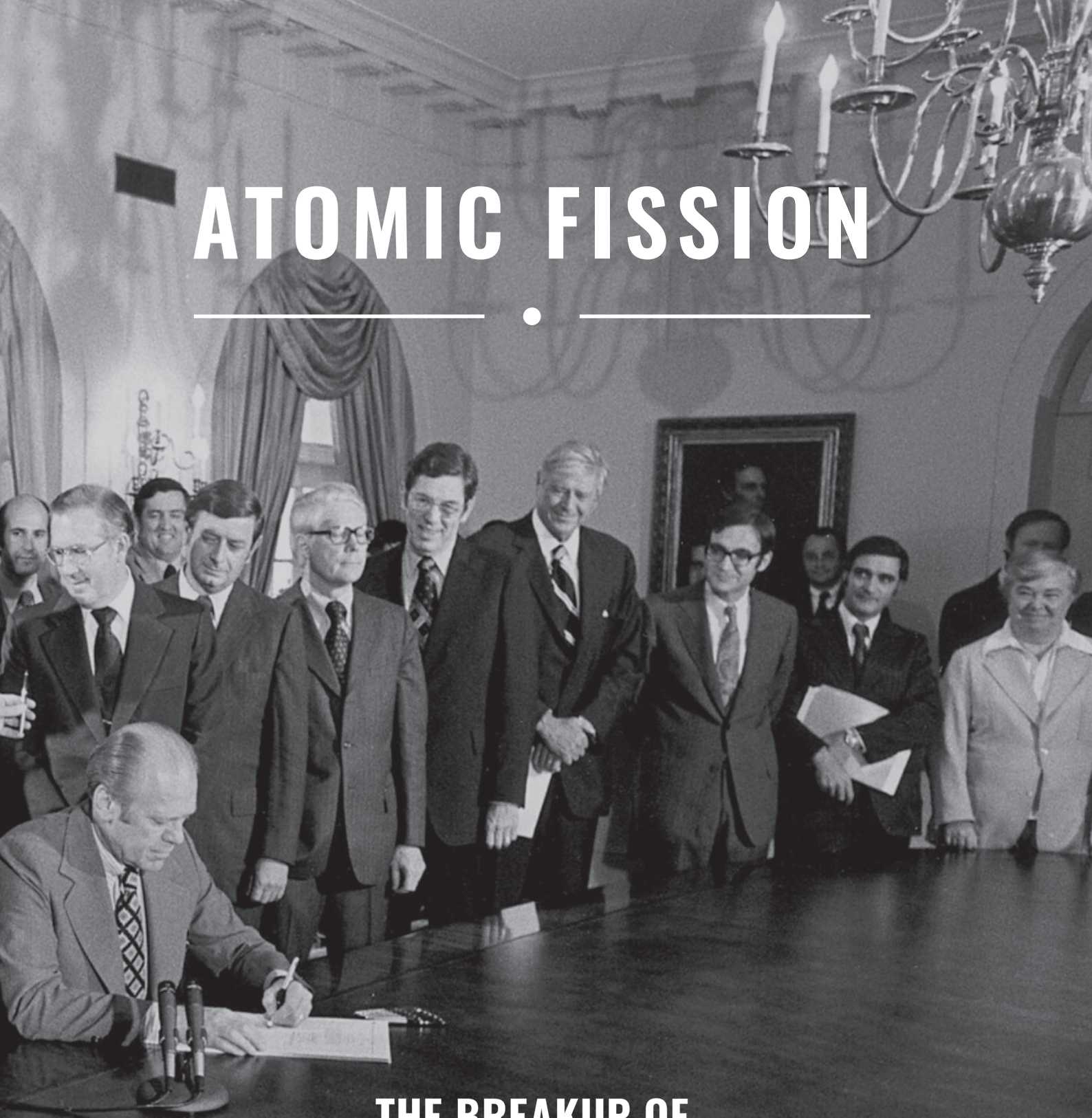
ATOMIC FISSION



THE BREAKUP OF THE ATOMIC ENERGY COMMISSION AND THE ENERGY REORGANIZATION ACT OF 1974

ERIC W. BOYLE, HISTORIAN, U.S. DEPARTMENT OF ENERGY
THOMAS R. WELLOCK, HISTORIAN, U.S. NUCLEAR REGULATORY COMMISSION

AVAILABILITY OF REFERENCE MATERIALS IN NRC PUBLICATIONS

NRC Reference Material

As of November 1999, you may electronically access NUREG-series publications and other NRC records at the NRC's Library at www.nrc.gov/reading-rm.html. Publicly released records include, to name a few, NUREG-series publications; *Federal Register* notices; applicant, licensee, and vendor documents and correspondence; NRC correspondence and internal memoranda; bulletins and information notices; inspection and investigative reports; licensee event reports; and Commission papers and their attachments.

NRC publications in the NUREG series, NRC regulations, and Title 10, "Energy," in the *Code of Federal Regulations* may also be purchased from one of these two sources:

1. **The Superintendent of Documents**
   U.S. Government Publishing Office
   Washington, DC 20402-0001
   Internet: www.bookstore.gpo.gov
   Telephone: (202) 512-1800
   Fax: (202) 512-2104

2. **The National Technical Information Service**
   5301 Shawnee Road
   Alexandria, VA 22312-0002
   Internet: www.ntis.gov
   1-800-553-6847 or, locally, (703) 605-6000

A single copy of each NRC draft report for comment is available free, to the extent of supply, upon written request as follows:

Address: **U.S. Nuclear Regulatory Commission**
Office of Administration
Digital Communications and Administrative Services Branch
Washington, DC 20555-0001
E-mail: Reproduction.Resource@nrc.gov
Facsimile: (301) 415-2289

Some publications in the NUREG series that are posted at the NRC's Web site address www.nrc.gov/reading-rm/doc-collections/nuregs are updated periodically and may differ from the last printed version. Although references to material found on a website bear the date the material was accessed, the material available on the date cited may subsequently be removed from the site.

Non-NRC Reference Material

Documents available from public and special technical libraries include all open literature items, such as books, journal articles, transactions, *Federal Register* notices, Federal and State legislation, and congressional reports. Such documents as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings may be purchased from their sponsoring organization.

Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at—

The NRC Technical Library
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738

These standards are available in the library for reference use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from—

American National Standards Institute
11 West 42nd Street
New York, NY 10036-8002
Internet: www.ansi.org
(212) 642-4900

Legally binding regulatory requirements are stated only in laws; NRC regulations; licenses, including technical specifications; or orders, not in NUREG-series publications. The views expressed in contractor-prepared publications in this series are not necessarily those of the NRC.

The NUREG series comprises (1) technical and administrative reports and books prepared by the staff (NUREG–XXXX) or agency contractors (NUREG/CR–XXXX), (2) proceedings of conferences (NUREG/CP–XXXX), (3) reports resulting from international agreements (NUREG/IA–XXXX), (4) brochures (NUREG/BR–XXXX),and (5) compilations of legal decisions and orders of the Commission and the Atomic and Safety Licensing Boards and of Directors' decisions under 10 CFR 2.206 (NUREG–0750).

Contents

President Gerald Ford signs the Energy Reorganization Act, October 11, 1974. (DOE/NRC)

Preface

On October 11, 1974, President Gerald Ford signed the Energy Reorganization Act of 1974 (ERA), which separated the U.S. Atomic Energy Commission (AEC) into two new agencies, the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Energy Research and Development Administration (ERDA). ERDA and the NRC began operations on January 19, 1975. On October 1, 1977, ERDA was one of three agencies merged into the new U.S. Department of Energy (DOE). This history provides the first detailed account of the passage of the ERA and the challenges the NRC and ERDA/DOE faced in implementing the law. The story concludes in the early 1980s when the NRC and the DOE survived efforts to dismantle them.

The origins of the "separation question" began 20 years before the ERA, with the passage of the Atomic Energy Act of 1954. The Act had saddled the AEC with a conflicted "dual mandate" to both promote civilian uses of nuclear energy and protect public safety. That potential conflict of interest became very real in the late 1960s after several controversies led to accusations that the AEC favored its promotional mission over safety.

However, the AEC was also under pressure to rapidly license new nuclear power plants to address energy shortages in the early 1970s. ERA authors believed the NRC, as a well-staffed independent commission with an exclusive safety mission, could rapidly license new reactors without sacrificing its credibility.

ERDA, too, was created to solve the energy crisis, but it also addressed demands by environmentalists and fossil fuel interests that the Federal Government diversify energy research and development programs dominated by nuclear power. ERDA took over the nuclear research and development capabilities of the AEC's national laboratories with an additional mission to develop a broad range of non-nuclear energy options.

The ERA's passage was not inevitable, as very different legislative proposals were put forward. Some critics of the AEC aimed to completely dismantle the agency and scatter its pieces among multiple Federal agencies with no particular allegiance to nuclear energy. However, the AEC and its allies prevailed in shaping the ERA to establish ERDA and the NRC as nuclear-centric agencies built from the foundation of the AEC.

The ERA was far from perfect. The final section of this history details how the ERA influenced early operations at the NRC and ERDA. In particular, the legislation transferred to the NRC the AEC's weak leadership structure, which made it difficult for the agency to set a firm regulatory course. The NRC's confused response to the 1979 accident at the Three Mile Island (TMI) nuclear power plant led to calls that the Commission be reconstituted as an agency led by a single administrator. Congress and President Jimmy Carter rejected that advice and passed Reorganization Plan No. 1 of 1980, which strengthened the powers of the Chairman and Executive Director for Operations.

The ERA's creation of ERDA, too, was criticized for being an insufficient response to the energy crisis, and President Carter subsequently persuaded Congress to centralize energy policy, research, and development in the DOE. The DOE experienced its own growing pains and survived an attempt to abolish the agency during the Reagan Administration.*

* The views expressed in this history are those of the authors alone and not necessarily those of the Nuclear Regulatory Commission or the Department of Energy, and they do not in any way represent an official position of the NRC or DOE.

On August 1, 1946, President Harry S. Truman signed the bill creating the U.S. Atomic Energy Commission. (DOE)

The first AEC Commissioners visit Los Alamos National Laboratory. Left to Right: William Waymack, Lewis Strauss, David Lilienthal (Chairman), Robert Bacher, Sumner Pike. (DOE)

The Iron Triangle

Born from the secrecy of the atomic weapons program of the World War II Manhattan Project and justified by the long-term emergency of the Cold War, the U.S. Atomic Energy Commission (AEC) and Congress's Joint Committee on Atomic Energy (JCAE) wielded power seemingly free of restraint. Never before had Congress created a congressional committee by statute, but with the JCAE, it did, vesting it with exclusive budgeting authority over the AEC and sole power to originate and report nuclear legislation. Most of its members were ardently pronuclear. They unstintingly supported the AEC's primary mission in weapons development and aggressively funded research and development (R&D) for civilian applications—billions were lavished on the peaceful uses of nuclear power at a time when Congress provided negligible support for other energy sources. So domineering was the JCAE that one nuclear industry publication described it as "akin to the Kremlin and determined to rule the nuclear affairs of the Nation by fear and intimidation."[1]

The primary mission of the AEC, as defined by Congress in the Atomic Energy Act of 1946, was R&D for military applications of nuclear energy. While the legislation promoted the use of nuclear energy for peaceful purposes, these uses were "subject at all times to the paramount objective of assuring the common defense and security" of the United States. Congress gave the new agency an exceptional authority in carrying out its mission. As Dr. James Conant, a veteran of the Manhattan Project, explained, "We are dealing with something that is so new, so extraordinary and so powerful that I, for one, feel that we are justified in setting up a commission with equally extraordinary powers." All nuclear facilities were to be owned by the Government. All of the research results were placed under the AEC's control and were usually classified information, and all technological developments resulting from that work were exempt from the patent system.[2]

With the emergence of the Cold War, the AEC initially devoted most of its resources to weapons development and production. This meant not only extensive work on new weapons designs and greater numbers of weapons but also the identification and development of major new sources of uranium and a vast increase in production facilities.

After the first Soviet nuclear detonation in August 1949, efforts to expand the weapons complex accelerated. Over a dozen new laboratories and production facilities were quickly added, and the number of employees in the nuclear weapons complex grew from 55,000 in 1947 to over 142,000 in 1952. The numerous activities that went into making nuclear materials and weapons and storing and disposing of waste were undertaken at hundreds of sites across the country. By 1960, the United States had conducted over 200 nuclear weapons tests at the Pacific Proving Grounds and the continental test site in Nevada. By 1961, the nuclear warhead stockpile had grown from 13 in 1947 to a staggering 22,229.

The AEC's primary success in the area of peaceful uses was in the production and distribution of radioactive isotopes for research and medical purposes.[3] However, the unfulfilled aspirations for civilian nuclear energy gained new life from the Atomic Energy Act of 1954, which empowered the AEC to license civilian uses of nuclear materials while providing "adequate protection" to the public. With the definition of "adequate" left to the AEC, this new grant of authority for civilian applications was so expansive, the U.S. Court of Appeals for the District of Columbia Circuit (DC Circuit) described it as "virtually unique in the degree to which broad responsibility is reposed in the administering agency, free of close prescription in its charter as to how it shall proceed in achieving the statutory objectives." In 1953, an awestruck *New York Times* editorial observed the following:

> The Atomic Energy Commission is probably the most important technical body in the world today. It commands intellectual, financial, and industrial resources of unprecedented magnitude. Its power is immense, its decisions have an influence which is far reaching. For those reasons it has responsibilities that far transcend those of other Government agencies, except those that are concerned with national defense and foreign affairs.[4]

Joining the all-powerful JCAE and AEC was the civilian nuclear industry, young in age and led by some of the Nation's most successful corporations. Companies such as General Electric, Westinghouse, Bechtel, and Babcock and Wilcox had already supported the AEC in operating its weapons production complex and national laboratories and in the design of the nuclear power plants for navy submarines and surface ships. Now they sought to translate their military technologies and know-how into civilian applications. Joined by some large electric utility companies, the industry enjoyed significant influence in Congress and at the AEC in securing legislation friendly to nuclear power development. This "iron triangle" of JCAE-AEC-industry control in nuclear energy seemed unassailable—until it was not.

The dissolution of the AEC through the Energy Reorganization Act of 1974 (ERA) and disbanding of the JCAE in 1977 occurred in parallel to a collapse in nuclear power plant orders in the mid-1970s. The implosion of the nuclear iron triangle has fascinated scholars and political observers who have seen the ERA as part of the broad defeat of the nuclear industry. Explanations focus on the political dynamics of the energy crisis, the AEC's loss of control over its internal debate on reactor safety, and the expanding influence of nuclear opposition groups in politics. With the AEC's allies unable to fend off these challenges, the ERA marked a new era when the nuclear iron triangle gave way to a broad political network that cut across fossil, nuclear, and alternative energy sources. These accounts have enriched our understanding of how insular iron triangles could not survive new demands for open government.[5]

Yet, these stories of a dramatic AEC collapse have overlooked the still formidable influence of the nuclear establishment, which included members of the nuclear iron triangle and sympathetic policy and opinion shapers in the press and think tanks. In most accounts, the nuclear establishment appeared to be onlookers who stood by as the AEC was dismantled over the course of a year and then cheerfully attended its funeral. The ERA's signing ceremony in October 1974 was described by an industry publication as "a jovial three-minute ceremony." JCAE members chatted and joked while President Gerald Ford signed legislation virtually guaranteeing the committee's demise. At the far end of the table, AEC Chairman Dixy Lee Ray looked on with approval as the President eliminated her job.[6]

The group had every reason to be elated. The ERA was their handiwork. The idea for it did not come from the White House, antinuclear activists, or nuclear power's rivals in Congress and the bureaucracy. All of those challengers submitted ambitious legislative alternatives but won only minor concessions. The nuclear establishment fended off efforts to completely dismember the AEC and implemented its own plan to use the AEC as the nuclear-focused core of the new Energy Research and Development Agency (ERDA) and an independent nuclear safety regulator (U.S. Nuclear Regulatory Commission, or NRC). The NRC's singular focus on nuclear safety and security, it was believed, would speed the licensing of new nuclear power plants while reassuring the public of reactor safety. ERDA was to develop the next generation of nuclear breeder reactors that would, supporters believed, solve the Nation's energy crisis for a millennium. Other energy sources received funding for long-term applications, but nuclear power dominated ERDA's early budgets.

The nuclear establishment's victory came from its recognition that its unprecedented power was fleeting and too aberrant for a Federal system of governance. Presidents since Dwight Eisenhower wanted to weaken the AEC and JCAE. Congressional enemies—many allies of fossil fuel interests—bided their time, and environmentalists tried to consign nuclear energy development and regulation to agencies skeptical of its utopian promise. With a little luck, their still considerable influence, and the opportunity offered by the

energy crisis and the Watergate scandal, the AEC's allies created successor agencies that still placed nuclear energy first.

Ultimately, their legislative intent did not produce the expected results. For political, technical, and economic reasons, the breeder reactor was abandoned during the Reagan administration. The ERA could not arrest the nuclear construction industry's terminal decline from lethargic energy demand and managerial, regulatory, and technical flaws that made nuclear power uncompetitive, unwanted, and difficult to license. Nevertheless, the ERA's legacy was substantial in creating an energy agency with a broad R&D program and an independent nuclear safety regulator that has set an international standard.

