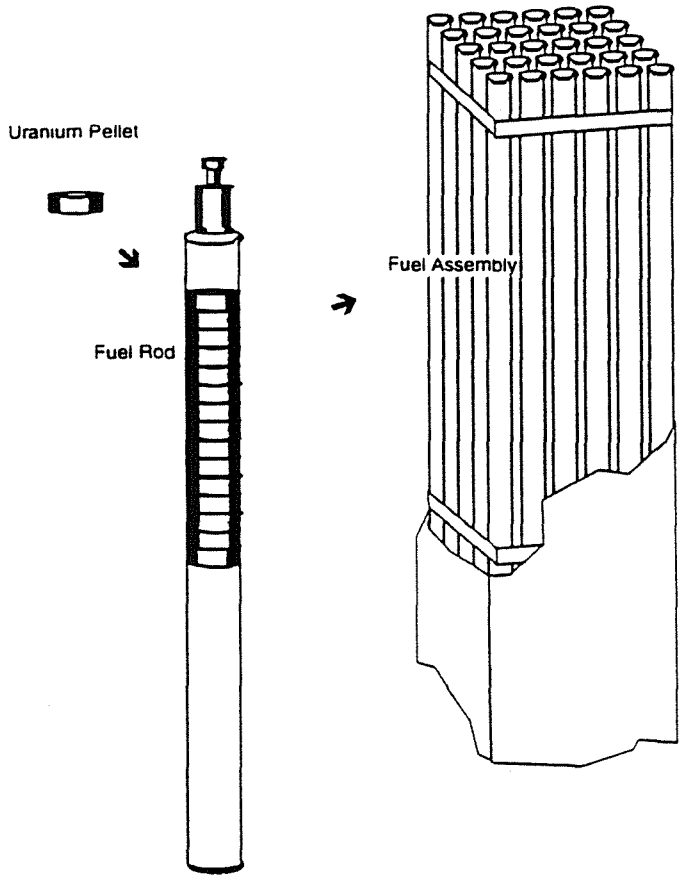
President Reagan reversed the ban on reprocessing and foreign owners were sought, with the intent of reprocessing domestic and foreign spent fuel. A Congressional decision not to provide federal funds to continue subsidizing the project effectively ended it. However, there is currently some interest in the possibility of using some part of the facility, probably the storage pool, to store spent fuel rods.

**Westinghouse Nuclear Fuel Division* is located in eastern Richland County. This plant manufactures fuel rods and fuel assemblies for nuclear power reactors. It began operating in 1969 and is operating today as an important manufacturer of reactor fuel.

*_Southern Space Nuclear Laundry_. It has two facilities, one on S. Edisto Court in a residential area of Columbia, another in Charleston. Ownership changed in 1985 to Interstate Nuclear Services. The company which opened in 1971 has been granted a new license for the Columbia location which is being challenged by local citizens. It launders radioactive contaminated clothing and equipment for utilities and nuclear businesses. More recently it has begun to launder contaminated clothing from SRS and other federal facilities. Although it has been in operation for more than twenty-five years, most neighbors were unaware of its function until plutonium contamination attributable to SRS became an issue in 1996.

*_Naval nuclear facilities_ and operations in the Charleston area. With the end of the cold war these activities have been cut back but the need for clean up remains.

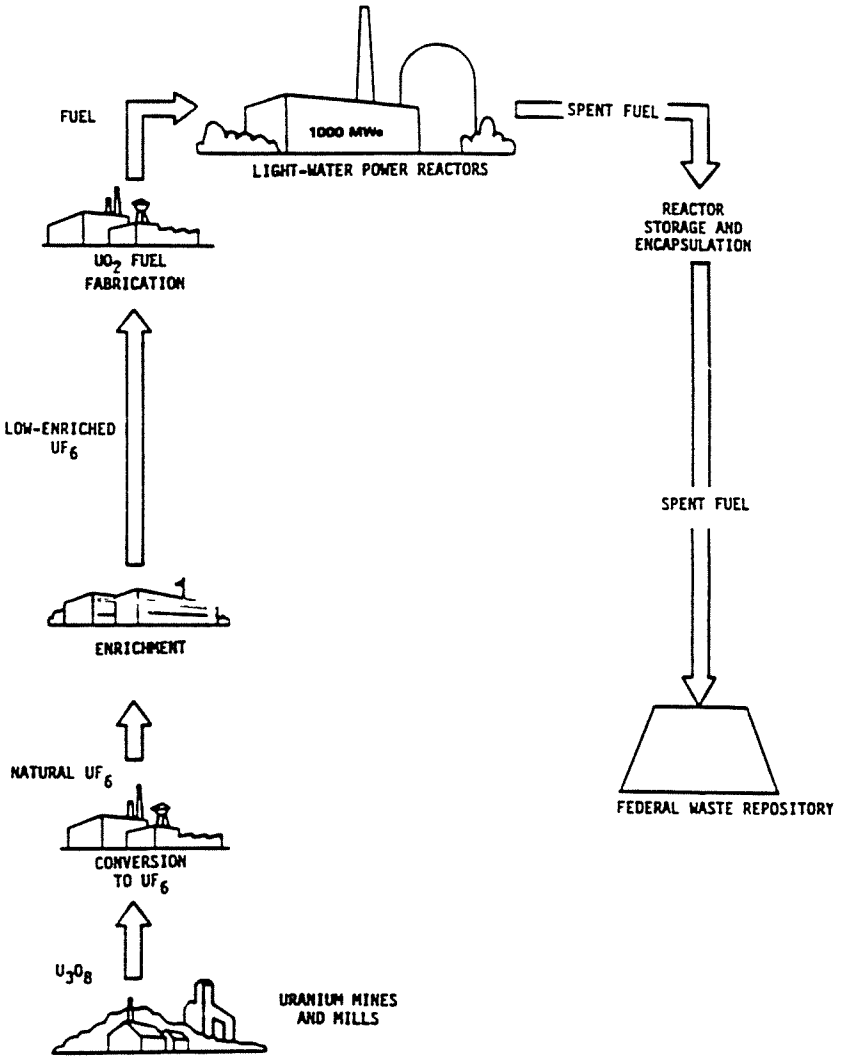
Figure 2: Fuel Rod Assemblies



Drawing adapted by LWVEF from DOE/RW-0447

Note: The above is a typical fuel rod assembly for a pressurized light water reactor (PWR) of the type used by South Carolina utilities. These assemblies may vary in type but most are 8.44 inches wide, 159.8 inches long, and contain 425 to 460 kilograms of uranium. These assemblies are inserted as a unit and removed for storage in pools of water to cool thermally as well as radioactively before they can be transported.

Figure 3: The Nuclear Fuel "Cycle"



Mwe = Megawatts electric power;
UF_6 = Uranium hexaflouride
U_3O_8 = Uranium oxide ore
UO_2 = Uranium dioxide

Source: Nuclear Regulatory Commission, NUREG-0016

PUBLIC VIEW

In recent years in South Carolina nuclear issues of one kind or another have been high in the public consciousness. Controversial high profile issues have been the continued acceptance of waste from all over the country at the Chem-Nuclear Systems, Inc. low level waste disposal site at Barnwell, and the foreign waste controversy: the Governor and the Attorney General as well as much of the public have objected to the importation of the foreign research reactor fuel for storage at SRS.

There is ongoing dialogue between citizens and DOE/Westinghouse on Savannah River Site issues and proposals for the future facilitated by an active Citizens Advisory Board. The federal Center for Disease Control (CDC) has a Dose Reconstruction Project underway to reconstruct and evaluate health impacts of SRS, again with its own Citizens Advisory Board. At this late date it has finally been recognized that there is a need for a comprehensive health study of the effects of SRS on the populations of South Carolina and adjacent Georgia. The CDC study is an attempt to compensate for this.

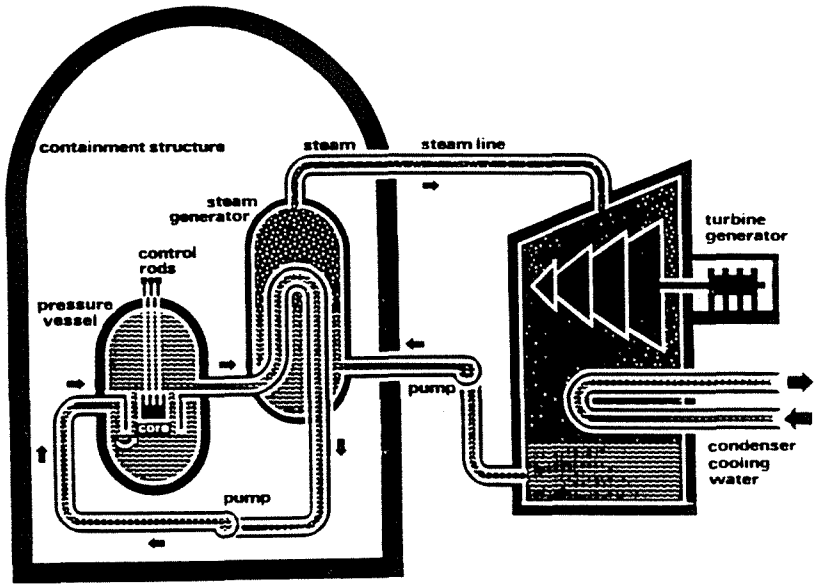
There is no similar pattern of activity or high level of awareness about the State's seven nuclear power plants or their waste management problems. Nor is there an institutionalized process for oversight on the part of citizens. The main entree of citizens in nuclear power plant issues has been through the licensing process, which occurs before a reactor can operate, the on-going Nuclear Regulatory Commission regulatory process, and through utility rate hearings.

SOUTH CAROLINA'S NUCLEAR UTILITIES: GENERAL CONSIDERATIONS

Three major electric utilities have operations in South Carolina: Duke Power, Carolina Power and Light (CP&L), and South Carolina Electric and Gas Company (SCE&G). A fourth utility, the State owned Santee Cooper, is a part owner of SCE&G's V.C. Summer nuclear reactor. Among them, the publicly owned utilities own and operate seven nuclear power reactors at four different sites within the state. Only Illinois with thirteen reactors at seven sites and Pennsylvania with nine reactors at five sites have more. South Carolina derives 63 percent of its electricity from nuclear power. On a national basis 22 percent of electricity is derived from nuclear power.

All of the State's reactors are of the ***pressurized light water reactor*** design. At all of these plants' spent nuclear fuel is being stored on site in fuel pools. In addition, dry cask storage and transshipping spent fuel from one reactor to another within the same company have been used to relieve the need for additional pool storage capacity by both Carolina Power and Light and by Duke Power.

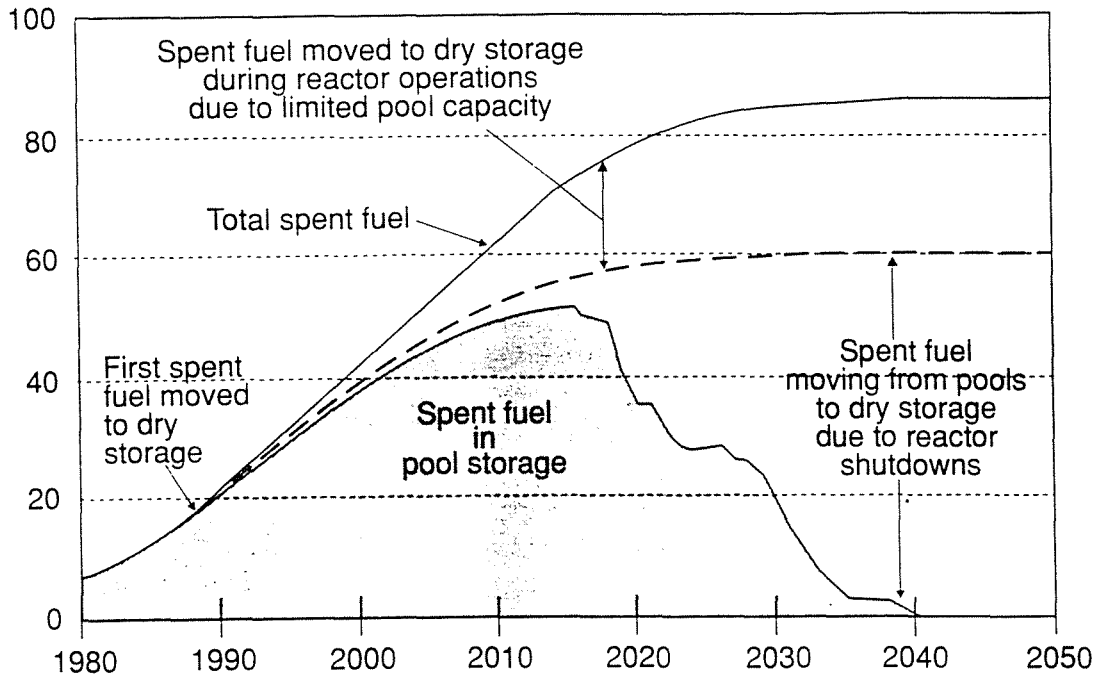
Figure 4: Pressurized Water Reactor



Source: Atomic Industrial Forum, Inc.