On September 6, 1954, President Dwight D. Eisenhower held a special "atomic fission rod" to break ground by remote control on the United States's first full-scale nuclear power plant built exclusively for civilian needs at Shippingport, PA. (DOE)

The Separation Question

By law, the AEC was an agency of contradictions. Most Federal departments were organized around general government purposes, such as agriculture, commerce, and labor, but the Atomic Energy Act of 1946 gave the AEC a focus on a single energy source and technology. This made sense in the 1940s, at a time when nuclear technology was a new field and secrecy about it was believed to be essential, but by the 1960s, the AEC's programs often intruded on the turf of other agencies. The U.S. Department of the Interior, for example, which had a strong interest in the development of oil and gas resources on its lands, represented a potential roadblock to the AEC's exclusive jurisdiction over the use of peaceful nuclear explosions to stimulate gas and oil production.[7]

Congress also forced upon the AEC a controversial commission structure. As a revolutionary technology with heavy research demands, lawmakers opted for a five-member commission rather than a single administrator to encourage collegial, deliberative policy formation. Yet, the Cold War dictated that the AEC's weapons production operations take precedence over civilian uses, and production missions were typically managed by a single administrator appointed by the president. In a nod to production efficiency, Congress added the General Manager who, as a chief executive officer, ran day-to-day operations and answered to the Commission. The commission arrangement soon frustrated presidents who found it difficult to influence AEC policy. Appointed to staggered 5-year terms, Commissioners usually hailed from both political parties and resisted executive direction.[8]

In its first 6 years of operation, the AEC survived numerous legislative challenges relating to the Commission's makeup, organization, and control of the atomic energy program. The majority of these proposals would have materially increased military influence over the program. This included one bill that would have established a new commission consisting of the Secretaries of State, War, and Navy, with two others appointed by the president. Another bill would have repealed the Atomic Energy Act in its entirety and given the War Department all powers and functions related to atomic energy. Still another Senate amendment to the Atomic Energy Act would have abolished the General Manager's office, the four major divisions, and the Military Liaison Committee, while transferring all of the functions, powers, and duties of the of the Commission to the administration of the Secretary of the Army under the general supervision of the Secretary of Defense.[9]

To its organizational conflicts, the Atomic Energy Act of 1954 added a conflict of interest. The AEC was to promote civilian uses while simultaneously protecting public safety. With the civilian nuclear industry in its infancy, the AEC's R&D and regulatory offices needed the same small pool of expertise usually found at the AEC's national laboratories. In *Controlling the Atom*, George T. Mazuzan and J. Samuel Walker explained that two separate organizations "would have worked at cross-purposes, perhaps frustrating the overall goal of building a viable atomic industry. Consequently, the risk of a conflict of interest in making one agency perform two contradictory functions appeared a small price to pay for the anticipated benefits."[10]

The "small price" of the dual mandate quickly became a major liability as it created what one legal observer called a "schizophrenia which is inflicted upon the AEC by law." The dual mandate led to charges of a conflict of interest in an AEC licensing controversy over the construction of the Fermi 1 reactor, first proposed in 1955. Fermi 1 was an advanced liquid metal fast

breeder reactor that raised numerous safety questions. The Democratic Party-controlled JCAE accused the Republican Party-dominated Commission of promotional zeal when it approved Fermi 1's construction permit before addressing all safety issues. To encourage transparency, a 1957 amendment to the Atomic Energy Act also required that a construction permit hearing be held for all new reactor applications. To prevent a replay of the controversy, reforms in 1961 separated the AEC's regulatory staff organizationally and physically from divisions under the General Manager that promoted nuclear energy. The Director of Regulation reported directly to the Commission and was moved to Bethesda, Maryland, some 15 miles from the main AEC headquarters in Germantown, Maryland. Chairman Glenn Seaborg noted this satisfied few of the critics, and charges of bias lingered as the regulatory division was still subordinate to AEC Commissioners who implemented the AEC's dual mandate. AEC and JCAE leadership recognized the ultimate solution lay in creating an independent regulatory commission, but they agreed the time was not ripe. The regulatory division was too small—just 53 technical staff were assigned to licensing and regulation in 1960—and lacking in technical talent to go it alone.[11]

By the early 1960s, the dual mandate had become unpopular even among some of its supposed beneficiaries in the nuclear industry. Industry stalwarts such as General Electric and Babcock and Wilcox were dissatisfied with the slow pace of nuclear power plant licensing and believed the dual mandate made the situation worse. They, too, called for splitting off AEC regulatory functions into an independent commission. In 1966, an industry newsletter suggested the AEC "must begin thinking seriously, on its own initiative, of a separated regulatory scheme completely invulnerable to cries of conflict of interest with AEC's promotional role." In 1967, Congressman John Anderson (R-IL) was the first JCAE member to call for an immediate split. Nevertheless, most of the AEC and JCAE leadership feared that creating an independent agency too soon might stifle nuclear power development and limit regulatory access to the best expertise in the AEC's national laboratories.[12]

While the dual mandate supported critics' arguments that the AEC promoted nuclear energy at the expense of safety, similar conflicts of interest were common among other Federal regulatory agencies. Promotional functions at the Federal Power Commission, Federal Aviation Agency, Civil Aeronautics Board, and the Federal Maritime Board coexisted with important public safety responsibilities.

By the 1950s, however, these conflicts of interest became glaring as executive advisory committees, such as the Commission on Organization of the Executive Branch (Hoover Commission), called for their elimination and regulation by independent commissions rather than single administrators. This was easier proposed than done. For example, in 1950, the Hoover Commission called on President Harry Truman to correct the "anomaly" of the Maritime Commission's functions that regulated the maritime industry while subsidizing it. Truman obliged, but in creating the Maritime Board and Maritime Administration, he did not separate their technical staffs because their scarce expertise was needed by both agencies. The Kennedy administration issued a new reorganization plan and dissolved the Maritime Board, citing "serious inadequacies" in the Board's execution of its regulatory functions. The AEC faced the same staffing problem. Spinning off regulatory staff into an independent commission required a major infusion of technical professionals, but the best nuclear experts were already ensconced at the AEC's national laboratories and in industry. An independent commission would have to wait until the industry and supporting expertise matured.[13]

Political clashes over the 1954 legislation between Democratic and Republican Commissioners inside the AEC and between the Democratically controlled JCAE and the Eisenhower administration also figured into debates over the merits of a commission structure versus a single administrator. In many clashes over weapons and civilian power development, Republican AEC Chairman Lewis Strauss became a lightning rod of controversy. His relationship with JCAE Chairman Senator Clinton Anderson became so bitter and personal, *Time* magazine called it a "blood feud" and a "beautiful hatred."[14]

Chairman Strauss roiled the waters by proposing to expand his powers legislatively by designating the Chairman as the "principal officer" with authority greater than the other four Commissioners. His request backfired. Commissioners had accused him of withholding vital executive branch information, and they feared "de facto one-man" rule undermining the collegial nature of the Commission. The JCAE designated the chairmanship as a mere "official spokesman" of the AEC and gave each Commissioner "equal responsibility and authority." An amendment in 1955 gave Commissioners "full access" to all the Chairman's information relating to "the performance of his duties or responsibilities."[15]

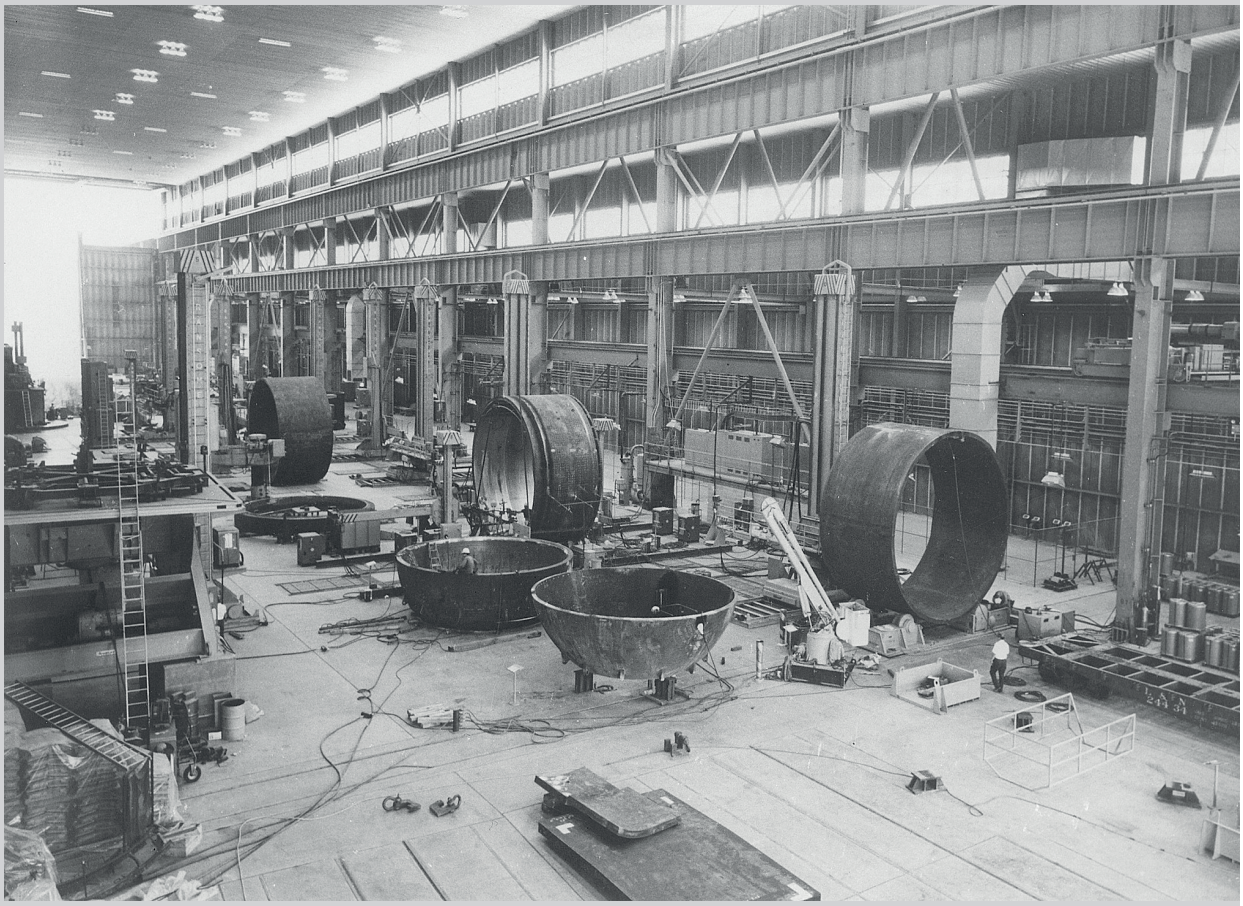
In weakening the chairmanship, the JCAE also weakened presidential control over the AEC. The president's unilateral power to select the Chairman diminished in significance as the chairmanship diminished as an office. The Strauss years, then, left the AEC with an unusually divided power structure at a time when most Federal commissions had strong chairmen with expansive administrative and management responsibilities. Divided authority suited the JCAE, which could exert substantial influence over the AEC with limited White House interference.

Frustrated by their inability to control the five-member Commission, presidential administrations tried to weaken the AEC and the JCAE. After the tumultuous Strauss years, President Eisenhower concluded the JCAE had unconstitutionally usurped presidential powers. He left office advising President John Kennedy, "Frankly, I see no need for the continuance of the JCAE." Rather than challenge the JCAE, Kennedy tried to expand his control of the AEC. His Bureau of the Budget proposed converting the AEC into a single-administrator agency. Even though the proposal had the support of AEC Commissioners, the plan died when the JCAE objected that regulatory staff needed the commission structure and the conversion could threaten the committee's existence. President Lyndon Johnson also tried to rid the AEC of its five Commissioners but dropped the plan after strong JCAE objections. After meeting with Clinton Anderson on Johnson's proposal, AEC Chairman Glenn Seaborg noted in his journal that Anderson rejected a single administrator because "the memories of the Strauss regime were still too vivid.[16]

While the JCAE had effectively resisted executive attempts to change the commission structure, some committee members determined that, if the agency were to survive, it needed to evolve beyond its exclusive focus on nuclear energy. Allies of fossil fuel interests complained of the very limited Federal support for research on oil, coal, and natural gas development. In 1968, Congressman Craig Hosmer, the JCAE's ranking Republican, offered a solution. Taking note of the lean budget environment induced by the Vietnam War, Hosmer suggested that the AEC's national laboratories might retain staff if it converted to a "Super Science Agency" to conduct research on a broad range of topics for the Federal Government, including fossil fuels. "It is clear that there will not forever and ever be an Atomic Energy Commission," he warned, "at least by that name and by its present functions." The following year, Hosmer called for a cabinet-level energy agency as well as separating the regulatory staff. In the coming controversy over the AEC's future, Hosmer's suggestion became the preferred solution by the AEC's allies.[17]

The JCAE placed substantial limits on the power of AEC Chairmen, due in part to the animosity between JCAE Chairman Clinton Anderson and AEC Chairman Lewis Strauss. In this 1959 picture, Strauss looked on with chagrin on as Anderson testified against his nomination to be Secretary of Commerce. Strauss failed to win senate confirmation. (UPI)

President John F. Kennedy exits through the North Lobby of AEC headquarters in Germantown, MD following a briefing on February 16, 1961. Behind the President are Chairman Designate Glenn T. Seaborg (center), Acting Chairman John Stephens Graham, Commissioner Loren K. Olsen, Commissioner Robert E. Wilson (extreme right), and Commission General Manager Alvin R. Luedecke. (DOE)



Indicative of private industry's growing participation in the atomic energy field was the $20 million Babcock and Wilcox Company plant at Mt. Vernon, Indiana. The first job for the plant was the fabrication of the 800-ton vessel for the Dresden Unit No. 2 reactor in 1967. (DOE)

Craig Hosmer (R-CA) served as the ranking GOP member on the JCAE. He was one of the earliest supporters of the idea to create an energy research agency. (California Blue Book)

The National Laboratories and the National Trust

Hosmer's idea of using the AEC's national laboratories as the basis for a general energy agency was not a new one. Years earlier, the AEC had suggested it was well prepared to diversify its research portfolio. The AEC's national laboratory system had been established during the Manhattan Project, primarily to support weapons R&D, but it had since expanded to become one of the largest R&D programs in the Federal Government. After World War II, the AEC expanded its weapons laboratories to include Sandia National Laboratory in 1949 and Lawrence Livermore National Laboratory in 1952. The weapons engineering and production network was also expanded to include facilities in Burlington, Iowa; Amarillo, Texas; Kansas City, Missouri; Miamisburg, Ohio; and Rocky Flats, Colorado.[18]

As Cold War tensions grew in the late 1940s and early 1950s, weapons production dominated the AEC's mission, but the AEC, even under initial Chairman David Lilienthal, remained determined to promote R&D on the peaceful uses of atomic energy. This included the reorganization of the Manhattan Project laboratories. For instance, the Metallurgical Laboratory at the University of Chicago was transformed into the new Argonne National Laboratory, which became the AEC's center for nuclear reactor development. The Clinton Laboratories in Oak Ridge, Tennessee, reorganized into the Oak Ridge National Laboratory and became the Nation's largest supplier of radioisotopes and home to the largest radiation genetics program in the world. A third research center was established by expanding the facilities of the University of California Radiation Laboratory at Berkeley, where scientists developed the process for radioactive carbon dating, discovered a string of new elements and isotopes, and pioneered the field of particle physics and accelerator research.[19]

The AEC's research program expanded dramatically in other ways during its first decade of operation. To provide regional research facilities in the Northeast, the AEC built Brookhaven National Laboratory, which provided a wide variety of research facilities, particularly in reactor physics, high-energy accelerators, and the biomedical sciences. The AEC also expanded support of the wartime research laboratories at Iowa State College, the University of Rochester, the University of California at Los Angeles, and the University of California Medical Center. Meanwhile, in addition to creating the network of national laboratories, the AEC awarded and administered hundreds of contracts with universities, research institutions, and nonprofit organizations for basic research in the physical and biological sciences.[20]

In the 1950s, the laboratories also expanded to include major research facilities and costly collaborative research projects. Building on breakthroughs at Berkeley National Laboratory and Brookhaven National Laboratory in the 1950s, the AEC was instrumental in obtaining Federal support for ground-breaking accelerators in the 1960s and 1970s at Argonne National Laboratory, the Stanford Linear Accelerator, and the Fermi National Accelerator Laboratory, which in 1972 had the world's most powerful proton synchrotron. AEC support was also vital in advancing costly and difficult research on fusion, not only at the national laboratories in Oak Ridge, Los Alamos, Livermore, and Princeton but also at many universities and industrial facilities.[21]

The AEC's laboratories were well situated to expand their research empire. Historically, they had focused on industrial applications of research and solving many of what Seaborg had described as "society-oriented problems" that extended beyond weapons development and nuclear power plants. An AEC report from 1950 demonstrated that, exclusive of reactor

development, about 15 percent ($4 million) of the Commission's physical research budget during fiscal year (FY) 1949 was for non-weapons-related work carried on by scholars on staffs and in the laboratories of many universities, research institutes, industrial organizations, and Government agencies other than the AEC. Major research programs included work in metallurgy, fundamental nuclear physics and chemistry, ceramics, and radiobiology. As early as 1954, the AEC had also created its own apparatus for publishing hundreds of scientific and technical reports based on laboratory R&D.[22]

Weapons laboratories also shifted some of their focus by the mid-1960s in the wake of the Limited Test Ban Treaty and a cutback in nuclear weapons production. In 1960, the AEC had devoted less than a quarter of its budget to the "peaceful atom." By the end of the decade, this had doubled to over 50 percent.

The establishment of a fundamental research program marked an important milestone at Sandia National Laboratory. Sandia had grown from a relatively small nuclear weapons design, assembly, and field-testing facility in the late 1940s to a well-respected R&D organization, recognized not only as the nuclear ordnance engineer for the Nation, but also as a center for research on combustion processes, physical electronics, hydromagnetics, theoretical mechanics, geophysics, and theoretical physics.