The fate of spent fuel now being stored on site in fuel pools or in dry cask storage is unclear. According to the Nuclear Waste Technical Review Board, at the end of 1995, 32,000 metric tons of fuel had been generated by 70 sites nationwide. That figure is expected to grow by 2,000 metric tons per year through the year 2010 unless a significant number of reactors shut down early.

Figure 5: Spent Fuel Accumulation - in thousands of metric tons



Note: The figure showing spent fuel in pool storage assumes the movement of all spent fuel from pools to dry storage approximately five years after plant shutdown. Assumptions include: 40-year operating licenses with no renewals and no new plant orders; all spent fuel remains at reactors.

Source: Adapted from DOE

All of the State's utility ***transmission systems*** are part of an interconnected grid that extends over much of the southeast and eastern portions of the United States. All are members of the Virginia-Carolinas Reliability Group, part of the Southeastern Reliability Council which coordinates planning for reliability among bulk power systems in the southeast.

Decommissioning is the term used for the process by which a nuclear reactor is shut down permanently in a way that will protect the public from exposure to or dispersion of radioactivity. All nuclear reactors will have to be decommissioned, thereby producing additional disposal requirements for nuclear waste in addition to spent fuel rods. The Nuclear Regulatory Commission (NRC) sets decommissioning dates as the license expiration date. Licenses are granted for forty years but may be extended. However, in early 1991 the Department of Energy estimated that 65 of the nation's 109 operating reactors would be shut down by the year 2020.

There has been some interest in retrofitting nuclear power plants to greatly extend the operating lives of the plants. As reactors age they are subject to problems: corrosion, stress, cracking of the steam generator tubes and embrittlement of metals in the reactor vessel from the effects of radiation, with safety implications for the public and plant personnel. Both technical and safety considerations relating to parts or areas that are worn

and/or radioactively hot, as well as cost factors, are likely to impede replacement and could affect decommissioning dates and efforts to secure license renewal. In cases where steam generators are replaced or plants are shut down for any other reason, utilities must purchase replacement power.

Nuclear utilities are obligated to plan and make financial provisions for decommissioning. In 1988 the NRC issued a rule which required an external mechanism to fund decommissioning costs for the components of a nuclear plant subject to radioactive contamination. For a fuller explanation of decommissioning and its implications see the League of Women Voters *The Nuclear Waste Primer, A Handbook for Citizens* pp. 67-70.

The Nuclear Waste Policy Act of 1982 (see Legislative Framework, Appendix II, p. A-3) requires the Department of Energy (DOE) to ***take title*** and begin disposing of spent fuel not later than Jan. 31, 1998. All nuclear utilities have contracts with DOE covering spent fuel disposal and have been making payments for that purpose. As of late 1996, nuclear utilities had paid more than $12 billion into a federal fund to pay for a permanent repository for spent fuel. Because the federal permanent repository for disposal has yet to be selected based on studies, or completed and licensed, a repository will not be available on schedule. DOE declared that, under these circumstances, it did not have to comply with its contracts with utilities. As a result of a 1996 court decision reached in response to a challenge by 73 power plants in 34 states the take-title provision stands. South Carolina did not join in that law suit. DOE's plans to take title are not clear. In late January South Carolina was one of 46 states and 33 utilities asking a federal appeals court to force DOE to begin disposing of radioactive waste next year and seeking permission to end payments to the fund earmarked for nuclear waste storage.

Regulating Nuclear Power: Electric utilities are subject to a variety of regulatory agencies dealing with nuclear safety, environmental matters and financial matters. For the Carolinas, South Carolina Public Service Commission and the North Carolina Utilities Commission have jurisdiction over the territory to be served, issuance of securities, and setting of rates in those respective states. Current rates are set to allow recovery of the cost of providing electric power to retail and wholesale customers and to ensure a reasonable profit for investors. The Securities and Exchange Commission, the Federal Energy Regulatory Commission (FERC), the U.S. Environmental Protection Agency (EPA), and state environmental regulators also have areas of jurisdiction. The federal Nuclear Regulatory Commission (NRC) has jurisdiction over the design, construction, licensing, maintenance and operation of nuclear power facilities.

Deregulation and restructuring of the electric power industry: As a result of the Energy Policy Act of 1992 the electric utility industry is facing many new challenges as it moves from a highly regulated and protected monopoly with set territories and ensured but limited stockholder profits to one in which it will have to compete for customers on both the wholesale and retail levels. The Act's initial effect is on wholesale customers of electric utilities. Changes have been made in certain underlying federal policies, mainly embodied in the Public Utilities Holding Company Act of 1935, concerning wholesale generation and sale of electric power. The Federal Energy Regulatory Commission now has the authority to permit wholesale transfer or wheeling of power over the transmission lines of other utilities. In other words, a power generator in one part of the country can sell to a wholesale purchaser in another part, even though it does not own the transmission lines. The Act

specifically prohibits the FERC from ordering retail wheeling, leaving that to the states. Smaller users - residential customers and most businesses and industrial customers - must wait for state legislative action. States in parts of the country where retail electric rates are high have taken the lead. As of December 17, 1996, six states including California and New Hampshire had made restructuring plans. At least 37 others are considering it. In South Carolina, legislation has been introduced and is being debated.

Interestingly, the preliminary steps toward deregulation, not recognized as such at the time, came from provisions in the Public Utility Regulatory Policy Act (PURPA) of 1978.