In the wake of the slowdown of nuclear weapons material production, Savannah River National Laboratory issued a Five-Year Plan in 1965 that outlined its search for new nonweapons missions. As both the laboratory's operator, DuPont, and the AEC knew, the heavy-water reactors at Savannah River were the most versatile production reactors in the country and were ideal for the production of all sorts of radioisotopes. Despite a longstanding resistance to supporting such nonweapons-related missions, by the late 1960s, DuPont had successfully expanded the scope of its contract to include the production of other, nonmilitary materials that the AEC might require. The company supported "any research and development programs that might result," and Savannah River became increasingly involved in radioisotope production. These radioactive elements had previously proven their value in medicine, agriculture, industry, and research, and under AEC-sponsored R&D, their applications were extended to such areas of major public concern as environmental pollution, public safety, and human prosthetic devices.[23]

In a 1960 special report to the JCAE, the AEC confidently asserted, "the strong capabilities of the laboratories are not the exclusive resources of the atomic energy field; they are held in trust for the nation as a whole." Although the AEC anticipated its backlog of nuclear research would keep the laboratories busy for a decade, the Commission insisted work for other Federal agencies could be accommodated in AEC laboratories when their skills were needed, opening the door to nonnuclear research.[24]

On September 19, 1966, Congressman Chester Earl (Chet) Holifield (D-CA), Chairman of the JCAE, addressed the Southern Governors' Conference with a call for the AEC to mobilize its extensive scientific resources to develop a strategy for addressing broader societal problems, such as controlling environmental pollution in American cities. Responding to Holifield's proposal, on November 1, the Commission's General Manager, Robert E. Hollingsworth, asked AEC division chiefs how the national laboratories might engage in this type of research. Observing that nuclear science had matured to a point at which the national laboratories no longer had a reason to exist primarily for nuclear research, there was widespread agreement that they were equipped to study large-system problems, such as air and water pollution, waste disposal, crime, transportation, zoning, power production and distribution, alternative energy, and a host of other national issues.[25]

In 1967, the JCAE amended the Atomic Energy Act of 1954 to allow AEC laboratories to use facilities and other scientific or technical resources to support research related to "the protection of health and the promotion of safety" and "the preservation and enhancement of a viable environment by developing more efficient methods to meet the Nation's energy needs." AEC laboratories responded in kind. Argonne National Laboratory's first venture into environmental research that was not exclusively sponsored by the Commission, the Chicago Air Pollution Systems Analysis Program, was partially funded

in 1967 by the National Center for Air Pollution Control of the U.S. Department of Health, Education and Welfare. By 1969, Argonne had established its own center for environmental studies, with an expansive research portfolio spanning subjects like waste management, hydrology, mineral resources, and energy development. At Oak Ridge National Laboratory, scientists worked to support the Federal Water Pollution Control Agency on studies of the impacts of heated water released from power plant cooling facilities into aquatic systems, while capabilities in the field of analytic chemistry were applied to investigations of atmospheric and water pollution. The AEC also established a new research facility in Oak Ridge for studying the relationships between terrestrial and aquatic ecosystems.[26]

In 1971, another amendment to the Atomic Energy Act permitted even greater latitude to the laboratories to perform general energy research, as concerns mounted over energy shortages. By this time, the AEC's increasingly diversified R&D program had already produced a number of tangible products. Atomic batteries were being used to power weather satellites, space probes, and artificial hearts. Nuclear radiation was being used to treat cancers. Radioisotopes provided advances in medicine, industry, agriculture, and chemistry. In addition to R&D related to nuclear power plants and the elusive fast breeder reactor, the national laboratories were increasingly recruited to contribute to solving energy shortages in other ways, including new mining techniques and methods for recovering gas and oil with the Plowshare program, which explored using nuclear detonations in civil engineering projects. Meanwhile, many believed research in nuclear fusion held the potential promise of an unlimited supply of energy from ordinary seawater.[27]

The AEC's Adversaries

While the national laboratories received broad support from the JCAE and AEC allies in the late 1960s and early 1970s, the Commission was simultaneously criticized by a variety of adversaries who undermined the AEC's reputation and influence. In recalling his tenure under President Richard Nixon, Chairman Seaborg attributed the AEC's mounting difficulties to "the spirit of the times, particularly the opposition to the Vietnam War and a rising environmental consciousness." Seaborg suggested these factors produced an atmosphere that "was not friendly to large-scale science and technology initiatives, particularly those that involved some government participation." He also acknowledged the AEC made its share of mistakes that exacerbated criticism.[28]

The mistakes made by the AEC fell into three primary categories: the hastiness of its operations, the zeal with which it promoted peaceful uses of nuclear power, and a problematic approach to its critics. These weaknesses played out in relative degrees in each of the following areas: fears surrounding the use of nuclear explosions for peaceful purposes, concerns about the environmental impacts of nuclear energy, questions about nuclear reactor safety, and the debate over what to do with nuclear waste.

Plowshare

The Plowshare project to develop peaceful uses of atomic explosions revived concerns about radioactive contamination and fallout from the testing of nuclear weapons. These concerns had peaked in the mid-1950s with a vigorous movement in favor of a test ban treaty, faded with the nuclear test moratorium of 1958, and dropped off the radar when testing went underground after the Limited Test Ban Treaty of 1963 banned nuclear weapons testing in the atmosphere, in outer space, and under water.[29] Plowshare's defenders believed they could use "peaceful nuclear explosives," or PNEs, to promote progress and modernity. PNEs could be used to excavate harbors and canals, stimulate the production of gas and oil, and provide storage facilities for water or fuel.[30]

The Project Rulison 40-kiloton nuclear device, part of the AEC's controversial Plowshare program, proposed the detonation of a nuclear explosive deep underground in Colorado to stimulate the release of natural gas. It was lowered into its 8,442-foot deep emplacement hole on August 14, 1969. (DOE)

As part of the AEC's international peaceful uses program, advocates argued that Plowshare could pay economic dividends and play a central role in diplomacy and geopolitics as part of achieving broader Cold War objectives. Ironically, Plowshare came under greater scrutiny partly over concerns that its tests violated the Limited Test Ban Treaty, which prohibited any nuclear explosion that "causes radioactive debris to be present outside the territorial limits of the State under whose jurisdiction or control such explosion is conducted." The U.S. Department of State and the Arms Control and Disarmament Agency maintained that the clause prohibited the release of any detectable radiation at all, no matter how small, that would cross a territorial border.[31]

In 1969, Project Rulison proposed the detonation of a nuclear explosive deep underground in Colorado to stimulate the release of natural gas that was too deeply embedded in hard rock to be recoverable by conventional means. While previous Plowshare tests had encountered little opposition, this time a protest was mounted, including a mail campaign conducted by a student group at the University of Colorado. Opponents warned that radiation from the explosion would create radioactive fallout, contaminate underground water resources, and damage property. The AEC assured members of Congress and Governor John A. Love of Colorado that extensive precautions would ensure that the detonation would be carried out safely. As the explosion date neared, a number of public interest groups, including an alliance of conservation organizations and the American Civil Liberties Union, attempted to have Rulison stopped by court injunction. The Federal District Court in Colorado, and then the Tenth Circuit Court of Appeals, ruled against them, and Rulison was detonated on September 10. In the wake of the explosion,

no abnormal radiation levels were detected, property damage was minimal, and the following spring, additional tests of the gas liberated in the explosion were found to be "well within the limits to assure public health."[32]

Seaborg admitted that, while the results from tests after Rulison were encouraging, "a certain amount of self-delusion was going on." While radioactivity from Rulison was well within existing guidelines, it was not zero. A draft report found evidence of tritium in the gas, and Arthur Tamplin, from the BioMedical Division of AEC's Livermore Laboratory, asserted, "There is no justification for exposing anyone to any amount of radiation—no matter how small—as a result of Project Rulison." Seaborg wrote in his diary, "This will surely lead to adverse public reaction when it is issued." By this time, the AEC knew Tamplin was not alone. The public was becoming increasingly intolerant of any radioactivity. As a result, no attempt was made to sell Rulison's gas, and in December 1970, Governor Love of Colorado wrote to Seaborg requesting that, from that time forward, "no experiment involving the detonation of a nuclear device in the State of Colorado be conducted… without official sanction by the state." In 1974, the State's constitution was amended to require a referendum on all future tests.[33]

Meanwhile, between 1969 and 1973, a number of other massive Plowshare projects were scrapped, including plans to use PNEs to excavate a harbor in Australia and construct a sea-level Panama Canal. In 1957, Plowshare's budget had topped $150 million, but by 1970, this had shrunk to $13.7 million (less than half the amount requested by the AEC), and by 1973, funding had dropped to $7 million. Since 1973, the United States has conducted no PNEs.[34]

Seaborg attributed the demise of Plowshare in part to the loss of faith in government endeavors in an era of antiwar protests and a mounting environmental movement. While the impact of indirect forces is hard to measure, he was almost certainly right that it was not a coincidence that increased scrutiny of Plowshare came at a time when concerns about the negative environmental impacts of nuclear energy came to a head.

Environmental Impacts of Radiation

As environmentalists increasingly expressed concern about industrial pollution in the 1960s, the environmental impact of civilian nuclear power facilities came under greater scrutiny just as fallout concerns had ramped up a decade earlier. One of the major controversies centered around the effects of waste heat from nuclear plants on water quality and wildlife, a problem known as "thermal pollution." The problem heightened anxieties at a time when a growing number of increasingly large nuclear plants were being planned. While advocates in the media and government agencies urged the AEC to take steps to ensure thermal pollution was addressed, the AEC refused, arguing that it lacked statutory authority to impose regulations on hazards other than radiation. The AEC had taken steps to ensure public safety by issuing restrictions based on guidelines from the Federal Radiation Council, a radiation advisory panel established by Executive order, but a growing contingent suggested that the AEC's regulations failed to adequately protect the public.[35]

This first emerged as a major controversy when the State of Minnesota raised concerns about plans to build the Monticello nuclear plant in northwest Minneapolis, Minnesota. Responding to questions raised by environmentalists, the State had retained a consultant to advise whether current AEC regulations governing radioactive discharges could guarantee public safety. The consultant recommended that Minnesota establish statewide standards that would limit radioactive discharges to about one-third the level permitted by the AEC. The State went even further, and in May 1969, stipulated that the Monticello plant must restrict its radioactive effluents to about 3 percent of that allowed by the AEC.[36]

The controversy attracted national attention and made AEC's radiation standards a matter of public debate. An article in *Science* reported that the Monticello dispute "cast doubt on the adequacy of existing AEC regulations to cope with radioactive effluent from the expected proliferation of new reactors." A debate subsequently ensued within

Demonstrators protest the threat of thermal pollution at the proposed Monticello nuclear plant in Minnesota, 1971. Star-Tribune, Minneapolis-St. Paul.

the AEC. In October 1969, the Commissioners unanimously voted to reject the AEC regulatory staff's recommendations for major revisions, insisting there "was not valid health or safety reasons for reducing the limits." Shortly thereafter, when members of the AEC's Advisory Committee on Reactor Safeguards, a statutory committee of outside nuclear safety experts, voiced their concerns with existing regulations, a new set of proposals was drafted. In February 1970, the Commissioners reversed course and voted in favor of new regulations that represented a small percentage of the existing maximum permissible limits: 1 to 2 percent for liquid effluents and 3 to 6 percent for gaseous effluents.[37]

To move forward with the revision of radiation standards, the AEC had to secure the support of the JCAE, which provided oversight and fiscal authority for the agency. While Chairman Seaborg noted in his diary that he expected to "meet some opposition" from the JCAE, he was not prepared for the "virulence of its opposition." Repeating earlier concerns that tightened restrictions would have an adverse effect on the nuclear industry and threaten the future use of the technology, JCAE Chairman Holifield told Seaborg on February 26 that the proposed revisions "would be letting the Joint Committee down after all its support of the AEC." The meeting concluded with "an emotional statement" by Holifield in which he said that "if we took this step we could so undercut his effectiveness that he would no longer be our supporter in Congress on any matter that required his help." In March 1970, following a "stormy" meeting between the JCAE and AEC staffs, the Commission proposed "an amendment to regulations that would merely require licensees to make reasonable efforts to keep radiation exposures 'as low as practicable' and to present they had done so in periodic reports to the AEC." Not surprisingly, critics saw this as a cop-out.[38]

From 1969 to 1970, a wave of antinuclear and anti-AEC books and articles aimed at the general public heightened tensions. In January 1969, an article in *Sports Illustrated* repeated concerns about the environmental effects of nuclear plants from thermal pollution and offered an indictment of the AEC and the nuclear industry for a wide

range of perceived failures. The following month, the influential book *The Careless Atom*, skillfully written by Sheldon Novick, a protégé of the environmentalist Barry Commoner and editor of the Committee for Environmental Information's journal, newly named *Environment*, echoed concerns about radiation exposure. While Novick insisted he did not oppose nuclear power in principle, he provided disturbing accounts of the environmental, technological, and safety hazards of the nuclear industry, describing the 1966 accident at the Fermi plant in Michigan, the damage estimates of the AEC's own report on reactor safety from 1957 (which speculated that an accident could cause up to 3,400 deaths, 43,000 injuries, and $7 billion in property damage) and questioned the adequacy of the Price-Anderson amendment to the Atomic Energy Act, which limited a utility's liability for an accident to $560 million.

In July 1970, Richard Curtis and Elizabeth Hogan's *The Perils of the Peaceful Atom* raised the ante by warning readers about the laxness of the AEC's regulatory practices and the unsolved problem of nuclear wastes, concluding that the entire nuclear enterprise should be scrapped as a costly mistake. The book received wide and respectful coverage in the press and some newspapers even ran excerpts. Both Novick's book and the Curtis-Hogan volume were issued in popular-market paperback editions.[39]

Perhaps the most embarrassing criticisms of the AEC in 1969 and 1970 came from two of its own scientists at the agency's Lawrence Livermore Laboratory, Dr. John W. Gofman and Dr. Arthur R. Tamplin. The Gofman-Tamplin attacks focused on what they believed were lax radiation standards. By their calculations, if the average exposure of the U.S. population reached the standard's allowable limits, the result would be 32,000 deaths per year. The AEC responded that current plant discharges were nowhere near the allowable limits, but by the summer and fall of 1970, their critiques of the AEC and nuclear power had gone viral by today's standards. Articles about the two appeared in *McCall's, Esquire, Atlantic Monthly, Newsweek, National Geographic, Reader's Digest, Life, Barron's,* and *National Journal*. Feature articles appeared in major newspapers, and all three television networks taped special programs.[40]

Reactor Safety

The environmental effects of nuclear power remained contentious issues, but by 1971, critiques increasingly focused on reactor safety. The dire predictions published in the 1957 report from the AEC's Brookhaven National Laboratory, "Theoretical Possibilities and Consequences of Major Accidents in Large Nuclear Plants" (known more commonly as WASH-740, for the shorthand label the AEC assigned to it) were increasingly cited as plans for nuclear plants expanded. In 1964, Brookhaven had agreed to undertake a technical reassessment of WASH-740, but in calculating the worst imaginable accident, the estimates were even worse: a staggering 45,000 deaths, 10,000 to 100,000 square kilometers contaminated with significant radioactivity, and damages of $17 billion. The death and injury numbers were so alarming, Brookhaven agreed not to include them in the report, but the AEC nevertheless decided not to publish the report due to an anticipated backlash. Former NRC historian J. Samuel Walker concluded this decision was "ill-advised," as it meant the AEC "handed other nuclear opponents an emotional issue by default." Walker saw this as another example in AEC's history where its commitment to nuclear development compromised the integrity of its regulatory program.[41]

Nuclear Waste

At the same time that doubts about the safety of nuclear reactors became a public issue, questions about the disposal of high-level radioactive wastes from nuclear reactor operations captured headlines and undermined the AEC's credibility. For decades, the AEC had delayed plans to build a permanent repository for high-level waste, so when a proposal to use an abandoned salt mine near Lyons, Kansas, was publicized in early 1971, the significant backlash came as no surprise. The National Academy of Sciences had already condemned plans to dispose of high-level wastes from Rocky Flats at the National Reactor Testing Station in Idaho, and the AEC had faced criticism for reports of leaking radioactivity in its Hanford, Washington, disposal trenches. Joining forces with Congressman Joe Skubitz, a Republican

whose district was located about 200 miles from Lyons, a cadre of scientists, public officials, and newspapers weighed in against the plans. Despite the AEC's insistence that it would not move forward until the suitability of the site had been confirmed, most observers remained unconvinced. When criticisms of the proposed repository proved well founded, the AEC cancelled it and escaped the fiasco with damaged credibility. As the *Washington Post* reported, the controversy confirmed not only the "general fear that most people have of radioactivity" but also "a basic distrust of the AEC."[42]

A New Generation of Activists

The AEC also faced a new generation of activists—lawyers, academics, and scientists—with the skills to challenge its authority. As the AEC's Stanley Schneider observed, the new generation of antinuclear leaders were "a group of articulate, vigorous, personable and, to a great extent, young people who have enough knowledge and a facility to use it to be extremely dangerous." Early antinuclear activism was local and fragmented, but national organizations began to enter the fray. This included groups like the Union of Concerned Scientists and Ralph Nader's Critical Mass Energy Project. In 1971, the first national antinuclear group, the Committee for Nuclear Responsibility, formed with four Nobel Laureates on its board. Its goal was to act as a political and educational organization to disseminate antinuclear views and advocate for a moratorium on nuclear power.[43]

In October 1972, the *New York Times* reviewed two new books that captured complementary expressions of the mounting criticism of the AEC as a manifestation of "bureaucratic schizophrenia" and hypocrisy. H. Peter Metzger, a biochemist and environmental activist, added to the growing arsenal of literature available to the "citizen activist" with *The Atomic Establishment*. Metzger argued the AEC had been reduced to a "fanatically defensive protectionist clique of tenured bureaucrats who have been drawing job security and prestige from the miraculous achievement of the Manhattan project" over 25 years earlier, and whose "best efforts since then have been divided between wildly inappropriate technological adventures and the justification of their past mistakes." In *Citizens vs. the Atomic Industrial Establishment*, Richard S. Lewis, the editor of the *Bulletin of Atomic Scientists*, relentlessly poured out the chilling details of a world in which scientists speak of "statistical deaths" and Nobel Laureates quarrel about cancer risks. The reviewer argued that, taken together, the books presented compelling evidence that the AEC had become a self-serving bureaucracy guilty of violating the public trust.[44]

The AEC did take steps to answer its critics by expanding its public information programs. It supplemented and updated its booklets, reports, films, speeches, and press conferences and added new films designed for television, along with pre-recorded radio programs. It established a Citizens' Workshop Program, which, by 1974, had made 700 presentations in 130 cities and 39 States to audiences totalling over 38,000 people. The AEC also increasingly used its Commissioners on news programs and in public meetings and created a task force of staff members from different divisions to coordinate public appearances and other public relations efforts. While it is hard to measure the impact of these efforts, polls indicate that public opinion remained mostly supportive of nuclear power in the early 1970s but steadily eroded throughout the decade.[45]

In the final months of its operation in 1974, the AEC received hundreds of letters recapitulating a wide range of critiques that had been leveled by its adversaries. In one letter, a member of the Task Force Against Nuclear Pollution in Louisville, Kentucky, lamented the "unnecessary proliferation of nuclear poisons which are inimical to all life." A sober reply from the AEC maintained one of their "paramount interests" remained "the safety of man and his environment" and included assurances that low levels of radioactivity released by nuclear power plants offered "no threat to public health and safety."[46]

In reply to a letter from Santa Barbara, California, which had been referred from the Office of the President and cited an article in *Smithsonian* as evidence for the assertion that "radioactive waste" from nuclear power plants constituted "a threat to all life on earth," the AEC offered a more detailed three-page reply.[47] The AEC asserted "no radiation injuries or deaths have resulted from the operation of licensed nuclear power plants in the United States, and no member of the public has received a radiation exposure in excess of prescribed

standards due to operation of any type of nuclear power plant in this country."[48] This statement, taken from an AEC report entitled "The Nuclear Industry—1969," had been criticized as "not entirely frank" in a *New York Times* article in 1970. Seaborg admitted it was "so hedged about with qualifications that if examined in detail it became quite unimpressive." The article noted:

> "No member of the general public" excluded those working in industry, and there had indeed been some excessive exposures in industry. "Exposure in excess of prescribed standards" begged a question, since the standards themselves were under attack as inadequate. "Civilian nuclear power plant" excluded military and research reactors, and there had been an accident at an Army reactor in 1961 that killed three workers. "In the United States" excluded problems encountered in other countries, for example, the very serious accident to England's Windscale reactor that had caused a regional public health emergency.[49]