> *The **Public Utility Regulatory Policy Act** of 1978 was intended to lessen dependence on imported fossil fuel by promoting conservation and development of more environmentally benign alternative sources of energy. It set up a new category of generator called qualifying facilities, firms that could produce electricity in non-traditional ways - co-generation, wind systems, solar energy systems, small hydropower facilities - and mandated that utilities purchase the output. Some utilities found such purchases beneficial in avoiding large capital costs for new generating capacity at a time of high interest rates and regulatory uncertainty. Some, however, are locked into contracts that are proving burdensome - under deregulation there will be no guarantee of cost recovery.*

Utility ***deregulation*** is one of the most important issues facing consumers at this time. During this period of change, the legislation and rules that will be adopted on the federal and state level demand careful analysis. All utilities are taking steps to improve their competitive positions in a more fully deregulated market. Cost cutting, emphasis on improved productivity, and major financial moves such as mergers and acquisitions are common.

The complexities and uncertain consequences are of particular importance to customers and stockholders of nuclear utilities. Nuclear utilities have significant investments in the current system. They have, for example, invested millions of dollars into construction, safety measures, insurance, nuclear waste disposal, and funds reserved for decommissioning. Will utilities be able to continue to recover costs, now included in the rate structure, or will stock holders have to absorb them? Will nuclear utilities be placed at a competitive disadvantage with non-nuclear utilities? The term "stranded costs" is used to describe specialized costs which may be difficult to recover in a deregulated market.

Users of large amounts of electricity such as auto and tire makers, steel makers and chemical companies are planning for deregulation and encouraging policy markets to make decisions that will allow them to purchase power inexpensively. Smaller users and homeowners are not well informed about deregulation and its potential effects and are more likely to be most negatively affected by new pricing structures.

Although South Carolina utilities generally have good operating records and some of the lowest electric rates per kilowatt hour in the nation, emerging problems in other areas of the country show the need for study, planning, and public input before major new deregulation rules are adopted. Despite the low rates, South Carolina is ninth among states in expenditures for electric power, showing the need for better energy conservation measures.

In California, for example, consumers have sued state regulators in an effort to impose stranded costs on stockholders rather than on consumers. In that state, in mid 1995, the stranded costs faced by the three investor-owned utilities exceeded each company's market value. According to the Wall Street Journal of February 19, 1997, state legislation has been passed which saves utilities from major writeoffs. The new law provides for the use of a financial market device called asset securitization. Under asset securitization the stranded costs are lumped together and sold as stranded cost bonds, backed by the state and the

utilities. The utilities not only avoid writeoffs but get their money up front without waiting years for the return from rates. The interest and principal on the bonds will be repaid out of a portion of future electric bills. Consumers in return have received a 10 percent cut in electric rates for a five-year period. For a fuller explanation, see the Wall Street Journal (WSJ), February 19, 1997, p. B6, and Moody's Investors Service Inc.

In New England, where retail electric rates are very high, the demand for immediate deregulation has been strong. Deregulated pricing in New Hampshire is set to begin on January 1, 1998. Both the federal Securities and Exchange Commission and New Hampshire regulators have been told by Northeast Utilities that two of its subsidiaries could be forced into bankruptcy if prices are based on market forces rather than being tied to the cost of production. Financial analysts are concerned that Northeast Utilities, with its massive costs associated with closed nuclear power plants, could then follow into bankruptcy (WSJ, Jan. 20, 1997, p.B4 and WSJ, March 3, 1997, p.B6).

Northeast Utilities has four nuclear reactors shut down in Connecticut. One, the Connecticut Yankee plant at Haddam Neck, is shut down permanently. A state review blames Northeast Utilities' troubles on short-sighted cost cutting measures taken to improve profitability and competitiveness. Replacement power alone is costing rate payers $30 million a month (see WSJ Jan. 2, 1996; WSJ, March 3, 1997, p.B6). Note: Connecticut Yankee is owned jointly by seven New England utilities, which includes Northeast.

SOUTH CAROLINA'S NUCLEAR UTILITIES: PROFILES

This section provides specifics on South Carolina's publicly owned utilities, useful for understanding the complex nature of today's public utility business and the many factors that need to be considered in this time of great change. The information has been obtained from business sources - each utility's annual report to investors, *Moody's Public Utilities Manual*, and the *Wall Street Journal*; from the annual Integrated Resource Plans required by the SC Public Service Commission; and from the 1996 DOE report *Spent Fuel Discharges from U.S. Reactors 1994.*

Two of the three utilities, Duke Power and SCE&G, are part of holding companies, an organizational system that facilitates ownership of regulated and unregulated businesses under one centralized management umbrella. Unregulated subsidiaries are not limited in the amount of profit they may earn, nor are they protected from losses.

BUSINESS PROFILES:

Carolina Power and Light (CP&L), Raleigh, N.C.

Company structure: an investor owned company.

Customer base: 1.09 million electric power customers in North Carolina and in central South Carolina

Operating revenues in 1995 $3 billion

Net income in 1995 $372.6 million

Total generating capacity: 9,613 megawatts of electricity from fossil, nuclear and hydroelectric. The company purchased enough additional electricity to bring the 1995 peak load to 10,156 megawatts

Generation mix in 1995: 44% fossil fuel, 42% nuclear 13% purchased power, 1% hydro

Nuclear reactors: H.B. Robinson 2 at Hartsville, SC; Brunswick 1 and 2 and Harris 1 in NC

Other business activities: CaroNet, Inc., a wholly owned subsidiary of CP&L, owns 10% interest in Bell South Carolinas PCS, a limited partnership led by Bell South Personal Communications, Inc. Through this limited partnership CaroNet will be in the mobile communications business as well as the interstate telecommunications service business in an area covering most of North and South Carolina as well as part of Georgia.

Duke Power, Charlotte, N.C.

Company structure: One of the largest investor-owned utilities in the United States. The company consists of ten business units which, except for electric service within Duke's franchised service area, are part of the holding company, Associated Enterprises Group (AEG).

Customer base: 1.8 million customers, in North Carolina and western South Carolina.

Operating revenues in 1995: $4.4 billion;

Net income: $714.5 million total (AEG units contributed $54.3 million of this)

Total generating capacity: 16,900 megawatts, including 12.5% Catawba nuclear station capacity.

Note: Duke operates the Catawba nuclear station but shares ownership.

Generation mix: 30% nuclear, 45% coal, 25% hydro.

Nuclear reactors: Oconee 1, 2 and 3 at Seneca, SC; Catawba 1 and 2 at York, SC; McGuire 1 and 2 in NC.

Other business activities: Duke is in the power marketing business and in the provision of related services worldwide. Duke is part of the holding company, Associated Enterprises Group (AEG). It has real estate interests and expects to enter the gas pipeline business. Duke made financial news headlines in 1996 when it entered into an agreement to buy PanEnergy Corp., a major natural gas pipeline concern. According to the Wall Street Journal, this purchase could bring Duke's combined revenue to an estimated $10 billion per year.

AEG includes such companies as Duke/Fluor Daniel, which focuses on engineering construction and operations of coal fired plants, Duke Engineering Services, Inc., and DukeNet Communications Inc. which develops and manages communications systems. DukeNet is a 20 percent owner of Bell South Carolinas PCS partnership, the successful bidder for the right to provide Personal Communications Services (PCS) in the Charlotte Metropolitan Trading Area covering both Carolinas and a portion of Georgia.

South Carolina Electric and Gas Company (SCE&G), Columbia, S.C.

Company structure: Principle subsidiary of the holding company, SCANA.

Customer base: 484,354 electric customers in South Carolina including Columbia and Charleston.

Operating revenues in 1995: $1.3 billion

Net income: $168 million

Total peak generating capacity in 1995: 4282 megawatts (MW).

Note: SCE&G sells electricity for resale to three municipalities, three investor-owned utilities, two electric coops, and a public power agency.

Generation mix in 1995: 65% coal, 27% nuclear, 5% hydro, 3% natural gas and oil.

Nuclear reactors: V.C. Summer at Parr in Fairfield County, SC.

Other business activities: The company provides electric and gas service to approximately 2.3 million people in South Carolina. After its purchase in 1982 of Carolina Energies, Inc., SCE&G became the largest supplier of natural gas in the State. SCANA is in the business of exploring for and developing oil and gas producing properties, marketing natural gas and light hydrocarbons, transporting and bulk storing propane, and operating and maintaining power plants for others. Its wholly owned subsidiary, MPX Systems Inc. provides telephone, fiber optics, and wireless communications services through its association with ITC Transmission Systems, a Georgia-based telecommunications holding company, and its subsidiaries.

Figure 6: SOUTH CAROLINA NUCLEAR POWER PLANT DATA
as of December 31, 1994

Electric Utility Name	Reactor Name	Maximum Dependable Capacity (net MWe)	Number of assemblies	Date of Operation	License Expiration	Actual or Projected Retirement
Carolina Power and Light	Robinson 2	683	157	1970	2010	2010
Duke Power Company	Catawba 1	1,129	193	1985	2024	2025
	Catawba 2	1,129	193	1986	2026	2026
	Oconee 1	846	177	1973	2013	2013
	Oconee 2	846	177	1973	2013	2013
	Oconee 3	846	177	1973	2014	2014
SCE&G	Summer	885	157	1982	2022	2035

Note: all reactors are of the pressurized water (PWR) type. Chart information comes from DOE report *Spent Nuclear Fuel Discharges from U.S. Reactors, 1994, February 1996.*

CP&L's H.B. Robinson 2 is South Carolina's oldest commercial nuclear reactor. It is scheduled to cease operating in 2010. CP&L plans to meet future peaking power needs with a gas turbine facility now in the process of construction. The estimated cost for decommissioning in 1993 dollars: $257.7 million. The costs are site specific and based on dismantlement and removal of all radioactive and other structures at the site. Funds for decommissioning are accumulated through rate base charges, which, for retail customers must be authorized by the South Carolina Public Services Commission. All funds designated for decommissioning are deposited, by regulation, in an independent trust fund.

Robinson was designed with limited pool capacity in the expectation that the spent fuel would be sent elsewhere for reprocessing. To free up pool storage some spent fuel has been shipped to CP&L's Brunswick and Harris plants in North Carolina. Robinson is also using on-site dry cask storage. Dry cask storage is a method of storing partially cooled spent fuel rods in heavily clad and air cooled casks.

Duke Power utilizes dry storage facilities for its older spent fuel at its Oconee plant. Currently it is building more bunkers to house the casks near Lake Keowee, and has planned for adequate storage to last well beyond the 2013, when the Oconee operating license for units 1 and 2 will expire. It has also used transhipping to McGuire.

As noted before, Duke Power operates but only owns 12 1/2% of Catawba. The other owners are the Piedmont Municipal Power Authority, the North Carolina Municipal Power Agency No.1, the North Carolina Electric Membership Corporation, and the Saluda River Electric Cooperative.

Estimated decommissioning costs are being accumulated through retail rates, as agreed to by the SC Public Service Commission and the NC Utilities Commission. The total for all Duke Power's nuclear reactors is estimated at $1.3 billion.

SCE&G's V.C. Summer plant is one-third owned by Santee Cooper, the state owned public utility, but it is operated by SCE&G. Pool storage capacity is expected to last until the current operating license expires.

SCE&G estimates the cost of decommissioning in 2022 dollars as $545.3 million. The company is accumulating this sum through rates over the life of the plant. The rate income is being used to buy insurance policies on the lives of key company personnel. This system, known as COMRep (Cost of Money Reduction Plan), has tax advantages. The plan is being reviewed by the Securities and Exchange Commission. All funds for decommissioning are deposited, by regulation, in an independent trust fund.

DOE's most optimistic estimate of the availability of a permanent repository for disposal of spent nuclear fuel rods is between the years 2010 - 2015. All South Carolina utility managers have indicated that they have appropriate plans in place and can manage their own spent fuel within their own systems during that time, although they are suing to force DOE to take title, and assume the costs of storage as agreed in existing contracts.

The Nuclear Waste Technical Review Board's (NWTRB) 1996 *Disposal and Storage of Spent Nuclear Fuel - Finding the Right Balance - A Report to Congress and the Secretary of Energy* provides an excellent review of spent nuclear fuel management, the issues involved, the options available, and Congressional proposals. The report states that utilities can manage for the next several years and that the methods now used to store spent fuel at reactor sites are safe and likely to remain safe for decades to come. However, beginning around the year 2010, large amounts of new dry cask storage capacity will be needed.

SPENT NUCLEAR FUEL: WHERE WILL IT GO?