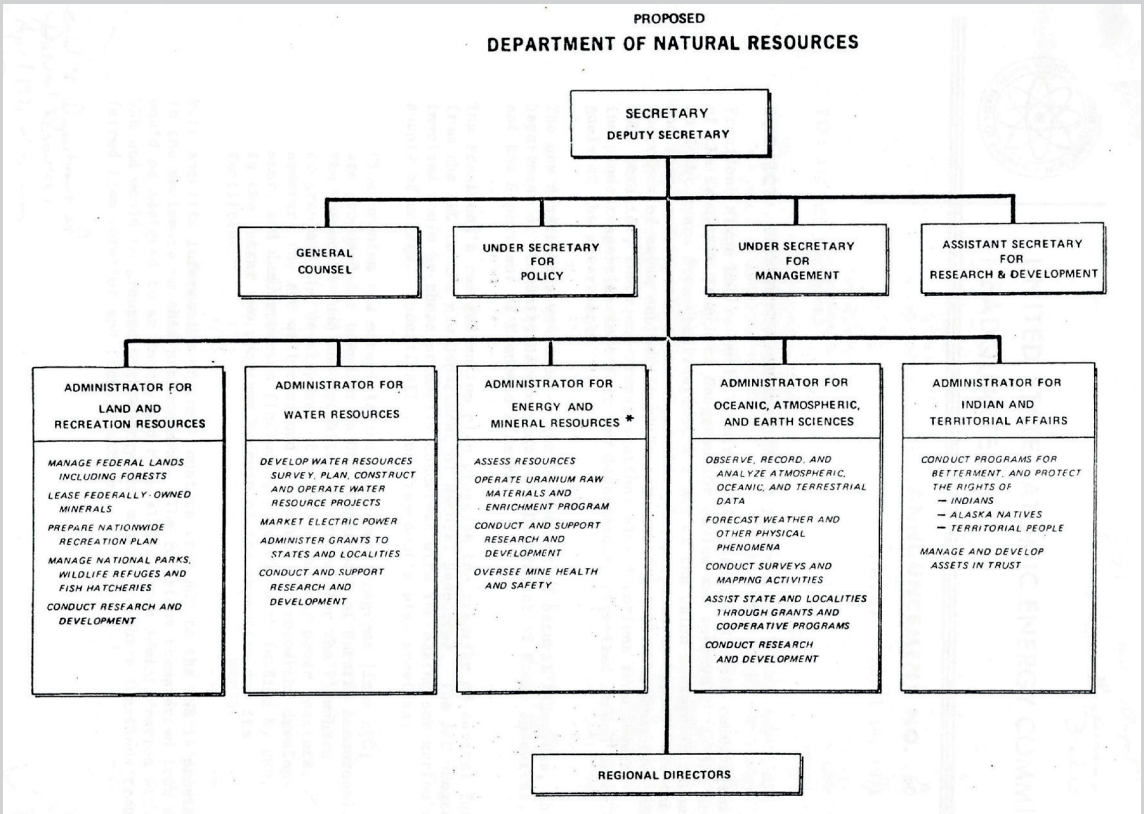
After reading an article about nuclear waste in *Reader's Digest* in August 1974, a letter writer from Kent, England, challenged AEC Chairman Ray on her reported characterization of nuclear waste as "the biggest non-problem America has." In a conscientious reply, supported by six enclosures, the AEC maintained that the United States' approach to managing radioactive waste differed only in minor detail from that used by every other nuclear-power-producing nation: "The wastes are either released to the environment, if they are at concentrations which are below those accepted by national and international standards as causing no harm to man and the environment, or they are packaged and isolated from the biosphere until radioactive decay has rendered them innocuous." The AEC letter ended with the assurance that the U.S. nuclear energy program's commitment to health and safety "is evidenced by the extensive and expensive development, operations and regulation which form the backbone of a program which has been and will continue to be, as safe as, or safer than, any other industrial effort ever undertaken by man."[50]

A poignant letter from a 14-year old girl asked President Ford if there was any way he might be able to "slow down the atomic power race." She admitted, "to be frank I am scared of what the world will be like when I'm older." The AEC reply expressed appreciation for "your concern for the future of the world." Unclear on whether the writer was referring to the nuclear weapons race or the development of nuclear energy, both were addressed with platitudes: "The basic purpose of the United States nuclear weapons program is to maintain a state of mutual deterrence while seeking mutual disarmament…[and] as to the spread of nuclear power…our concern is that public health and safety be the paramount consideration."[51]

These letters illustrate the pervasive influence that AEC critics had on public opinion, the impact that public opinion had on motivating AEC critics, and the challenges the AEC faced in responding to its critics. In *Containing the Atom*, J. Samuel Walker maintains that activists had such a major impact for several reasons. First, a "general disillusionment with the government, established institutions, and science that prevailed by the late 1960s, largely as a result of the Vietnam War," made it difficult for the AEC to overcome a pervasive skepticism directed at the agency. Try as it might to resist and counter, the AEC was unavoidably subject to broader social forces beyond its control. Second, it was "easier to win the public's attention by stressing dramatic dangers than by explaining safeguards." Seaborg attributed this to a tendency for the public to be illogical in its evaluation of risk, as well as a special kind of fear associated with nuclear hazards. Third, Walker argued that the cumulative effect of the issues faced was difficult to overcome, including the concerns over Plowshare, thermal pollution, radiation, reactor accidents, and waste disposal discussed above. He concludes the "AEC sabotaged its own credibility and enhanced that of its critics by consistently emphasizing the development of the nuclear industry rather than the prompt resolution of regulatory issues." These factors were exacerbated by a perceived lack of transparency by the AEC.[52]

Long after he left the AEC, Seaborg candidly admitted to the AEC's shortcomings on handling safety and regulatory problems in particular. He acknowledged that his "early boosterism of nuclear power may have contributed to later problems." He acknowledged that, due to an impatience to achieve economic benefits quickly, "U.S. nuclear plants were prematurely escalated in size that strained the technology and magnified the potential consequences of an accident, no matter how unlikely." Finally, Seaborg believed that, due to its "relative political immunity in the early years, and also because most of its activities remained secret for so long, the AEC was unskilled in explaining itself to the public."[53]

Nixon poses with members of the "Ash Council" at his home in San Clemente, California. The council recommended a major reorganization of executive branch cabinet departments. (Nixon Library)



Nuclear energy's low priority in Nixon reorganization plan was evident in the proposed organization chart for the Department of Natural Resources. Buried deep inside a division of energy and mineral resources, offices devoted to nuclear energy R&D were not even listed on the chart. (NARA)

AEC vs. Nixon

While the relative political immunity described by Seaborg was already on the wane by the late 1960s, it became clear that the AEC's salad days ended abruptly with President Nixon's election in 1968. Seaborg, a Nobel Prize winner for his discovery of plutonium, saw he had lost the easy access to the presidency that he, a Democrat, enjoyed under Presidents Kennedy and Johnson. While the Bureau of the Budget recommended unprecedented cuts to AEC budget proposals under Kennedy and Johnson, Seaborg reported that he had succeeded in restoring the most serious cuts by personally appealing to each president. This was not the case with Nixon. Although Nixon kept Seaborg on as Chairman for a couple of years, he granted just one individual meeting to Seaborg on budget matters, in December 1969. During Seaborg's presentation, the scientist recalled, Nixon showed little interest and subsequently rejected nearly all of his requests.[54]

President Nixon's lieutenants shared his skepticism of the AEC. The leadership at the Bureau of the Budget—soon reorganized into the Office of Management and Budget (OMB)—was unwilling to bless the AEC's expansive budget requests that were easily granted under President Johnson. James Schlesinger, assistant director of the Bureau of the Budget under Nixon, succeeded Seaborg as AEC Chairman. Dismissing his predecessor, Schlesinger observed, "All Seaborg had to do was wave his magic wand, either his Nobel wand or his plutonium wand, over the budget and he could expect the Administration to approve it without any real questions. By the close of the 1960s, however, this magical trick no longer worked." The tight budgets were a portent of the assault Nixon planned against the AEC itself.[55]

While presidents had particular reasons to break up the AEC and JCAE, their interest in executive reorganization was also part of a broader effort since the Truman administration to establish what scholars call a "managerial presidency" with a bureaucracy more directly responsive to executive direction. For example, President Johnson established two task forces that investigated agency reorganization along functional lines, such as the establishment of the U.S. Department of Transportation. President Nixon also pursued broad reorganization in the name of executive efficiency but also because he believed the bureaucracy was liberal and hostile to his agenda. He reshaped the Post Office, merged the Peace Corps and Vista programs, and created the U.S. Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration, the Federal Energy Office, and the Federal Energy Administration. Nixon did not sign the ERA in October 1974 only because he had resigned in Watergate disgrace 2 months earlier.[56]

The most revealing of President Nixon's grand reorganizational ambitions was a failed campaign to transform cabinet departments. He appointed a council headed by Roy Ash, president of Litton Industries, who later became Nixon's OMB Director. From the Ash council's recommendations, Nixon proposed folding seven cabinet offices into four super-sized departments for human resources, community development, economic affairs, and natural resources. Nixon would control them through a Domestic Council of his own political staff, similar to the National Security Council's powers in security and foreign policy. Nixon's political goals dovetailed with the theory behind a managerial presidency in which a president could achieve efficiency and policy effectiveness through a functional reorganization built around what Nixon called "the great purposes of government."[57]

In regulating environmental impacts on the Nation's air, land, and waters, President Nixon's EPA provided a model for his new Department of Natural Resources (DNR) that was compatible with the functional model of governance. Nixon invoked EPA's environmental zeitgeist in calling for a DNR built around the "interdependent nature"

of resources programs. The DNR would absorb the entire Department of the Interior, the Forest Service, the Army Corps of Engineers, the Rural Electrification Service, the National Oceanic and Atmospheric Administration, and most of the AEC. Seaborg recognized the plan meant "total dismemberment" of the AEC, as the proud agency would suffer the indignity of being buried deep inside the DNR's energy division. This AEC rump would compete for policy attention and budget resources with other minor offices.[58] For critics of atomic energy, Nixon's proposal had a dual benefit. The AEC would cease to exist and so might the JCAE. With no specialized nuclear energy agency, the JCAE would be redundant to existing congressional committees.

In President Nixon's plan, atomic energy no longer held a position of privilege in the Federal bureaucracy. With the DNR directing civilian development and nuclear weapons programs spun off to the U.S. Department of Defense, all that would remain of the original AEC would be nuclear power regulation, and even that might not be independent. Proposals called for it to be rolled into an existing regulatory agency where nuclear safety regulation would be just one mission among many. An alarmed Seaborg insisted to White House officials that AEC programs were too interdependent to cut up, and he proposed Hosmer's earlier idea of an energy agency. Rather than build a resources agency around the Department of the Interior's core, he preferred an AEC-based agency to conduct all Federal nuclear and nonnuclear energy research. Publishing this idea in 1972, Seaborg implicitly disparaged Interior's technical capability: "No other agency of the Federal Government is in a more favorable position to launch a unified program for meeting energy needs of the American people than the Atomic Energy Commission. It should be transformed into the U.S. Energy Agency."[59] Seaborg's proposal had little immediate support in the executive branch, but the ensuing battle pitted the AEC's political power and reputation against Interior's.

President Nixon's cabinet reorganization plan came at a time of vulnerability for the AEC's civilian nuclear program. Although touted as a clean energy source, environmentalists questioned the risks from routine radioactive discharges, thermal pollution, and whether the AEC was an objective regulator. "After years of living in a balmy kind of political immunity," the *Washington Post* reported in 1970, the AEC was under an "all-out assault" for the fact that "it has been regulating the same programs it has been ordered to promote." Making for odd bedfellows with environmentalists, politicians from oil States such as Senator Allen Ellender (D-LA) called for AEC scrutiny: "Nobody dared to touch it, and it strikes me that it's time somebody took a good look at their affairs."[60]

While early talk among JCAE members focused on splitting regulatory staff into an independent nuclear safety commission, the Ash Council and the AEC's environmental adversaries favored knocking nuclear power off its pedestal entirely. In keeping with the philosophy of a managerial presidency, the Ash council favored single-administrator regulatory agencies over a commission under the logic that single administrators were more efficient and responsive to executive direction. Environmentalists, along with Senators Edmund Muskie and Henry "Scoop" Jackson, favored moving AEC regulatory staff into the EPA, an agency, environmentalists anticipated, that would be agnostic on nuclear power. Aligned with the White House on creating a DNR, Jackson represented a significant challenge to AEC allies. One of the chamber's most powerful members with presidential ambitions, Jackson so dominated resource issues that a White House aide admitted to President Nixon that Republicans on Jackson's Committee on Interior and Insular Affairs "have a major inferiority complex when it comes to Jackson."[61] In December 1969, Nixon's chief domestic advisor, John Ehrlichman, asked Seaborg if he supported moving the AEC's regulatory function to the EPA. Stalling, Seaborg replied that it would be possible "someday" but regulatory staff still needed access to AEC expertise in the national laboratories. He warned his fellow Commissioners that compromise was necessary or the AEC might be forced into a split on unacceptable terms.[62]

A powerful senator and presidential aspirant, Henry "Scoop" Jackson was a key supporter of legislation to create a Department of Natural Resources. (University of Washington, Jackson Papers).

Mr. Atomic Energy

Athwart the White House, Jackson, and environmentalists stood Congressman Holifield. A founding member of the JCAE, "Mr. Atomic Energy" had served several times as JCAE Chairman. If President Nixon's DNR proposal succeeded, Holifield recognized, "the Atomic Energy Commission would be dead." He publicly announced, "I am completely opposed to any move to destroy the AEC." Rather than dissolve the AEC into the DNR and the EPA, Holifield favored Seaborg's idea to build from the AEC two new nuclear-centric agencies. The AEC's national laboratories would form the core of an energy agency that would perform mostly nuclear energy research but diversified into fossil fuels and alternative sources. The AEC's regulatory division would become an independent commission. Holifield was in a position to get what he wanted. After inheriting the gavel of the Committee on Government Operations, new House rules required him to choose between it and his JCAE chairmanship. Wisely, he opted for Government Operations. All of Nixon's reorganization plans would have to clear his committee. Holifield recalled to a biographer, "The Administration would then have to bargain with me."[63]

The White House had leverage, too. Holifield passionately wanted funding for the liquid metal fast breeder reactor. The breeder was capable of producing more fissionable fuel than it consumed, and, in 1970, he concluded it was the solution to an energy crisis he anticipated well before it struck in 1973. As he neared the end of his career, Holifield confessed to an industry official the threat of an energy crisis "is so clear to me, and it is so urgent that, for the first time in my life, I am aware of the meaning of my age and the shortness of the probable time which I have to work on the problem."[64]

Holifield's energy anxiety and breeder fixation meant opportunity for the White House. OMB and White House officials had been skeptical of the breeder's viability, and, in 1970, they frustrated the Congressman by committing to just $50 million in R&D funding for one plant. The White House demanded the nuclear industry share in its costs as the beneficiaries of the program. The nuclear industry, however, proved reluctant to contribute much at all. More Federal support was needed. In a memorandum to Ehrlichman, White House staffer William Kriegsman wrote, "Holifield has one burning desire—to go down in history as the father of the breeder reactor. He sees this as the capstone of his 24 years on the [JCAE] and is so emotionally involved that he is nearly irrational on the subject." To get the DNR, Kriegsman suggested the administration hold further breeder funding hostage. He predicted Holifield would accept even the dismantling of his beloved AEC to get it. Indeed, Holifield's ambitions for the breeder were boundless. He wanted three diverse breeder demonstration projects, each with a gigantic price tag of $500 million in 1972 dollars. Even that amount was a substantial underestimate; the U.S. Department of Energy's (DOE's) ill-fated breeder demonstration plant would have cost at least $4 billion in the 1980s if it had been finished.[65]

In early 1971, President Nixon allowed Holifield to bypass his budget hawks for a ride on Air Force One, where the Congressman framed his pitch on the breeder as a political winner for Nixon. The breeder, the Congressman told him, could give the President something to talk about besides Vietnam, give the Nation 1,000 years of energy, and give Nixon a scientific legacy rivalling President Eisenhower's Atoms for Peace program and President Kennedy's space program. The Congressman predicted his three breeder projects could be well along by the end of Nixon's second term in 1976. If his administration supported the plan, Holifield told him, he was ready to retire.[66]

In April 1971, President Nixon invited Seaborg, Holifield, and key JCAE members to a cabinet meeting where they pitched the breeder with unrestrained enthusiasm. Holifield told the assembled that the energy crisis was "a problem . . . that we can solve" and the breeder

Rep. Chester "Chet" Holifield (D-CA). A founding member of the JCAE and primary author of the Energy Reorganization Act, Holifield was Congress's most consequential legislator on energy affairs. (California Blue Book)

In 1972, AEC Commissioners joined President Nixon for the swearing in of Dixy Lee Ray. Left to right is Clarence E. Larson, James T. Ramey, James R. Schlesinger (Chairman), Nixon, Ray, and William O. Doub. (Nixon Library)

could increase the effective supply of energy by fifty-fold: "If we do this, we will have an inexhaustible source of energy for 1,000 years." Senator John Pastore said the AEC could match the space program's to-the-moon-by-1970 goal with a breeder by 1980. Senator Howard Baker, whose state of Tennessee would benefit from the project, called the breeder a transformative "thousand year event" for energy supplies that would benefit Nixon's interest in foreign policy. Nations, he predicted, would scramble for U.S. breeders, not just fighter jets. All that was needed, the group argued, was for the President to sell the idea to the American people.[67]

President Nixon was sold. He told his aides he wanted the breeder built in California where it would do the most political good, an idea that died when no Golden State utility expressed interest. He instructed the staff to use the breeder as "a trading card" in reorganization negotiations with Holifield, but he admitted he would support it regardless. Nixon also asked that his June 1971 energy message focus exclusively on the breeder—an instruction watered down by his speech writers. Nevertheless, Seaborg said Nixon's plan "was all we in the AEC could reasonably have wished."[68]

In his message on energy before Congress on June 4, 1971, President Nixon positioned the DNR as part of a broader range of proposals designed to address a growing energy problem. He argued that the "assumption that sufficient energy will always be available ha[d] been brought sharply into question" in the preceding year. Nixon cited the brownouts that had affected some areas of the country, the shortages of fuel, the sharp increases in fuel prices, and the growing awareness of the environmental consequences of energy production. The United States could not take its "energy supply for granted any longer." Alongside plans to increase the availability of fossil fuels on Federal land, improve energy conservation measures, and achieve the successful demonstration of the breeder reactor by 1980, he pledged support for fusion research projects, as well as the modernization and expansion of uranium enrichment capacity.[69]

Holifield reciprocated with a meager commitment. In summer 1971, he conducted friendly committee hearings on the proposed Department of Community Development, the piece of President Nixon's reorganization plan thought to have the best prospects, but the bill fizzled. The DNR and Nixon's other "super agencies" never came up for a vote. The DNR proposal seemed perplexingly naïve with regard to the political interests against the legislation, and privately, Nixon had been wary of expending political capital on it. But his staff convinced him to try. Like presidents before him, Nixon yearned to overcome a perceived fossilized bureaucracy of multiple commissions, bureaus, and agencies with overlapping jurisdictions that made it impossible for him to achieve policy objectives.[70]

President Nixon proved wiser than his staff. It was farfetched to think Congress would create a gigantic resource agency that would trample well-entrenched nuclear and nonnuclear interests. Lumbermen were certain to raise their hackles at the idea of removing the Forest Service from the production-oriented U.S. Department of Agriculture. The Army Corps of Engineers had a deep bench of interests that would not accept its demotion in a resource agency.[71] By the end of 1971, it was clear the cabinet reorganization had no support in Congress, and Nixon himself seemed to lose interest in the plan.[72] Holifield won this round, he got lavish breeder funding, the DNR was dead, and the AEC was safe.

In September 1971, Nixon traveled to the AEC's Hanford facilities in eastern Washington to announce funding for a second breeder reactor.
(Nixon Library and DOE)

Shown here visiting Nixon at Camp David, Maryland, AEC Chairman James Schlesinger oversaw a major reorganization of the agency, replacing senior regulatory staff and improving relations with AEC critics. Leaving the AEC in January 1973, he was promoted to conduct a similar housecleaning at the Central Intelligence Agency. (Nixon Library)

A New Chairman

Or so it seemed. The AEC's Achilles heel, regulation of civilian nuclear power, gave President Nixon an opening to change the AEC from within. The agency's regulatory division consumed just 1 percent of its budget, but it received most of the agency's bad press. The time to license a nuclear plant doubled in the face of rising opposition. Pronuclear and antinuclear critics excoriated the agency for botching its dual mandate to promote nuclear power and protect the public. The AEC was accused of suppressing research at its national laboratories that suggested an emergency cooling system may not function properly in accident conditions. The agency's environmental record also took a hit after the July 1971 *Calvert Cliffs* decision by the DC Circuit. Judge Skelly Wright excoriated the AEC's narrow interpretation of its responsibilities under the National Environmental Policy Act (NEPA) that limited the scope of its environmental impact statements (EISs) for reactor licensing applications. Wright concluded, "We believe that the Commission's crabbed interpretation of NEPA makes a mockery of the Act."[73] In both cases, it appeared the AEC prioritized the promotion of nuclear power over its safety and environmental responsibilities.

With the AEC reeling from public criticism, President Nixon passed over the usual members of the atomic establishment to appoint to the Commission political loyalists who came with a mandate to improve the AEC's standing with critics, purge old guard, and speed reactor licensing. The first two appointees, Chairman James Schlesinger and Commissioner William O. Doub, took office in 1971 just as the *Calvert Cliffs* decision was handed down. It gave the new arrivals an upper hand in reorganizing the agency.[74]

Schlesinger, a summa cum laude economist with a Harvard PhD, had served as assistant director at the Bureau of the Budget and was a skeptic of the AEC's priorities. His management style was a notable departure from Seaborg's famous detachment from day-to-day operations. In an admiring feature, the *Washington Post* described him as "stern, arrogant, brilliant," and, by his own admission, "no gentleman." Schlesinger brought to the job bluntness, a keen intellect, supreme confidence, and a moral fervor that won him top spots in three presidential administrations and, almost as often, got him fired. After a meeting with Schlesinger early in his presidency, President Nixon told an aide, "Never bring that guy in here again." His talents eventually impressed Nixon, and he won return visits to the Oval Office and subsequent appointments as Director of the Central Intelligence Agency and Secretary of Defense. President Ford, however, fired him from the Pentagon after reportedly tiring of professorial, pedantic lectures. For a time, President Carter found Schlesinger's qualities attractive, selecting him to serve as his energy czar and the new DOE's first secretary. "Jimmy and Jim" were inseparable, at least until Carter accepted his resignation in a major cabinet overhaul. In his brief tenure at the AEC, he set a new course. An avid student of organizational theory, Schlesinger concluded the agency "was a mess" of dead wood and many "independent empires" structured around outputs—reactors and fissionable materials—instead of establishing divisions around functional inputs, such as security or licensing, that cut across outputs.[75]

An ally of Schlesinger, Doub also lacked a nuclear résumé. A lawyer and former Chairman of the Maryland Public Utilities Commission under then-Governor Spiro Agnew, the White House liked his regulatory background. Doub recalled that he and Schlesinger were told by the administration staff that the AEC-JCAE relationship had become "incestuous" and to focus "on the regulatory problem and the need to get the licensing of nuclear power plants under control." His job was to reform the agency to prepare for its "gradual dissolution."[76]

With Schlesinger and Doub on board, there were four Republican Commissioners and just one Democrat, James Ramey. While the voting math favored the "big house cleaning job" they planned, Ramey was a formidable adversary. A New Deal Democrat and close ally of Holifield, he was an ardent advocate of nuclear power. He opposed breaking up the AEC, and, along with the nuclear industry, favored appealing the *Calvert Cliffs* decision to the Supreme Court. To move forward on regulatory reform, Schlesinger and Doub conducted extensive negotiations with Ramey and ultimately convinced the Commission against appealing *Calvert Cliffs*. The AEC announced it would abide by the decision, modify its rules, and revise EISs to consider nuclear and nonnuclear environmental impacts. The Commission successfully recruited new regulatory staff with varied expertise, such as in biosciences, to meet its NEPA responsibilities. In late 1971, the Commission also launched a major reorganization of AEC divisions along the functional lines Schlesinger favored.[77]

The White House provided a veneer of objectivity to the Schlesinger-Doub overhaul. Even before the Senate approved Schlesinger's appointment, he worked confidentially with the AEC staff and White House aide Kriegsman on a reorganization plan. Kriegsman left the White House to join the consulting firm A.D. Little. Upon assuming the chairmanship, Schlesinger contracted with A.D. Little for a report written by Kriegsman supporting his views on AEC reform, as an AEC memorandum put it, "in the guise of impartial recommendations from an independent consulting firm." Schlesinger's determination and Kriegsman's report allowed for a rapid AEC overhaul "before vested interests in the staff could mount opposition." To cap off the clever subterfuge, Kriegsman was later appointed an AEC Commissioner.[78]

As part of the reorganization effort, Schlesinger also increased the use of AEC resources to support President Nixon's mandate to agencies to correct environmental abuses and promote greater energy supplies. To the displeasure of nuclear advocates, and likely to put distance between himself and Seaborg, Schlesinger promoted a vision of the country's energy future that included expanding R&D efforts for nonnuclear energy sources by using the AEC's national laboratories to solve America's mounting energy problem. Beginning with Schlesinger, the national laboratories increasingly shifted focus to nonnuclear R&D designed to address the Nation's mounting energy crisis, including support for projects involving high-capacity energy transmission, coal gasification, solar and geothermal energy research, and an analysis of energy systems.[79]

A swift purge of regulatory leadership had also checked potential resistance to the overhaul. Schlesinger and Doub hired an ally to head the AEC's Office of the General Counsel and eased into retirement Harold Price, the AEC's first and only Director of Regulation. Price, they believed, had not prepared the agency for the huge volume of pending regulatory cases, a somewhat unfair assessment given the agency's severe Vietnam-era budget caps. Regulatory staffing increased 50 percent, but license applications had increased 600 percent. Price did not help his case when he raised doubts about Schlesinger's suggestion that regulatory functions could be transferred to the EPA or the Federal Power Commission. A few weeks later, Schlesinger told the staff he had accepted Price's resignation letter, which cited "family commitments" for his departure. Doub's hand-picked successor, L. Manning Muntzing, was a highly capable telephone industry lawyer who had appeared before him at the Maryland Public Utility Commission.[80]

Schlesinger and Doub confronted industry next. "Gentlemen, I am not here to protect your triple-A bond ratings," Schlesinger said at his first meeting with industry executives. At a 1971 industry conference in Bal Harbour, Florida, the pair made plain that times had changed. Doub insisted the licensing process would not be gutted to limit public participation as some in the industry wanted as a means of speeding reactor licensing. Schlesinger's after-dinner speech stole the show as he announced the AEC was reducing its promotional role in support of a nuclear industry that had matured. "You should not expect the AEC to fight the industry's political, social, and commercial battles," he told the gathering. "These are your tasks—the tasks of a self-reliant industry." As one reporter noted, "the finality of Schlesinger's speech in Florida stunned some of the power executives. 'You could have heard a pin drop during the speech,' said one

member of the audience." An industry publication later observed, "The speech...went over like a burp at a temperance meeting."[81]

The Schlesinger-Doub strategy received plaudits for improving the AEC's immediate public relations problems. But the White House burdened them with implementing a contradictory strategy to speed up the licensing process while addressing the grievances of nuclear plant opponents. While some of the latter's issues could be resolved through process and transparency reforms, they were committed antinuclear activists who feared nuclear technology and distrusted the AEC. To the industry's frustration, improvements to the licensing process did not overcome deeper issues—myriad legitimate, unresolved safety issues, construction management incompetence, quality control problems, and expensive construction financing in an inflationary environment. Opposition and delay continued long after Schlesinger and Doub left office. Nevertheless, the duo won more resources for regulation, expanded its staff, and put distance between the AEC and industry.[82] Convinced the AEC was ready, Senator Pastore, Chairman of the JCAE, informed Schlesinger in 1972 it was time to consider splitting off the AEC's regulatory functions.[83]

A New Beginning

After his landslide re-election in 1972, President Nixon did not revive his grand reorganization legislation and struck out on his own to control the bureaucracy. He appointed four "counselors to the president," officials who would act as super-secretaries with cross-cabinet control. Holifield, however, could not rest. The AEC and JCAE faced ongoing threats from the White House and Congress. The rise of liberal politics in the Democratic Party was growing into a House revolt against the power of committee chairmen and the committee structure. The JCAE's unitary control over nuclear energy put it in the crosshairs of Richard Bolling and his House Select Committee on Committees, which favored breaking up the JCAE and returning oversight to multiple committees in the House and Senate. The JCAE weakly countered that it could be transformed into a Joint Committee on Energy, a proposal with little political support.[84]

Holifield sent a letter to President Nixon to congratulate him on his reelection and to convince him to consider turning the AEC into a general energy research agency and a regulatory commission. The energy research agency would be a DNR in reverse. Rather than absorb the AEC into a super-sized Department of the Interior inexperienced at energy research, the AEC would swallow up most of the Federal Government's energy programs, including Interior's coal research program.

In making his case, Holifield pointed to the careful preparations made by the AEC and the JCAE to position the AEC for nonnuclear energy research, including Congressman Hosmer's recommendation to Nixon that a presidential task force investigate the possibility of creating a Federal energy agency that would "have authority over anything pertaining to energy or ancillary to it." Holifield also cited the 1971 legislation sponsored by the JCAE empowering the national laboratories to do nonnuclear energy research, including work on energy storage and transmission systems, synthetic fuels, and environmental research. This built upon a record of research by the AEC on other energy sources, including oil shale, hydrogen, solar, geothermal, and methane. Holifield told the President, "The Atomic Energy Commission could provide this integration of policy and effort [on energy] in the executive branch and, in my opinion, the Joint Committee on Atomic Energy could do the same in the legislative branch." It would be simple; eliminate the "Atomic" from the AEC and JCAE's names and give them a broad mandate to promote all energy options.[85]

Momentum was on Holifield's side. President Nixon's warnings about the Nation's growing concern over energy resources in his June 1971 address before Congress had been followed by attempts to launch investigations on the energy situation in both houses. Extensive hearings on all aspects of the energy supply in 1972 were marked by warnings that unless the United States revised its energy policies, it would be unable to meet its fuel needs in the future. The unusually bitter winter of 1972–1973 brought those concerns to a peak. Shortages of fuel oil and natural gas brought what *Congressional Quarterly* described as "an abrupt recognition of the tenuous balance between the nation's power supply and its economic stability."[86]

When asked about the Nation's continuing energy "challenge" in July 1972, AEC Chairman Schlesinger, sounding more like the head of an *energy* agency than an *atomic* energy agency, explained that a continuing increase in energy demand, a "topping out" in domestic oil production, an adverse balance of payments for imports, limitations on coal use due to environmental objections to expanded strip mining and the burning of high-sulfur coals, inadequate gas supplies, and delays in the licensing and construction of nuclear power plants all had created the perfect storm. Thus, with Holifield's plans for creating an energy agency, the country could solve an emergent problem. Creating a DNR would not. As one AEC official assured, "It is an

idea whose time has come. [It is] not the product of a conspiratorial cabal of AEC heads seeking to extend their domain but a feeling among like-minded men that the nation's impending energy bankruptcy is too serious a problem to be left to drown in a sea of reports."[87]

A consistent theme among the AEC's allies who called for an energy agency was to make much of the unflattering comparison between the purported excellence of the AEC's national laboratories and the Department of the Interior's limited programs. Even Senator Jackson, the chief DNR proponent, eventually conceded that he was underwhelmed by Interior's research capabilities. Meanwhile, support for creating an agency dominated by Interior lost ground as *energy* needs overtook resource conservation as a national issue. DNR supporters adapted to the rise of energy by renaming it the Department of Energy and Natural Resources (DENR), but its prospects waned as the energy crisis grew.[88]

By mid-1973, Watergate diverted President Nixon's attention from reorganization to political survival, and the initiative on energy shifted from the executive branch to Congress and the bureaucracy. An April 1973 cabinet meeting epitomized the distracting effect of Watergate. The meeting was to focus on Nixon's energy message, but, according to notes by Ehrlichman, the President talked of nothing but the scandal and assured those present that he was "doing everything possible to get to the truth." Ten days later on April 30, 1973, Ehrlichman was fired, and Nixon's scandal-ridden administration set executive agencies adrift. An official from the U.S. Department of Justice told a reporter that he never needed clearance from the White House: "There is no White House anymore." True as it was, he was fired for the remark.[89]

Despite their opposing party affiliations, Nixon and Holifield maintained a cordial working relationship. (Nixon Library)

Bringing her dogs, Jacque and Ghillie, to work every day, Dixy Lee Ray was a breath of fresh air in Washington politics. She proved to be an effective political strategist and a powerful advocate for the Energy Reorganization Act. (DOE)

Dixy

As President Nixon's second term began in 1973, Schlesinger had seemed prepared to go along with White House plans for an AEC breakup. In a stroke of fortune for AEC allies, Schlesinger was suddenly appointed to conduct a similar housecleaning at the Central Intelligence Agency. His replacement had her own ideas about reorganization. Dixy Lee Ray had been appointed as Commissioner just a few months earlier and, with Schlesinger's departure, was suddenly elevated to the chairmanship in early 1973.

A professor of zoology at the University of Washington, notable largely for turning Seattle's Pacific Science Center into an interactive learning center for children, Ray was an outsider's outsider. She drove her 28-foot motorhome across the country and lived out of it parked for a time at William Doub's country home. The nuclear industry had greeted her initial Commissioner appointment with unconcealed sexism. A nuclear industry newsletter, *Nucleonics Week,* observed that Nixon appointed the "spinster" after "scouring the rolls of distaff academia" for an appointee environmentalists could accept. Environmentalists expected even less of her as Chairman, predicting other AEC Commissioners would make "mincemeat" of her. It was thought she would preside only until the agency could be dissolved into the DENR.[90]

Ray surprised everyone by asserting her own and the AEC's independence. When President Nixon introduced his new Management by Objectives (MBO) program at the beginning of his second term, Ray cleverly resisted Administration efforts to exert more direct influence over the agency. The MBO program required each Federal agency to submit a list of goals and objectives to the OMB within the Executive Office of the President that were "to be of a Presidential-level importance." For the AEC, this included some pressure to change the AEC's priorities to comply with executive intent. In a memorandum from Nixon to Ray in April 1973, he explained the goal of the MBO program was to "give Americans the kind of results, reliability, and responsiveness they deserve from their government," but he also made it clear that he expected agencies to align their goals and objectives with the Administration.[91]

In Ray's initial response to the Director of the OMB, she assured Roy Ash that the AEC's list would be of "Presidential significance," but she also made clear that AEC goals and objectives would be determined by "the broader national implications of these proposals." In the area of nuclear power, for example, in the short run, the Commission could help to relieve the problem of energy shortages by increasing the efficiency of the licensing process for new nuclear power plants, and in the long run, the AEC could contribute to new methods of energy production through the development of the breeder reactor and controlled fusion. But, Ray noted, technology alone would not guarantee that the Nation would enjoy all the potential benefits inherent in nuclear energy. "The AEC must promote public acceptance of nuclear power as a safe and reliable energy source and as an effective way of limiting pollution of the environment," Ray insisted. The Commission intended to build that public acceptance by improving its regulatory operations and expanding its activities in nuclear safety and waste management.[92]

In the area of regulatory operations, Ray took reactor safety research away from the AEC's promotional division of reactor development and technology. The division's director, a close Holifield ally, resigned in protest. The need for such a move had grown acute in the wake of a controversial rulemaking hearing on emergency reactor cooling systems where both the AEC promotional and regulatory divisions were accused of suppressing negative safety research results. Creating a separate office for reactor safety research ensured regulators had independent access to "confirmatory research" that could serve as the technical basis of licensing decisions. It also prepared the ground for a similar office in an independent commission. In the name of independence, Ray also pushed against JCAE influence when she

convinced the White House to not reappoint the JCAE's closest ally, Commissioner Ramey. *The New York Times* concluded Ray had done what her predecessors had not in "establishing the commission's independence from the domineering Congressional committee."[93]

Nevertheless, Ray allied with Holifield against Jackson and the White House's DENR legislation. As one AEC staffer described it, the administration "chose Dixy Lee Ray as a caretaker to preside over the dissolution of the agency. Unfortunately, they hadn't told her about their plans and got a nasty surprise when she put her foot down and said flatly she couldn't support moving the AEC into DENR." She rallied the other Commissioners and, in a letter to the White House, objected to any plan that might "completely dismember the AEC as it now exists."[94]

While staking out the AEC's independence, Ray charmed the press with decisiveness, a quirky personality, and impressive intelligence. She became famous for wearing white knee socks and taking her dogs Ghillie and Jacques to work every day. Despite her life-sciences expertise, she easily grasped the technical issues of nuclear energy and could explain them to anyone. *Nucleonics Week* admitted it had underestimated her:

> She looks like the heroine of an English detective novel. There is a lot of Miss Marple about her. There was more than a little wry humor at the prospect of a lady marine biologist who takes her dogs to work, lives in a motor home, and wears knee socks and loafers, running a $3.5 billion government agency. To be sure, her nomination to be chairman was widely interpreted as a token gesture to the women's liberation and environmental movements. Her principal role was to quietly preside over the dissolution of AEC and its absorption into the Dept. of Energy & Natural Resources proposed by the Office of Management and Budget. But they're not laughing anymore.