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As more and more reactors are decommissioned, there will also be a need for greater low level waste storage capacity to accommodate reactor parts which may be very radioactive. The term high level by definition is reserved for highly radioactive liquid reprocessing waste, although it is commonly used to describe spent fuel rods. This has implications for South Carolina if Barnwell's Chem-Nuclear Systems, Inc. low level radioactive burial site remains open and has capacity. The site has already received decommissioning waste. Parts from the Massachusetts Yankee Rowe plant, including four steam generators, were sent there in 1993 despite protest by environmental groups in the states along the transportation route. The protestors cited safety issues and the lack of a formal decommissioning plan. Yankee Rowe's owner claimed it was no more risky than other shipments that had gone to Barnwell in the past.

Four possibilities for interim or ultimate management of spent fuel are currently under discussion by DOE and the nuclear industry:

(1) Ultimate permanent storage at a federal site in Nevada or elsewhere.

(2) Interim storage at commercial power plants, with federal reimbursement of storage costs for fuel scheduled for receipt at the federal repository. A certain amount of movement of spent fuel may take place within and perhaps between facilities and more use made of dry cask storage.

(3) Construction of a new centralized federal temporary storage facility or monitored retrievable site (MRS) at some unnamed site to receive fuel from closed or closing nuclear power plants. Siting of such a facility can be expected to be as controversial as siting of a permanent repository. Advocates point to the fact that an MRS would allow the spent fuel to cool radioactively and thermally, and minimize the problems anticipated in placement of spent fuel in a permanent repository. Opponents of a centralized storage facility see it as a de facto permanent disposal facility which would divert from the goal of developing a permanent repository. However, bills providing for a temporary storage site were introduced in the 104th Congress and further action can be expected. See NWTRB report cited above.

(4) Reprocessing of spent fuel to recover the uranium and plutonium is something that has been encouraged for a long time by many in the nuclear industry. However, with the coming decommissioning of the nation's aged reactors, expected to accelerate after the year 2010, a new generation of nuclear reactors would have to be built to utilize these materials. Management of large volumes of reprocessing waste would add to the nation's as-yet unresolved high level nuclear waste disposal responsibilities.

APPENDIX I: QUESTIONS AND ANSWERS

How does the production of electricity from a nuclear power plant differ from the production of electricity from other fuel sources?

All electric power plants use an energy source to turn a turbine to produce electricity. A hydro power plant uses the energy from water power to turn the turbine. A fossil fuel plant burns oil or coal to produce steam to turn the turbine which in turn produces the electricity. A nuclear power plant uses atomic fission to boil water to produce steam, which then turns the turbine that produces the electricity.

What is atomic fission?

Atomic fission is the process by which uranium and other heavy element atoms split under neutron bombardment into smaller fragments. The most important fissionable element in this country's production of electrical energy is uranium-235. It can be split into fragments by low-energy neutrons with an accompanying release of usable energy.

What is the main advantage of atomic fission as a source of electrical power?

Atomic fission produces a tremendous amount of energy compared to fossil fuel. The fission of 1 gram of uranium-235 evolves about 20,000,000 kilocalories of energy. The combustion of 1 gram of coal releases 8 kcal. Put another way, the fission of 1 gram of uranium is equivalent to the combustion of 5500 pounds of coal or the explosion of 33 tons of TNT.

Are there other advantages in using nuclear power?

Early on, nuclear power was promoted as a very cheap way to produce electricity. It was often described, in the words of one Atomic Energy Commission member, as "too cheap to meter." The main advantage is that nuclear power does not contribute to the green house effect as does fossil fuel: it produces no hydrocarbon emissions, it does not produce the sulfur dioxide and nitrogen oxide gases that contribute to acid rain.

Are there other energy sources besides fossil fuel, hydropower, and nuclear power?

Other energy sources such as solar power, hydrogen and biomass (burnable organic matter) have been and are being used to produce energy. Energy conservation programs have yielded good results and show further potential.

Why has the building of nuclear plants come to a stop?

Early projections about the technical, economic and political factors involved in operating nuclear reactors and managing spent nuclear fuel was overly optimistic. Technical issues have divided nuclear boosters and nuclear skeptics. In addition, the nuclear industry has been affected more than its competitors by the changing economics associated with the high cost of building large power plants, the length of time it takes to bring a nuclear plant on line, costs associated with complying with safety and environmental regulations, and the cost of borrowing money. Safety concerns in the wake of Three Mile Island and Chernobyl have made communities less accepting of nuclear power. Utilities are reluctant to build any large new plants.

Economic factors will change further with the move from regulated cost-plus rate structures under which recovery of costs plus a limited profit has been guaranteed, to the realities of the deregulated market. Companies will be free to maximize profits but will have no assurance of cost recovery. Nuclear power generating utilities are considered to be at a cost disadvantage in this new environment.

What are the major disadvantages of using atomic fission as a fuel source?

Fission, because it releases such a tremendous amount of energy, is inherently a dangerous technology that has to be carefully controlled and monitored.

The fission process also produces new chemical elements that have unique properties of their own in terms of radioactivity, emission of heat, and toxicity. Reactor fuel assemblies must be replaced periodically because, as uranium 235 is depleted, fission products build up in the fuel rods. Arrangements for the final disposition of this spent fuel are behind schedule and a matter of national concern. For a description of fission see *The Nuclear Waste Primer* 1993 pp.13 and 14.

What are the main radioactive components of spent fuel rods?

Spent fuel rods, when taken from reactors, normally contain more than 100 radioactive fission products as well as transuranics - elements with a higher atomic number than uranium, produced by neutron bombardment, none of which are found in nature. These fission products have varying half lives - the time it takes for the material to lose 50 percent of its radioactivity - ranging from a fraction of a second to millions of years. For example, Iodine-131 has a half life of eight days; strontium-90 has a half life of 28.8 years; plutonium-239 has a half life of 24,000 years. Because of radioactive decay, the composition of spent fuel rods changes with time.

What happens to the spent fuel rods?

An operating nuclear reactor must be shut down periodically to allow for removal of spent fuel rods and then replacement with fresh fuel. The intervals between shut downs may be twelve, eighteen, or twenty-four months. To remove the spent fuel rods, the reactor must be shut down for the period of time needed to allow for the rods to cool in place. Then a portion, usually one-third, of the spent rods is removed, replaced, and the spent rods submerged in a pool of water dedicated to cooling and storage. The rods remain in the pool for a period of years, again to allow cooling. As determined by the Nuclear Waste Policy Act, the cooled spent fuel rods are destined to be sent to a federal repository for permanent storage.