In a gushing feature story, *Reader's Digest* described her as the most powerful woman in Washington, whose refreshingly candid and amusing remarks disarmed skeptics. Asked one reporter, "Tell us the truth, would you let your dogs sleep next to a nuclear reactor?" Ray replied, "Yes, and you know I sleep next to my dogs."[95]

Reflecting Ray's rising influence, President Nixon's energy message in April 1973 was vague on the AEC's ultimate fate. While he advocated for the DENR as part of an effort to avert a "genuine energy crisis," the role of the AEC in this effort, in the short term, appeared to be limited to providing greater amounts of enriched uranium fuel for the Nation's nuclear power plants, continuing efforts on the fusion energy front, conducting R&D related to storage of radioactive waste produced by nuclear reactors, and working with the Department of State and Congress to develop a program of international cooperation in R&D for new forms of energy. Nixon nevertheless insisted that the DENR would play a central role in providing leadership and administering the national energy policy outlined in his message.[96]

With Executive Order 11712, "Special Committee on Energy and National Energy Office," dated April 18, 1974, President Nixon also established a Special Committee on Energy and a National Energy Office to "develop a more comprehensive, integrated national energy policy to meet the emerging energy challenge." At the end of June, Nixon directed "the Chairman of the Atomic Energy Commission to undertake an immediate review of Federal and private energy research and development activities," under the general direction of the renamed Energy Policy Office (EPO), to provide recommendations for R&D funding for the following year's budget. Ray was given until December 1 to finish the report. Executive Order 11726 had established the EPO in the Executive Office of the President. Nixon directed the EPO to identify major problems in the energy area, review alternatives, make policy recommendations, ensure that Federal agencies developed short- and long-range plans for dealing with energy matters, and monitor the implementation of approved energy policies with the goal of achieving independence from foreign energy suppliers by 1980.[97]

The Path to the ERA

Driven in part by a need to escape Watergate's pall, the Nixon administration made Holifield's energy agency its own in announcing the plan on June 29, 1973. The White House's proposal acknowledged, as one OMB official said, "the dominant political realities" that had driven energy to the forefront and forced the President to demonstrate his ability to act. As President Nixon put it, the Federal Government had a "national responsibility" to the growing energy challenge. In a statement from the White House, Nixon asserted, "America faces a serious energy problem. While we have only 6 percent of the world's population, we consume one-third of the world's energy output. The supply of domestic energy resources available to us is not keeping pace with out ever-growing demand, and unless we act swiftly and effectively, we could face a genuine energy crisis in the foreseeable future."[98]

Under the proposed legislation President Nixon was sending to Congress, the DENR remained the centerpiece of this effort. But it would be complemented by two entities drawn from the AEC, which would be split into ERDA, built on the foundation of the national laboratories, and an independent regulatory agency called the Nuclear Energy Commission (NEC).[99] Reflecting the urgency to boost electric power, Nixon's announcement made no mention of the proposed NEC's safety responsibilities, only its licensing functions. ERDA would be responsible for directing a $10 billion, 5-year energy R&D program. AEC Chairman Ray proclaimed, "This is a proud day in the history of the Atomic Energy Commission as we stand on the threshold of new challenges and broader responsibilities…. We can take pride in the fact that, in assessing the energy needs of the nation, the President has called upon us to broaden our responsibilities and to assume leadership in the research and development of all forms of energy."[100]

The DENR's prospects in Congress appeared to be bleak. As one Senate staffer said, "Last time, when they came up here with the resources department proposal, they didn't know what the hell they really wanted, or at least they wouldn't tell us. If they aren't better prepared to make hard decisions concerning the Corps of Engineers, Forest Service, etc., and stick with them, they'll run into the same crossfire and kill the bill."[101]

In step with President Nixon, Holifield introduced a House bill, H.R. 9090, on June 29, and Jackson (DWA) introduced a Senate bill, S. 2135, on July 10, each with a proposal for the three-headed DENR/ERDA/NEC. These proposals differed from the DNR reorganization proposals of 1971 in significant ways. The 1973 proposal integrated within one unit—ERDA—both nuclear and nonnuclear R&D, which was not the case with the 1971 proposal. The proposed ERDA would also be an independent agency, reporting directly to the president, not through a secretary. The House and Senate bills also looked a lot better for the AEC. In 1971, it was proposed that policy and funding for AEC R&D be transferred to the DNR, leaving the AEC fragmented in its operations and identity. In contrast, the 1973 proposals essentially meant the AEC would become the proposed ERDA and assume most major Federal nonnuclear R&D from other departments. The licensing and regulatory functions of the AEC would be separated from the R&D functions, to form a new nuclear regulatory commission. The bills framed the DENR as a necessity to "bring together and provide leadership and direction for federal activities which most directly relate to the discovery, assessment, preservation, development, utilization, future adequacy and enjoyment of natural resources, including energy source, achieving a sound balance between preservation and development."[102]

Whether he intended it or not, Holifield's explanation for the reorganization proposed by H.R. 9090 undercut the DENR itself. He suggested H.R. 9090 constituted a "something old, something new" proposal. The DENR could be seen as a revival of President Nixon's 1971

proposal for a DNR, which was "part of a broad program of department reorganization" that "Congress took no final action on" after "extensive overview hearings." Interest in a reenvisioned DENR in 1973 was justified by the mounting "energy problem." Like the DNR before it, the DENR would consolidate into a single department the principal programs—now scattered among five Cabinet departments and two agencies—having a direct bearing on the conservation and utilization of the Nation's dwindling natural resources. The DENR would also work to improve substantially the capacity to understand what was happening nationally and internationally to both the "supply" side and the "demand" side of the energy equation, and to project these needs into the near-term future. What made the renamed DENR proposal "new," according to Holifield, was the addition of an independent agency for energy R&D. Holifield argued that ERDA provided the means for accomplishing two of the major goals Nixon had laid out in his June 29, 1973, address: minimizing dependence on foreign energy sources and investing $10 billion over the next 5 years on energy R&D. As Holifield saw it, the "best way to launch this effort is to adapt an existing organization which has the necessary laboratory and other facilities, scientists and technicians, and management experience; namely, the Atomic Energy Commission." ERDA would apply the AEC's resources to all forms of energy.[103]

As hearings for H.R. 9090 and S. 2135 began in July, it appeared that the threat of an energy crisis had made support for the DENR of 1973 more palatable than for President Nixon's 1971 DNR. The Secretary of the Interior, Rogers Morton, agreed that a reorganization was "vitally needed" and expressed his belief that the DENR "would provide the structure needed to deal with Nation's natural resource needs and goals."[104] Morton also conceded there would be an inevitable conflict between the new Secretary of the DENR and the director of Nixon's new energy policy office. The Undersecretary of Agriculture, J. Phil Campbell, Jr., expressed his support for the measure, which he believed would promote more effective management of natural resources.[105] The Administrator of the National Oceanic and Atmospheric Administration, Robert M. White, also expressed support for the decision to move the Administration from the U.S. Department of Commerce to the new DENR, a move he deemed the "next logical step" for the agency.[106]

AEC Commissioner Ray chose not to address the DENR specifically in her prepared remarks in July 1973 and instead focused exclusively on the ERDA section of the bill. Ray supported the idea to consolidate Federal R&D in one agency and agreed that concentrating responsibility in ERDA would "assure an optimum allocation of federal resources to a broad spectrum of energy projects, prevent duplication of effort, and provide the necessary flexibility to exploit new developments." Ray emphasized that the AEC was prepared to put the full force of its $3.3 billion national laboratory system behind energy R&D, along with its greatest asset, its staff, which included 7,000 government employees and 85,000 contactors, located in almost every State in the union. Ray also explicitly endorsed the key organizational change for the AEC in the proposed legislation—the separation of the developmental functions of ERDA from the regulatory functions of the NEC.[107]

Hearings on H.R. 9090 from July through September 1973 provided an opportunity to address some key questions about whether the legislation could finally resolve the AEC's organizational conflicts. ERDA was to be led by a single administrator appointed by the president, which Chairman Ray and others supported. Witnesses at the hearing emphasized that the national laboratories' record of accomplishment would provide assurance of success in energy research and justified its absorption of the Department of the Interior's coal research programs. Fossil fuel executives further worried that if the DENR were not created, ERDA's control of policy decisions would give the upper hand to nuclear power interests. Holifield's main task was to reassure fossil fuel lobbyists and environmentalists that the new agency would be more than the AEC with a new name. ERDA divisions for fossil fuels, alternative energy sources, and conservation had to be created and funded.[108]

For the proposed NEC, protecting its independence and expanding its capabilities dominated the hearings. The agency would have

sole regulatory oversight for all aspects of the civilian and commercial fuel cycle facilities and the safeguarding of nuclear materials security and accountability. The primary concern was how to make it self-sufficient in safety assessment capabilities without creating research facilities duplicative of the national laboratories. Holifield and others worried that if the NEC were given its own research facilities, it might be biased toward its own work. Witnesses argued instead for NEC authority to independently contract with outside entities for confirmatory research of its licensing and regulatory decisions.[109]

By September 1973, President Nixon, while not admitting there was an energy "crisis," continued to stress the need to do more about the energy "problem" amidst fears of gasoline shortages. He encouraged congressional enactment of four bills that he hoped would increase energy supplies in the short term, including funding for the construction of an Alaskan oil pipeline, construction of deepwater ports for receiving petroleum imports, deregulation of natural gas, and new standards for surface mining. He also continued to express hope that Congress would move quickly to authorize the DENR and ERDA.[110]

Jackson's proposal to integrate ERDA into the DENR ran into stiff resistance. AEC Chairman Ray vowed the bill would pass "over my dead body." "Including ERDA in a monster agency is something we have fought strenuously against.... I am in favor of an independent energy R&D agency or an independent AEC." Only the AEC, she asserted, had the "combination of skills and esprit" to achieve the same for the energy field and highly trained scientific and technical personnel in a variety of disciplines, including biology, chemistry, high-energy physics, plasma physics, mathematics, ecology engineering, and health physics. Ray presented a compelling message that the Department of the Interior lacked the AEC's extensive experience with R&D through its national laboratories. A White House staffer admitted, "Let's face it. The record of the Interior Department in the technological field is not good."[111]

On October 6, war broke out in the Middle East. Although Israel, an American ally, would ultimately emerge victorious, the effects of what became known as the Yom Kippur War soon spread to North America. Beginning October 17, the Organization of Arab Petroleum Exporting Countries placed an embargo on crude oil shipped to all countries that had supported Israel, including the United States. By November, oil supplies were critically low, creating "the most acute shortages of energy since World War II." The price of oil quickly doubled, then quadrupled, and long gas lines across the country became commonplace. No longer regional, in the closing months of 1973, energy shortages spread nationwide and threatened virtually every sector of the economy. It is estimated that the gross national product dropped by $10 to $20 billion during the embargo, unemployment caused by the embargo amounted to 500,000 workers, and consumer prices increased 9.8 percent.[112]

The oil embargo turned energy into an issue that could compete with Watergate for headlines. Blaming congressional inaction on his previous reorganization proposals, President Nixon called for passage of AEC reorganization legislation, emergency conservation, deregulation of fossil fuels exploration, and accelerated licensing of nuclear power plants.[113] "The energy crisis has got them all scared," said a congressional staffer. "Congress and the Administration will have to come up with something."[114] Concurrently, the pressure on the AEC to license reactors grew more urgent as utilities announced more than forty new orders in 1973, a record.

On November 7, in a televised address, President Nixon urged Americans to lower thermostats, drive slower, and eliminate unnecessary lighting. Recalling the Manhattan Project, which had built the atomic bomb, and the Apollo Project, which had landed two Americans on the moon, Nixon expressed his faith that American science, technology, and industry could free the United States from dependence on foreign oil. Pledging increased funding for energy R&D, he launched "Project Independence" to develop domestic energy sources to eliminate dependence on foreign energy supplies and achieve energy self-sufficiency by 1980.[115]

President Nixon also reiterated his desire for a cabinet-level energy department, as the DENR/ERDA/NEC proposals in H.R. 9090 and S. 2135 had provided, but at the same time, he urged Congress to give priority to the establishment of ERDA, to speed passage by

avoiding the controversial aspects of the DENR reorganization.[116] In referring to the need for national energy self-sufficiency, Nixon said the following:

> We must also have a unified commitment to that goal. We must have unified direction of the effort to accomplish it. Because of the urgent need for an organization that would provide focused leadership for this effort, I am asking the Congress to consider my proposal for an Energy Research and Development Administration separate from any other organizational initiatives, and to enact this legislation in the present session of the Congress.[117]

Holifield wasted no time and introduced a new House bill, H.R. 11510, on November 15. A new Senate bill sponsored by Senator Abraham Ribicoff (D-CT) followed shortly thereafter on November 27. The DENR had been stripped from each bill. Holifield explained that the subcommittee on H.R. 9090 had planned to hold further hearings, but "the increasing public and congressional concern about the energy crisis caused us to change our legislative plans." The Committee on Government Operations held hearings on these bills from December to March.

On November 25, responding to a nationwide fuel shortage triggered by the Arab oil embargo, President Nixon told Americans they needed to reduce their energy use, calling for "the full cooperation of all the American people in sacrificing a little so that no one must endure real hardship." In addition to proposing a reduction in jet fuel for passenger flights, a reduced speed limit on vehicles, restricted hours for gas stations, and a cut in heating oil deliveries to homes, Nixon called on Congress to enact a series of measures to cut back on consumption. Repeating the rallying cry for self-sufficiency, he assured Americans that short-term sacrifices would ultimately help ensure the success of Project Independence, "a series of plans and goals set to insure that by the end of the decade, Americans will not have to rely on any source of energy beyond our own."[118]

On December 1, AEC Chairman Ray delivered the report on the Nation's R&D activities that Nixon had requested on June 29. *The Nation's Energy Future* provided a blueprint for ERDA and a path to energy self-sufficiency that must have buoyed nuclear advocates and concerned its critics. While the report recommended a broad range of tasks designed to conserve energy sources; increase domestic production of oil, nature gas, and coal; promote the use of renewable energy sources like hydro, geothermal, and solar; and expand the production of nuclear energy, the lion's share of resources went to nuclear. Nearly half of the recommended FY 1975 Federal budget recommendations for energy R&D would go toward validating the nuclear option. When the Committee on Government Operations reported on H.R. 11510 on December 7, it noted that *The Nation's Energy Future* should be consulted by ERDA's incoming Administrator, even if the Administrator might decide to modify it "to accord with available resources, emerging opportunities, and responsibilities under the charter given by this bill." In a report from September 1974 on the physical research capabilities of the AEC, the Commission also made it clear that it was poised to support not just fission and fusion R&D but also work on non-polluting coal as a primary fuel, coal liquefaction, coal gasification, magnetohydrodynamics, geothermal energy, solar energy, hydrogen production and storage, storage batteries, superconducting transmission, and chemical and physical assessment of pollutants.[119]

Just a few days later, the President created the Federal Energy Office in the Executive Office of the President on December 4, to coordinate American efforts to cope with the oil embargo and allocate precious supplies of oil. The office established an allocation program for a variety of fuels in short supply and assumed responsibility for implementing President Nixon's proposals for Project Independence.[120] Shortly thereafter, the House easily approved Holifield's legislation on December 19, by a vote of 355 to 25. H.R. 11510 had been endorsed by a variety of organizations representing differing energy points of view, including the Edison Electric Institute, the National Rural Electric Cooperative Association, and the American Coal Association.

The AEC's most effective critic was the Union of Concerned Scientists. Shown here, UCS leaders Daniel Ford (left) and Henry Kendall (right) testify before the JCAE with consumer advocate Ralph Nader (center). (Nuclear Industry, AIF)

The 1974 oil embargo led to shortages and a near quadrupling of gas prices. Congress and the president were under intense pressure to act on the crisis by passing energy legislation. (NARA)

ERDA's Path through the Senate

Nuclear opponents had a better reception in hearings for the Senate bills, as the energy crisis provided them with a platform to question the narrow reliance on fossil and nuclear energy. The Senate's Committee on Government Operations was chaired by a nuclear skeptic, Abraham Ribicoff. He provided a friendly forum to nuclear power critics such as Daniel Ford, the executive director of the Union of Concerned Scientists, who sought a more thorough dissolution of the agency, or at least greater limitations on the NEC's autonomy through expanded influence of "intervenors," a term used to describe opposition groups using established legal procedures to express their opposition. Ford, who had previously alleged the AEC had suppressed worrisome safety research and staff dissent, contended that the agency had lost the public's trust and questioned whether it would regulate fairly when split off into the NEC. In March 1974, the Committee on Government Operations opened up additional hearings on the AEC's safety record, the fairness of the licensing process and public participation, the adequacy of safeguards on nuclear materials to prevent proliferation, and the protection of the NEC's independence. The AEC's General Manager complained, "It is clear that much of this [Senate] review stems from Dan Ford's testimony that the AEC is not fit to become the core of ERDA and NEC."[121]

AEC critics also questioned whether the regulatory staff of an independent agency had the resources and capability to regulate a new issue that emerged during the hearings, safeguarding nuclear materials. Episodes of potential diversion of weapons-grade materials raised questions about the possibility of similar diversions in the commercial nuclear industry. Radiation scientist Theodore Taylor warned that "one person working alone in a basement" with weapons-grade plutonium could easily produce a nuclear weapon. Safeguards, Ribicoff pointed out, was not even a line item in the current AEC budget.[122]

Chairman Ray directly addressed a wide range of critiques voiced during the hearings in March 1974, the third time she appeared before a congressional committee to discuss the legislation. Regarding concerns that the AEC, as the major component of ERDA, might "dominate" the new agency and give it a "nuclear bias," Ray maintained there were at least four barriers to "this kind of distortion in ERDA." First, she noted that the ERDA Administrator and Assistant Administrators would be appointed by the president only with the advice and consent of the Senate, which would ensure a balanced representation. Second, each energy system under development would have equal access to the Administrator and an equal voice in decisions. Third, the organizations being transferred from the AEC to ERDA already had a history of pursuing research projects "beyond the formal limits of nuclear research and development." Fourth, Congress, in chartering and appropriating funds for ERDA, would have a strong hand in determining the scope and direction of the agency's activities. After all, the legislation itself recognized the "vital importance of all areas of energy research and development and the need to devote appropriate attention to each."[123]

Rarely one to pull punches, Ray offered "a few words about the charges which a small but vocal minority has leveled in recent months on the Commission's nuclear power program." Ray wanted to make it clear that she was "*not* referring to the constructive suggestions which we continually receive from responsible critics but to the 'shot-gun' attacks by those who are attempting to turn public opinion against nuclear power in any form." As a reply to those attacking

the AEC, who might appear to be "discrediting the kind of forward-looking research and development program which is needed to meet our energy needs," Ray intended to "set forth the essential facts." The first target: "*claims* that nuclear power plants are dangerous." The AEC had fumbled questions about radioactive exposure from nuclear plants in the past, and in this case, Ray acknowledged that they emitted radiation but relied on the estimates that physicist and Manhattan Project veteran Ralph Lapp provided on the upper limit of cumulative deaths attributable to radiation-induced cancer up through the year 2000. "There would be 200,000 deaths from natural background radiation; 100,000 from medical X-rays; 7,200 from jet airplane travel; 6,800 from weapons fallout; and 90 from nuclear power plants. The total estimated cancer deaths from all causes over the same time period would be 20 million. So nuclear power plants do represent some measurable risk, but it is insignificant when compared with other causes of cancer."[124]

Next, Ray addressed the concern that nuclear power plants may have accidents. Ray insisted that the AEC believed "that the care taken in design and operation ensures that the chances of a serious accident happening at a nuclear plant are very small." Here, she brought in backup. Noting that, in fall 1972, the Commission set up a group of scientific experts to study this issue, she handed the question of reactor safety off to Professor Norman Rasmussen of the Massachusetts Institute of Technology, who directed a team of over 50 contractors working on the study, to answer questions. In his written testimony, Rasmussen noted that the final results of the study were not yet available, but nevertheless some general conclusions could be offered. According to Rasmussen, the risk of an accident was very small. An unlikely accident involving a core meltdown at a nuclear plant would also "have rather small consequences as opposed to the fairly commonly held conception that severe consequences would result." He compared the consequences to that of a large jet airplane crash.[125]

Regarding the protection of special nuclear materials against theft or diversion, Ray suggested the discussion of AEC safeguards had been "frequently blurred by over-simplification." Ray assured members of the subcommittee that the protection of nuclear material was considered one of the AEC's "most important responsibilities." Ray noted that during 1973, significant improvements were made in AEC regulations as a result of its continuous analysis of present and potential threats. "We are spending $6 million this year for research and development on safeguards. This is in addition to more than $45 million we are spending for guard forces and protective measures" at nuclear plants and in transit. The AEC considered this adequate, but Ray also noted the Commission had "studies underway to strengthen our safeguards to meet the changing levels of threat."[126]

AEC critics were undoubtedly dissatisfied with Ray's assertions, and they were certainly disappointed when Senator Jackson's S. 2135 bill to create the DENR lost steam. Ray's energetic opposition to the control the DENR would assert over ERDA's energy R&D grew more intense. She said of the DENR, "You would never get anything done or reach any of your goals. It [energy development] would be lost. What we need is an independent agency with a strong mandate and strong leadership at the top. ... Does anyone honestly think that the Defense Department could have completed the Manhattan Project on time? Or that, say, the Interior Department could have successfully managed the Apollo Program?" Jackson countered, "Energy must be considered as a part of the larger function of natural resource management. There should be one manager in the federal government who is concerned with national energy requirements in all forms and with the relationships between energy and other important resources matters." At a February hearing, however, Ribicoff announced he would forward the ERDA and NEC bills without the DENR. Adopting Ray's rhetoric, he said the Nation needed an energy program equivalent to Apollo or the Manhattan Project. Defeated on the DENR, Jackson could at least claim authorship of legislation for $20 billion in energy research. In April 1974, Ribicoff's subcommittee reported a bill without the DENR that nevertheless heartened nuclear power critics on one point. It declared that "no energy technology be given unwarranted priority," and it added a new division for energy conservation alongside divisions for nuclear and nonnuclear energy.[127]

NEC's Path through the Senate

As the fate of ERDA brightened by spring 1974, opponents turned their attention to the NEC. During the earlier House hearings on the bill, nuclear critics proposed alternatives to the NEC and encouraged legal opposition to new plant licensing hearings. Representing the environmental organization Friends of the Earth, attorney Anthony Roisman called for fairness in the NEC licensing process by providing legal expenses to intervenor groups that opposed nuclear power plants and participated in licensing proceedings. He also rejected the idea of an independent nuclear commission and instead suggested merging the NEC into an "Energy Regulation Commission" concerned with regulating all energy sources. He said, "The NEC as proposed merely perpetuates the fragmented system of regulation." Suggestions that the NEC be merged into the Federal Power Commission or a broad energy commission, as Roisman wanted, made little headway. The Federal Power Commission dealt with electricity rates and promotion of electricity consumption, the counterargument went, which made it a poor candidate to conduct independent safety assessments. Details such as whether the NEC would assume regulatory authority over ERDA facilities were unresolved, but the NEC's creation seemed increasingly assured as industry representatives signaled their support.[128]

While Ribicoff's committee did not entertain changing the NEC's commission system, it was far more friendly to tinkering with the NEC's staff structure and licensing processes, as Roisman proposed. It created a centralized materials safeguards "bureau," a more independent status that a "division" or "office." The NEC received greater oversight authority of existing and new ERDA reactors and to license ERDA surface and underground repositories of high-level waste. It added criminal penalties for directors of licensees that failed to report non-compliance with regulatory safety requirements.[129]

Many amendments reflected Roisman's earlier efforts to empower intervenor groups to slow the licensing process procedurally, appropriate Federal funding for intervenors in legal proceedings, and increase the transparency of NEC business. The most controversial amendment came from Senator Edward Kennedy to form a coordinating council with authority to fund intervenor groups in licensing proceedings. Kennedy argued counter-intuitively that well-funded intervenors would increase the efficiency and speed of licensing hearings. In institutionalizing the role of intervenors, however, the amendment implied that the regulatory staff was biased toward license applicants and an adversarial hearing was necessary. Senator Pastore worried the amendment would "create ambulance chasers" who intervened simply to collect a salary from the Federal Government.[130] Other amendments gave intervenors more opportunities for judicial appeal during the licensing process and required that corporate proprietary information be made public unless it did "irreparable competitive injury." While few objected to an amendment giving NEC office directors direct access to the commission to raise safety issues, one that would have required some commissioners have professional backgrounds in health and environmental sciences "sounds too much like it was written by [antinuclear activist] Ralph Nader," said one industry news source.[131]

A small number of amendments sought to satisfy White House objectives. For example, Holifield's legislation stipulated that the AEC Commissioners would continue on as NEC Commissioners. The OMB legal staff, however, objected to the "continuation" approach. Although continuation offered a more seamless transition to a new

agency, the OMB staff interpreted it as a challenge to the president's appointment authority, and they pressed for an amendment that made the new commission truly new. It would begin "de novo," and a new slate of commissioners would be appointed.[132]

The Senate amendment process had left the bill so "Christmas Treed," as *Nucleonics Week* reported, that concern grew that Senate-House negotiations to reconcile their bills might fail. A congressional source said, "it is the most complicated thing I have ever seen." AEC Chairman Ray complained the Senate legislation had "a very anti-nuclear bias."[133] Holifield was reportedly "breathing fire" over the Senate bill. He particularly objected to using taxpayer money to fund "a new breed of harassment experts" among intervenor groups. Holifield and Congressman Hosmer had announced they would not stand for reelection, but Holifield threatened, "If I have to leave Congress without an ERDA bill, I'll leave Congress without an ERDA bill, but they're not going to destroy the AEC." For weeks, he refused to name House representatives to the Senate-House conference committee to negotiate compromise legislation. Senate sources defended their handiwork, "We want to assure that ERDA is not just AEC by a new name."[134]

President Nixon's Watergate saga culminated in his resignation on August 8, 1974. The new President, Gerald Ford, supported bringing the energy reorganization bill to a conclusion on Holifield's terms. Ford disapproved of several provisions in the Senate bill, particularly supplying "unlimited Federal assistance" and technical resources to intervenors. The primary assurance of safety, the White House said, was not paid opposition but creating an independent regulator. Ford also questioned provisions for the extensive release of proprietary information allowed in the bill.[135]

The Final Legislation

In the final showdown in the House-Senate conference over the ERA, Holifield was victorious on the major issues, so much so he bragged that the final product was "95% the House bill." Ribicoff confessed, "We are an unhappy group of Senate conferees and we do not feel we have gotten anything." Holifield replied, "I have been living with this problem for about 28 years. ... I see our applications for licensing languishing for two or three years. I see our plants being obstructed and not being built for something like nine or ten years. ... The goal is the achievement of energy."[136]

The final bill made the AEC-turned-ERDA an energy research powerhouse. It absorbed research functions from the EPA (automobiles), Department of the Interior (fossil fuels), and the National Science Foundation (solar and geothermal power). For the NEC—renamed the U.S. Nuclear Regulatory Commission—Holifield stripped out the amendments that he considered most objectionable, including the extensive release of proprietary information and assistance to intervenors. Regarding assistance to intervenors, Holifield said, such support opened the process to "any organization that claims to be self-anointed as a guardian of the public interest... and we arm the opposition to the programs which the Congress has inaugurated and which the Executive Branch is trying to implement. ... This might well be termed the Lawyer's Welfare Act." Gone, too, were requirements that Commissioners represent the professions of nuclear safety and health and environmental sciences. Holifield's poker-faced threats to kill the bill worked. Ribicoff admitted his dissatisfaction with the removal of key regulatory language related to disclosure and licensing oversight costs, noting "what we have now is so bad, we'd prefer not to have anything," but he ultimately conceded the energy crisis was so "important that we don't have the temerity, frankly, to delay this thing any longer."

Noting that 65 differences between the House and Senate bills had been resolved, Ribicoff urged the Senate to approve the ERA. He took credit for including some key elements from the

Senate bill, including a statement of congressional intent that all possible sources of energy be developed. The ERDA Administrator and Deputy Administrator would be required to be specially qualified to manage a full range of R&D programs. The ERDA Assistant Administrators would be required to be specially qualified to manage the energy programs to which they were appointed, and there would be an appointment of a separate administrator for conservation. He emphasized that the legislation was "the most important piece of energy legislation to come out of Congress" in establishing a structure to end U.S. energy dependence "and protect us from the inherent and irreversible dangers of nuclear power. Without it, we would have been headed for an uncertain, indeed menacing, rendezvous with the 21st century."[137]

If the legislation felt like a loss to Ribicoff, ERDA still bore the gentle influence of AEC critics. ERDA began operations with six divisions emphasizing diverse solutions to the energy crisis, including environment and safety, fossil fuels, conservation, national security, and alternative energy sources such as solar and geothermal. The legislation also spelled out 11 responsibilities for the ERDA Administrator to ensure attention to nonnuclear energy sources and conservation.

ERDA would also operate in a different political climate. Llewellyn King, who served as editor of *Nucleonics Week* and founded *Energy Daily*, expected nuclear power would continue to dominate energy research budgets at ERDA. "The AEC is dead, long live the AEC," he wrote. Nevertheless, he recognized the battle over the AEC had transformed the political landscape. The nuclear power industry and the AEC had been indulged by the Federal Government, but where the AEC had once "been able to do no wrong, by the beginning of this decade it could do no right." This, he believed was the fault of the JCAE, which had "hugely oversold" the promise of the peaceful atom and became "the chief and unrivalled promoter of the atom, leading the AEC by the nose through a variety of questionable nuclear escapades." He mourned, "The AEC has never recovered from the consequences of that excess" and energy policy would suffer as a result.[138]

The new NRC had survived the antinuclear onslaught with its independence intact, but it, too, bore the imprimatur of its critics through mostly uncontroversial tweaks.[139] The Senate legislation envisioned sweeping NRC regulatory authority over ERDA reactors and waste repositories. The final law eliminated NRC oversight of weapons production reactors and toned down its input on other ERDA facilities where the NRC would issue a "certificate of compliance" rather than a license or perform in a consultative role. Nevertheless, any ERDA high-level-waste repository required an NRC license. The NRC also had new requirements for transparency in issuing quarterly reports to Congress on unusual events at its licensed facilities. A seemingly unremarkable amendment that later proved consequential encouraged open discussion of safety concerns by empowering office directors to bypass the Executive Director for Operations (EDO) and take their concerns directly to the Commission. The Senate's criminal penalties for a licensee's executive officers who withheld information on safety issues was reduced to civil penalties. To limit partisanship on the Commission, only three of the five Commissioners could represent one political party. Nuclear critics also helped expand the capability of the NRC by successfully lobbying for an office for materials safety and safeguards and, reflecting the intense safety controversies of the early 1970s, an office of nuclear regulatory research; its research program would consume about half of the NRC's early budget.[140]

On October 11, 1974, President Ford signed the ERA. Few mourned the end of the AEC. Dixy Lee Ray reflected the victorious mood among the act's supporters. A reporter asked her "how it feels to have a $1 billion agency just disappear from under you?" She corrected him. "It's $4 billion, sir.... We are not actually having an agency disappear so much as having the responsibilities of the AEC melded into—merged into—a much broader agency which will direct itself...in research and development of energy across the board, of which nuclear energy will be one part." The people in the national laboratories "whose genius brought nuclear energy" to maturity could do the same for alternative energy sources.[141]

For the NRC, optimism also reigned. The nuclear industry was "positively bubbling over with enthusiasm" for the NRC. Freedom from the AEC's promotional mandate, it was hoped, would lead to

unbiased regulatory oversight. One utility lawyer said, "I may be a Pollyanna on this one, but I really look forward to the new commission." "Quite frankly, I don't see how they [the regulatory staff] can get any more conservative than they have been in recent years," said another.[142]

Antinuclear activists were also delighted about their post-ERA prospects. With a stiffened spine, the NRC might be tough, and, as one intervenor lawyer said, if it overreacted with too much regulation, "It couldn't happen to a nicer industry."[143] At a major antinuclear conference in Washington, activists predicted the imminent collapse of the nuclear industry. Dan Ford of the Union of Concerned Scientists was so confident in a legal victory stopping nuclear power that he predicted the theme of the 1975 conference would be reactor decommissioning. Ralph Nader told the assembled to take no quarter. A year earlier, he predicted that the nuclear industry would be dead in 5 years, and he thought they were still on schedule. Solar was the energy of a future in which democratic control of all technology would prevail. It was an imperfect forecast of the future—economics more than politics killed nuclear power—but it proved more accurate than the industry's.[144]

Pressing a hardline with Senator Ribicoff, Holifield eliminated the most objectionable elements of the Senate version of the ERA. At the end of conference negotiations, Senator Jackson congratulated him. (Nuclear Industry, AIF)

The Joint Committee: A Reckoning

Victory on the ERA came at a cost for the JCAE; it was an anachronism, a committee with no obvious agency to oversee and out of step with the times. The post-Watergate congressional elections of 1974 had swept into Congress many antinuclear lawmakers. The nuclear industry warned that "momentous times" lay ahead. The Atomic Industrial Forum, the lobbying arm of the industry, moved more staff to Washington, expanded its public affairs outreach, and doubled its budget. In a letter to board members, Forum leadership offered a grim, prescient assessment. "Where there used to be the countless AEC features, speeches, media relations, booklets, films, and background papers about the benefits of nuclear power, there will soon be only a vacuum. NRC cannot 'promote' the advantages of nuclear energy, and ERDA will no doubt emphasize other energy sources during its formation phase." The loss of JCAE leadership, especially Holifield and Hosmer, had capped off the industry's steady erosion of influence. "The incoming Congress is not only the most liberal in decades, but also seems to interpret the recent election as a national mandate against 'the establishment.'"[145] A shell of its former self, the JCAE was expected to offer little protection to nuclear interests, and it did. The four congressional oversight committees in the House and Senate tended to be far more skeptical of nuclear power than the JCAE. Holifield had cut a deal none too soon.

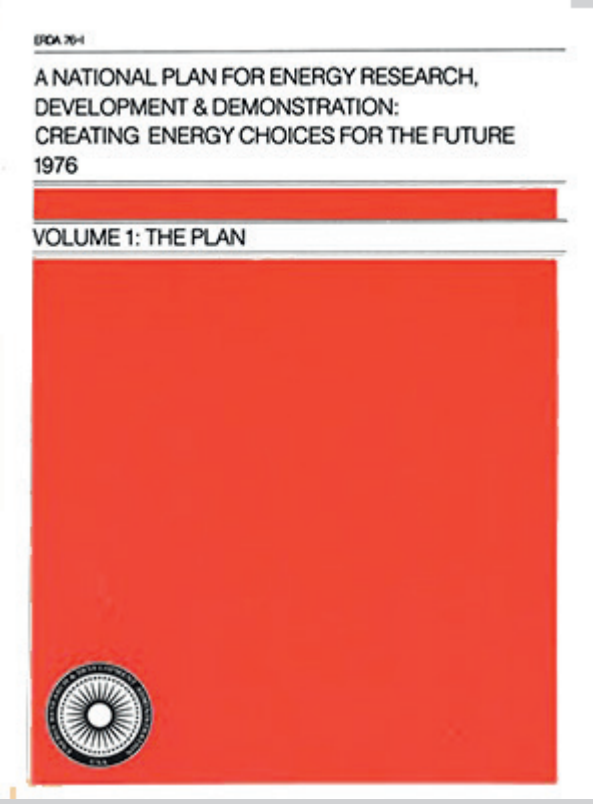
The unique Cold-War justification for a unitary committee for atomic energy was obsolete. Representative Melvin Price, chairman of the JCAE, pled his case to Richard Bolling, Chairman of the House Select Committee on Committees. The JCAE, he maintained, had provided unparalleled oversight of nuclear energy. Price argued that the JCAE's specialized knowledge could be leveraged by expanding into a Joint Committee on Energy to meet the energy crisis. Bolling accepted none of Price's logic. ERDA and the NRC required different oversight committees, he noted, and there was nothing exotic about ERDA's solar and coal research programs that required specialized knowledge. The JCAE's oversight was remarkable, he told Price, only because virtually all past Federal energy research funding had gone to nuclear energy.[146]

In addition to breaking up the JCAE, the Bolling Committee called for a restructuring of numerous House committees overseeing environmental, labor, and educational issues that satisfied liberals in the party caucus, but other members considered it too extreme. A second committee under Julia Butler Hansen (DWA) countered with a moderate plan that preserved temporarily an emasculated JCAE. "Hell, it's better than losing," Holifield confessed.[147]

The reprieve lasted barely 2 years. In 1976, the *National Journal* announced it might finally be "doomsday" for the JCAE. When a nuclear export recommendation by the JCAE was dismissed by other committees, longtime member Pastore complained, "There was a time when this Joint Committee was the most prestigious committee in Congress. ... If you take that [power over nuclear exports] away from this committee...I am ready to resign because if my only job is to make bigger and better bombs, I don't want to be on this committee." Pastore's threats made no difference. Staffers on another committee speculated that "Stripping JCAE of its legislative jurisdiction is in the air." In early 1977, the Senate assigned no

members to the JCAE and House voted 256 to 142 to remove all legislative authority from the JCAE. The newly named Senate Committee on Energy and Natural Resources and the House Committee on Interior and Insular Affairs assumed oversight of the NRC, with some concurrent jurisdiction by respective committees on appropriations, international affairs, and government operations.[148] Nuclear energy became a common issue with common congressional oversight.