Do the utilities have adequate on site storage?

Some do and some don't. Older reactors, built before the mid '70s, were built with the expectation that the rods would be reprocessed (the various chemical constituents separated out) and the uranium and plutonium present in spent fuel recovered for use as new fuel. The sizes of spent fuel pools at early reactors were designed with that in mind. Consequently, in older reactors, such as H.B. Robinson, the storage pools are inadequate despite reracking. A common interim measure is for utilities to remove older, cooler, spent fuel from fuel pools and place it in concrete dry casks for storage. Duke Power was one of the first utilities, in 1990, to use this method. South Carolina utilities have, in some cases, shipped spent fuel to other sites with available pool storage and/or dry cask storage.

APPENDIX II: LEGISLATIVE FRAMEWORK

Federal Laws:

The *Atomic Energy Act* of 1946 shifted the authority for controlling nuclear technology from the military to a unique five-member civilian commission, the Atomic Energy Commission (AEC). The AEC was given unprecedented authority to regulate all aspects of both military and commercial fissionable material. Neither citizens nor the government itself, other than the congressional Joint Committee on Atomic Energy (JCAE) had oversight of AEC activities.

Eight years later, the Atomic Energy Act of 1954 initiated the transformation of nuclear technology from purely military usage to production of commercial electric power. The 1954 Act permitted privately owned utility companies and manufacturers to build, operate, and own nuclear facilities, based on AEC developed research and information and subject to AEC licensing. Private companies did not leap at this opportunity - the technology was new and risky and the private sector chose to let the government absorb the development costs. However, both the AEC and the congressional JCAE saw commercial development as a way to improve the country's economic and strategic security, and took a number of steps to make nuclear technology more acceptable. A number of reports were issued which touted nuclear power plants as clean, cheap and safe sources of electricity. Cost estimates were based on experimental and extrapolated information and usually were unchallenged. Legislation was passed, the Price-Anderson Act, to limit the liability in the case of a catastrophic commercial nuclear power accident. The measures had results: in 1963 Jersey Central Power and Light Company bought a nuclear power plant and within four years seventy-five nuclear power plants were on order.

The *Price-Anderson Act* of 1957, amended the Atomic Energy Act. It encouraged the development and use of nuclear energy by limiting the liability for damages from a single accident involving radiation or radioactive materials. Price-Anderson set up a three-tier no-fault system: the first tier is private insurance for utilities licensed by the NRC, typically $200 million. If that should prove insufficient, a second tier exists comprising a pooled risk fund to which each utility contributes. If the private and pooled assessment is insufficient, it is expected that congressional action would cover the needed amount.

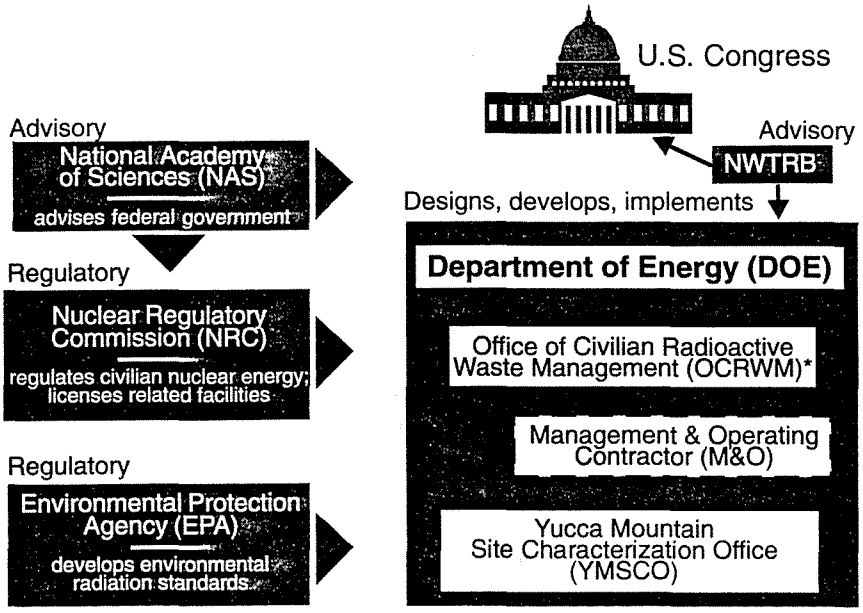
Nuclear opponents claim that Price-Anderson is a subsidy for the nuclear industry, which interferes with free market forces by keeping the cost of nuclear energy artificially low. Critics also charge that it removes an incentive to operate with maximum safety and underestimates the costs of a major catastrophe

Supporters, on the other hand, argue that it protects the public interest by clarifying the rights of those damaged and making available an immediate pool of money. Without the Act, the hypothetical utility suffering a major catastrophe would probably go bankrupt and no one would recover. Supporters cite the good safety record of the industry as a whole and contend that in the event of a major catastrophe, the government would have to step in anyway.

The 1988 revision of Price-Anderson extends the accident coverage and the liability limitations to programs covered by the Nuclear Waste Policy Act: a proposed geologic repository, and a proposed Monitored Retrievable Storage facility, and the transportation system for spent fuel. It also added coverage for DOE contractors. Whether it would cover transportation to and from a privately developed and operated interim storage facility is unclear. This Act is scheduled to be renewed in 2003.

The National Environmental Policy Act of 1969 gave the NRC the added responsibility of - among other provisions - evaluating non-radiological as well as radiological impacts on the environment of major nuclear facilities proposed for licensing.

Figure 7: Spent Fuel Disposal: General U.S. Organizational Framework:



** The U.S. Geological Survey, a bureau of the U.S. Department of the Interior, and the national laboratories, part of the DOE complex, carry out significant R&D work on this program. In addition, many contractors and subcontractors provide support to the DOE.*

Source: NWTRB Nuclear Waste Management in the U.S., The Board's Perspective; Cantlon, et. al., June 1996

The *Energy Reorganization Act* of 1974 abolished the Atomic Energy Commission, dividing its responsibilities between the short lived (1974-1977) Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC). The Nuclear Regulatory Commission consists of five members appointed by the President. It regulates all U.S. commercial nuclear activities. Nuclear power reactors have to be licensed by the NRC before starting operations. President Carter issued an executive order in 1979 strengthening the powers of the NRC chairman, in response to the Rogovin and the Kemeny Commission reports on Three Mile Island; both had been highly critical of the NRC.

Department of Energy Organization Act of 1977 established DOE as a new cabinet level department to coordinate and administer all the energy activities of the federal government including the nuclear weapons program, energy conservation, and interstate commerce functions such as transport of nuclear materials across state lines. The Act set up the Federal Energy Regulatory Commission (FERC), an independent five member agency within DOE which regulates the interstate aspects of the natural gas industry, oil pipelines and the transmission and interstate sale of electricity in interstate commerce.

The *Public Utility Regulatory Policy Act* (PURPA) of 1978 was intended to lessen dependence on imported fossil fuel by promoting conservation and development of more environmentally benign alternative sources of energy. See page 12.

The Low Level Radioactive Waste Policy Act of 1980, amended in 1985, made each state responsible for its own low-level waste. Under the law states may join regional compacts. South Carolina was a leader in these attempts to solve the low level waste dilemma. Barnwell, S.C. became the first site for the Southeast Low Level Radiological Waste Compact. As the date approached for that facility to close, the State withdrew from the Compact. The controversial Chem-Nuclear Systems, Inc. Barnwell site is still open to waste from all states except for North Carolina, the designated successor host state, because that state has not fulfilled its obligation to provide a licensed new site on schedule.

The NRC has delegated its regulatory responsibility for the Barnwell site to the South Carolina Department of Health and Environmental Control.

The Nuclear Waste Policy Act of 1982 established the Office of Civilian Radiological Waste Management within DOE. It established a site selection process for identifying two permanent geological repositories, an interim storage facility and a waste transport system. It is this law that assigned DOE the responsibility for accepting spent fuel by January 1998 and created the Nuclear Waste Fund - a fee assessed on nuclear generated power - which in late 1996 amounted to about $12 billion.

The Nuclear Waste Policy Act Amendments of 1987 effectively canceled the site selection process then underway and designated only Yucca Mountain in Nevada for study as the permanent repository for spent fuel. The 1987 amendments also prohibit the construction and operating both an interim storage facility and a repository within the same state. Since the repository is not ready, some members of Congress want to change these provisions and reconsider the interim storage facility concept.

The Energy Policy Act of 1992 partially deregulated the wholesale electric utility industry by changing certain underlying federal policies concerning wholesale generation and the sale of electric power. The 1992 Act also prohibits the Federal Energy Resource Commission (FERC) from ordering retail wheeling, a term meaning the transmitting of electric power to an individual customer on behalf of another producer. Retail deregulation must be determined by state legislatures and regulators. Some states have already taken steps to allow retail electric customers to buy power from suppliers other than the local utility.

Under provisions of the Act non-utility generators may now build and own generating plants and co-generating plants for sales to utilities.

The FERC is proposing a rule that could be finalized in 1997. Under this rule: 1) electric utilities under FERC jurisdiction owning or controlling transmission systems would be required to file with the FERC a plan that would allow buyers and sellers of bulk power equal and open access to their transmission systems; 2) utilities with transmission systems would be required to provide all new wholesale buyers and sellers of electricity the same equal and open access to the utilities transmission systems; and 3) these utilities would be permitted to recover certain stranded investments incurred as a result of the restructuring order. The stranded cost issue is one that has particular importance for customers of nuclear utilities.

State Law:

The South Carolina Atomic Energy and Radiation Control Act was passed and then amended in the '60s. This law established South Carolina's policy of encouraging nuclear development. It is discussed in the section "The Evolution of the Nuclear State." See Page 1.

APPENDIX III: EMERGING ISSUES
CONSIDERATIONS FOR SOUTH CAROLINA CITIZENS

South Carolina citizens are being bombarded with information from proponents of immediate deregulation and those who want to do it in a more deliberate, thoughtful way. Yet the information is for the most part superficial. Contacting elected representatives and regulatory bodies is effective in making sure that there is a careful examination of the issues, with all stake holders participating

The following are just a few of the many questions citizens may wish to ask their utilities, state regulators, and elected representatives regarding both nuclear and pocketbook issues:

What will be the impact on South Carolina of the fact that by the year 2010 the pace of decommissioning will accelerate as licenses expire, and spent fuel storage capacity becomes increasingly inadequate?

Not only will the number of spent fuel rods needing storage and disposal peak nationally, but a wide variety of materials including the reactors themselves will have to be dealt with. Much of the material, although highly radioactive, is classified as low level waste. In the past, the Chem-Nuclear Systems, Inc. low level waste site at Barnwell, SC has received reactor components from other states.

If the siting process for the federal permanent repository at Yucca Mountain does not proceed in a timely manner, and there is a demand for a temporary storage facility, should a regional MRS (monitored retrievable storage, or away-from-reactor storage site) be established? Would you object to SRS being used for this purpose?

Most of the nation's nuclear waste is generated east of the Mississippi. The idea of using a federal facility for this purpose is not new: It was once proposed to establish a temporary storage facility at a TVA site.

What is your stand on proposals like the following, which would change national policy dating back to the late '40s, of keeping clear distinctions between defense and civilian radioactive operations?

Use of commercial reactors to manufacture tritium, needed to maintain the national nuclear weapons stock, at commercial power plants?

Use of mixed uranium and plutonium fuel (MOX) in commercial reactors? This is proposed as a way to reduce the world's excess of plutonium, enhance nuclear disarmament, and reduce the threat of nuclear terrorism.

Under retail deregulation of electricity, who will pay for stranded costs: utility rate payers, utility bond and stock holders, the state, or a combination? Can some reasonable compromise be reached to protect the interests of all?

As utilities streamline operational budgets in order to function in a competitive market how will the following be affected?

- *operational safety at nuclear plants, as in Connecticut?*
- *spent fuel storage and disposal?*
- *programs and policies related to the needs of the indigent and poor credit risk customers?*
- *energy conservation and alternative energy programs?*
- *emergency services for power outages, especially following natural disasters?*
- *greater reliance on older, more polluting, fossil fuel plants*

Will there be greater reliance on older, more polluting fossil fuel plants and a consequent negative effect on our air and water quality?

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