As Holifield headed into retirement in 1975, the nuclear industry honored him at an award banquet. Despite passing the ERA, his address was not a triumphant valedictory but equal parts I-told-you-so and sadness. He had predicted the energy crisis, he reminded the assembled, and wondered if the Nation could mobilize for a peacetime energy challenge "when there is no Pearl Harbor to feed our fears and no Sputnik to fire our determination." He entered retirement with foreboding that the Nation might fail to develop the breeder. He acknowledged the rising tide of opposition to its technical problems and expense but warned, "If we fail to support the breeder, we will have abdicated our responsibility for international leadership in the atomic energy field."[149] Rallying support for the breeder reactor within ERDA proved to be a challenge.



While the ERA mandated the development of the first national plan for energy research, development and demonstration, ERDA's first two attempts, including the plan seen here, came under fire from critics who argued they failed to adequately address the ongoing energy crisis.

ERDA after the ERA

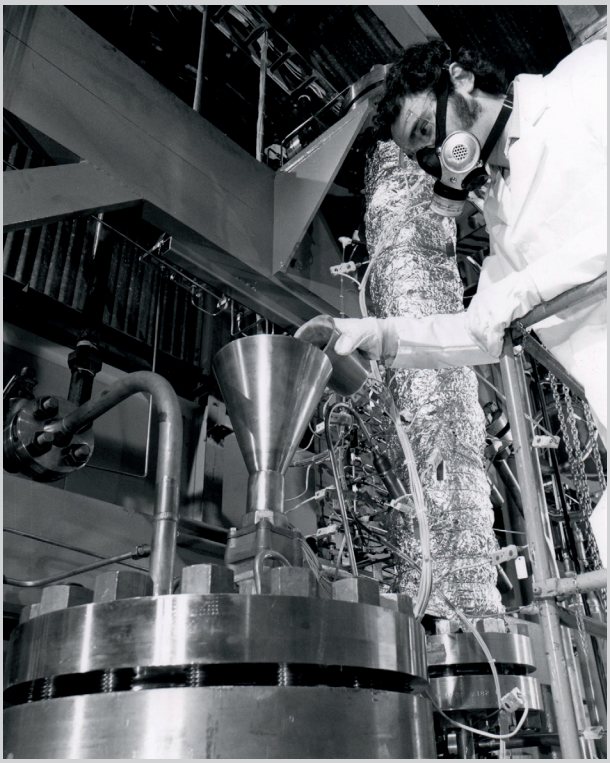
President Ford selected Robert C. Seamans, president of the National Academy of Engineering, as the first head of ERDA. A former Secretary of the Air Force and deputy administrator of the National Aeronautics and Space Administration (NASA), Seamans took office on December 30 1974, a few weeks before the formal establishment of the agency on January 19, 1975. Seamans reportedly established his headquarters in downtown Washington, 25 miles southeast of the former AEC headquarters in Germantown, Maryland, partly to dispel the idea that ERDA was simply a continuation of the old AEC. Seamans would also be closer to the White House and Congress.[150]

Given that a large portion of ERDA's programs, personnel, and budget had come over from the AEC, it should not have come as any surprise that nuclear energy was the program area that confronted the new ERDA Administrator with a disproportionate share of problems during the first year of the agency's existence.[151] One of the most difficult challenges ERDA had inherited from the AEC involved the continued efforts to develop the breeder that Holifield had championed. By 1975, the breeder project included a demonstration plant in Oak Ridge, Tennessee—the Clinch River Breeder Reactor—and a test reactor facility in Richland, Washington—the Fast Flux Test Facility.[152]

As a result of the D.C. Circuit's 1971 *Calvert Cliffs* decision, an extensive EIS, considering both nuclear and nonnuclear environmental impacts, had to be filed before work could be started on the demonstration plant. Rather than file a brief with the courts in its closing days as an agency, the AEC had passed on to ERDA a 4,500-page draft EIS. A review committee, headed by Deputy Administrator Robert Fri, determined that there was sufficient need at that time for the breeder reactor to meet the Nation's future energy needs, so the EIS was filed and the project moved forward. In December 1975, an authorization bill for ERDA included $171 million for the Clinch River reactor.[153]

Despite the Ford administration's backing, the breeder was no Manhattan Project. It was criticized as a weapons proliferation risk by activists. Construction was behind schedule and consuming a third of ERDA's R&D budget. Suffering from numerous technical problems, the projected costs for the whole program had risen from $3.9 billion to $10 billion, and the cost of the first demonstration plant quickly doubled. The case for the breeder depended on robust electrical demand growth and scarce recoverable uranium deposits, but demand growth flattened while recoverable uranium reserves grew. With the collapse in new reactor orders, uranium was cheap and plentiful, and the breeder's plutonium would be expensive and irrelevant. In short, none of the technical and economic assumptions on which Holifield built his case for the breeder proved true. In 1983, Congress eliminated its funding. Breeders developed in other countries have struggled to prove their technical viability. Seaborg, a breeder supporter, looked back on the failed program and admitted he did not appreciate the "intractable technical problems" that came with the breeder's extremely high operating temperatures and intense neutron flux that stretched the limits of materials science.[154]

Finding a solution to the nuclear waste problem was another difficult challenge that ERDA inherited from the AEC. Two weeks after the agency was activated, ERDA officials convened a special task force to review all aspects of the nuclear fuel cycle, and a month later the task force reported that the back end of the cycle, waste management, was "at a standstill."[155] Following the advice of the task force, Seamans took steps to centralize headquarters waste management activities by transferring responsibilities to an expanded Division of Nuclear Fuel Cycle and Production, while granting environmental oversight to the new Division of Environmental Control Technology.[156]



(Left) The Oak Ridge National Laboratory was involved in both process development and engineering evaluation of several ERDA-supported coal-conversion processes for producing synthetic crude oil from coal, circa 1976. (DOE)

(Right) A Dunlite wind turbine, with 3 blades and a 12-foot rotor diameter, is being tested at the Energy Research and Development Administration's Rocky Flats, Colorado facility, circa 1977. (DOE)

The new fuel cycle division quickly revised its conception of waste management centered around the idea of using "multiple barriers" between civilian high-level wastes and the environment. Liquid wastes, for example, would be solidified and sealed in high-integrity containers and then placed in "terminal" repositories underground. This granted ERDA new flexibility by opening up the possibility of multiple sites for terminal storage facilities and facilitating the transportation of waste. In early 1976, ERDA officials decided to build the Waste Isolation Pilot Plant (WIPP) in a bedded salt deposit near Carlsbad, New Mexico, to be used for disposal of transuranic wastes from the defense program and for the performance of R&D with other waste materials in salt. Legally, ERDA could place transuranic wastes in the WIPP without seeking a license from the NRC. In June 1977, however, ERDA officials decided that, to establish credibility for the concept, it would be worth seeking an outside independent analysis and public participation. Officials recommended expanding the scope of the WIPP to include nonweapons-related high-level defense wastes, but this would require NRC licensing and permit demonstration tests.[157]

ERDA's commitment to an expanded waste program was apparent in the FY 1977 budget, which included a five-fold increase for R&D for civilian wastes to almost $60 million. Defense waste R&D funding also grew, increasing by over 60 percent to more than $30 million. ERDA began a nationwide survey of potential repository sites but the search was never completed due to opposition to exploratory drilling in some cases and changes in policy regarding the reprocessing of spent fuel with the administration change and the creation of the DOE in 1977.

While ERDA was occupied with nuclear energy challenges inherited from the AEC, other energy legislation passed in 1974 compelled it to diversify its energy R&D. The Solar Heating and Cooling Act, the Geothermal Energy Research, Development and Demonstration Act, and the Solar Energy Research, Development and Demonstration Act contained injunctions to the Administrator of ERDA to initiate and conduct research and related activities in each of these areas. The Federal Nonnuclear Act of 1974, meanwhile, included a requirement that, not later than June 30 of each year, the Administrator would present to Congress a comprehensive plan for energy research, development, and demonstration. This would represent the first national energy plan, with the possible exception of *The Nation's Energy Future* report that the AEC Chairman had submitted to President Nixon in December 1973. That report had been developed by 16 technical review panels consisting of 121 Federal employees from 36 departments and agencies, assisted by 282 consultants from the private sector, and included the review and evaluation of more than 1,100 proposals and the review of an overview panel consisting of the Departments of Commerce and Treasury, the EPA, the Council on Environmental Quality, NASA, and the AEC.[158]

ERDA also came under pressure to broaden its energy approach. Before the publication of ERDA's plan, "Creating Energy Choices for the Future," the Congressional Office of Technology Assessment (OTA) had been tasked with evaluating the plan to provide "the background information necessary for an effective analysis of ERDA's energy R&D programs" by Congress. In October, the OTA presented a highly critical report. While it characterized ERDA's plan as "a significant milestone in the evolution of a long-term national energy policy," the OTA asserted the ERDA implementation plan appeared inadequate. The plan pursued technological options while neglecting consideration of the broader aspects of energy production, delivery, and use. The OTA maintained ERDA's plan failed to address factors mandated by the Federal Nonnuclear Energy Research and Development Act, including the public acceptability of approaches; institutional, jurisdictional, economic, and environmental compatibility questions; and fundamental constraints like personnel, capital availability, and the transportation of energy supplies. The second major "departure from congressional mandate" could be seen in the plan's almost exclusive focus on increasing energy supply while neglecting the role of conservation. The law required energy conservation to be "a primary consideration in the

design and implementation" of the ERDA program, yet only 2 percent of ERDA's budget was allocated to conservation programs.[159]

The OTA report criticized several other aspects of the plan identified when ERDA solicited input from dozens of organizations, agencies, and experts. Issues included a lack of coordination and cooperation with other Federal agencies, State and local governments, and international partners; a lack of attention to near-term energy problems; an inadequate assessment of existing energy resources; insufficient commercialization plans and policies to ensure coordination with industry; and a tendency to rely on old or outdated approaches and remedies. The OTA maintained there was a need to re-examine the overall energy research, development, and demonstration (RD&D) budget because it was "an outgrowth of decisions made prior to the Arab oil embargo." Since ERDA's programs for basic research had largely been inherited from the agencies that it incorporated, these programs needed to be reevaluated in relationship to overall RD&D goals. In the area of nuclear energy specifically, the OTA identified a need for a nuclear waste management plan and urged a reevaluation of the breeder and fusion programs. Largely in response to the OTA criticism, the congressional committee responsible for ERDA oversight delayed consideration of the ERDA plan and requested it submit an updated and revised plan in early 1976.[160]

The OTA's analysis of the revised 1976 plan acknowledged that substantial progress had been made in improving ERDA's approach to achieving the Nation's energy goals, yet serious concerns remained. The OTA began by noting that, in the year since ERDA's formation, domestic production of natural gas had declined 6.9 percent and crude oil 4.5 percent. At the same time, petroleum imports accounted for 40 percent of the Nation's total petroleum consumption (up from 37 percent in 1975). To the OTA, this suggested "achieving energy independence by 1985 ha[d] become all but impossible." ERDA's plan and program simply did not adequately pursue important potential near-term and mid-term sources of domestic energy supply to address the ongoing energy crisis. These criticisms reflected the inherent challenge in developing a national energy plan where previously there had been none, even if ERDA had inherited a sizeable staff and RD&D budget.[161]

The NRC after the ERA

The NRC began operations on January 19, 1975, with ample staff and budget. Regulatory personnel ballooned from several hundred in the mid-1960s to over 2,000 by 1975. Former Apollo astronaut William Anders became the first Chairman. Founded, in part, to speed reactor licensing, the first NRC Commission felt more compelled to establish the new agency's impartiality. "Our job is to develop credibility," Anders said. "We're the referee, there'll be no pompoms in our hands."[162]

His pronouncements were met with skepticism. The ERA did not change existing regulatory requirements, and the AEC regulatory staff moved en masse to the NRC. Some critics dismissed the reorganization as merely a change in letterhead, but the new regulatory agency was profoundly different from the AEC. In preparation for the split, employee quality was upgraded with the hiring of more technical staff with graduate degrees. Raised too were expectations for transparent regulation and tolerance of staff dissent as the Commission instituted an open-door policy. Former Commissioner Doub contended that his efforts to raise the regulatory staff's game had benefited safety and the industry. "A strong effective regulatory organization...is the most effective way of meeting the utilities objective of licensing plants." Dixy Lee Ray agreed. As a biologist, she took pride in the recruitment of experts in the life sciences who served as a "moral force and leadership" within the agency.

In early 1975, the first NRC Commission met with President Ford. (Left to Right) Richard Kennedy, Marcus Rowden, Chairman William Anders, Ford, Victor Gilinsky, and Edward Mason. (NRC)

The fresh perspective of outsiders continued with the appointment of new Commissioners and agency leadership. NRC Chairman Anders was the only AEC Commissioner holdover.[163]

The NRC would be a more capable regulator, but would it be accepted by the public as independent? Departing Director of Regulation Manning Muntzing sounded a note of optimism. He acknowledged the burden of the dual mandate, but, he said, "The Nuclear Regulatory Commission has been freed from the albatross of apparent compromise that hindered the AEC. The creation of NRC gives added prominence to nuclear regulation in this country and it provides an opportunity to carry out our responsibilities to protect the public health and safety free from any appearance of promotionalism." The NRC, he concluded, could be a "tough but fair" regulator.[164]

The road to "tough but fair" was uncertain, and the NRC charted a difficult course between excessively burdensome and overly permissive regulation. It was quickly criticized by the nuclear industry for the slow pace of licensing power plants and by environmentalists for expediting its decision, in November 1975, on fuel reprocessing sought by the industry. Anders said with a grin, "I've had Ralph Nader chewing on one arm today and the industry chewing on the other. I guess that means we're impartial."[165]

There was a long to-do list of safety issues. A nagging problem unresolved by the AEC was "generic" safety issues—general concerns raised by regulatory reviews and plant events that required further evaluation. The list of 34 generic issues the NRC inherited from the AEC expanded to 133 by 1979. The NRC, however, narrowed the list to 20 that were "potentially risk significant." Nuclear power critics questioned why the NRC did not shut down nuclear power plants while it investigated the generic items. Ralph Nader accused the agency of favoring plant operation over its safety obligations. The NRC's reply was that its licensed plants retained ample safety margins.[166]

In March 1975, just 2 months after the NRC began operations, Unit 1 at Alabama's Browns Ferry nuclear power plant suffered the industry's most serious near miss to date. A fire broke out in a room densely packed with power cables connected to safety equipment throughout the plant. The many penetrations created where the cables passed through the room's walls had to be properly sealed, and, to detect the whoosh of air through gaps in the seals, a maintenance worker held a lighted candle near each penetration and watched for flickers in the flame. The candle ignited the cable insulation, and it soon spread to the insulation of dozens of nearby cables. Before it was extinguished, the fire raged for several hours, damaging over 2,000 cables, many connected to safety-related equipment.

Critics argued that the Browns Ferry fire was proof of nuclear power's unpredictability. *Newsweek* reported that the investigation had uncovered "a series of errors and omissions...so great as to shake confidence in the adequacy of safety arrangements in the nation's nuclear power plants." The NRC launched a major investigation into the fire and upgraded regulations. Despite the damage, the NRC argued that its "defense in depth" approach with multiple layers of safety prevented a major accident.[167]

In the wake of accusations that the AEC had silenced staff dissent on critical safety issues, the NRC pledged itself to be a transparent regulator with an open-door policy to encourage employees to express their dissenting safety concerns. Nevertheless, it was embroiled in "whistleblower" controversies. In January 1976, Robert Pollard was an NRC staff member involved in the technical reviews of several nuclear plant applications, including Indian Point Units 2 and 3, approximately 25 miles north of New York City, when he concluded that the NRC was not taking plant safety seriously and his superiors had ignored his concerns. He publicly announced his resignation outside of NRC headquarters to Mike Wallace of the television show *60 Minutes*. With cameras still rolling, Wallace confronted NRC Chairman Anders about Pollard's safety concerns. Following the *60 Minutes* episode, Pollard joined the Union of Concerned Scientists as their leading technical expert. The Pollard controversy, along with the claims of several other whistleblowers in the nuclear industry, forced the NRC to implement and carry out programs to protect and give voice to dissenting professional opinions.[168]

Rising public concern that regulators safeguard against the domestic proliferation of nuclear weapons-grade materials, such as uranium and plutonium, played a significant role in the ERA's creation of the NRC's Office of Nuclear Material Safety and Safeguards. The NRC tightened domestic safeguards requirements for the transportation, storage, and accounting of nuclear materials. The ERA's authors did not anticipate that vesting the NRC with the authority to license nuclear material exports and imports would give the domestically focused agency an unusual, and perhaps unconstitutional, role in foreign policy. President Carter had campaigned on a promise to reduce the threat of nuclear proliferation at home and abroad. This placed the NRC on a collision course with the executive branch over its authority, granted by the ERA, to license nuclear fuel exports. Marcus A. Rowden, the AEC's former General Counsel and the NRC's second Chairman, summed up the constitutional dilemma: While the president held constitutional authority over national security and foreign relations, the ERA had unwittingly given export licensing authority to the NRC, "an agency wholly independent of the executive branch."[169]

In the late 1970s, the issue was joined in a controversy over an export license application for a shipment of nuclear fuel for India's Tarapur nuclear power plant. The approval of such an application was ordinarily routine. However, India had exploded its own nuclear device in 1974—made possible by technology and materials provided by unsuspecting Canadian and U.S. governments. Vehement opposition arose to the shipment unless the Indian government accepted full-scope safeguards requirements. Considering such safeguards an insult to its sovereignty, India refused. Hoping to deepen ties with India as a counterbalance to the Soviet Union and fearful India would simply bypass U.S. non-proliferation requirements by obtaining the fuel elsewhere, the Carter administration supported approval of the export license.[170]

The export decision was complicated by the Nuclear Non-proliferation Act of 1978, which set strict requirements and hurdles on the export of U.S. nuclear technology and materials to nations that did not abide by U.S. non-proliferation goals. The NRC could rule against such shipments, but the legislation resolved the constitutional problem created by the ERA by requiring that the NRC receive executive branch views on the issue before it ruled on an export license, and the law empowered the president to overrule the NRC if the decision was "seriously prejudicial" to U.S. non-proliferation objectives or the common defense and security of the Nation. As a further complication, the legislation gave Congress the power to veto the president's decision by a majority vote of both houses.[171]

When India refused to agree to full-scope safeguards, the NRC disapproved the shipment. President Carter overrode the decision and survived a congressional veto by a narrow 48 to 46 vote in the Senate. Carter's support for the shipment undermined the non-proliferation idealism he brought to the White House and damaged him politically. Ultimately, the NRC's constitutional problem was resolved by limiting the agency's check on executive authority.[172]

From ERDA to DOE

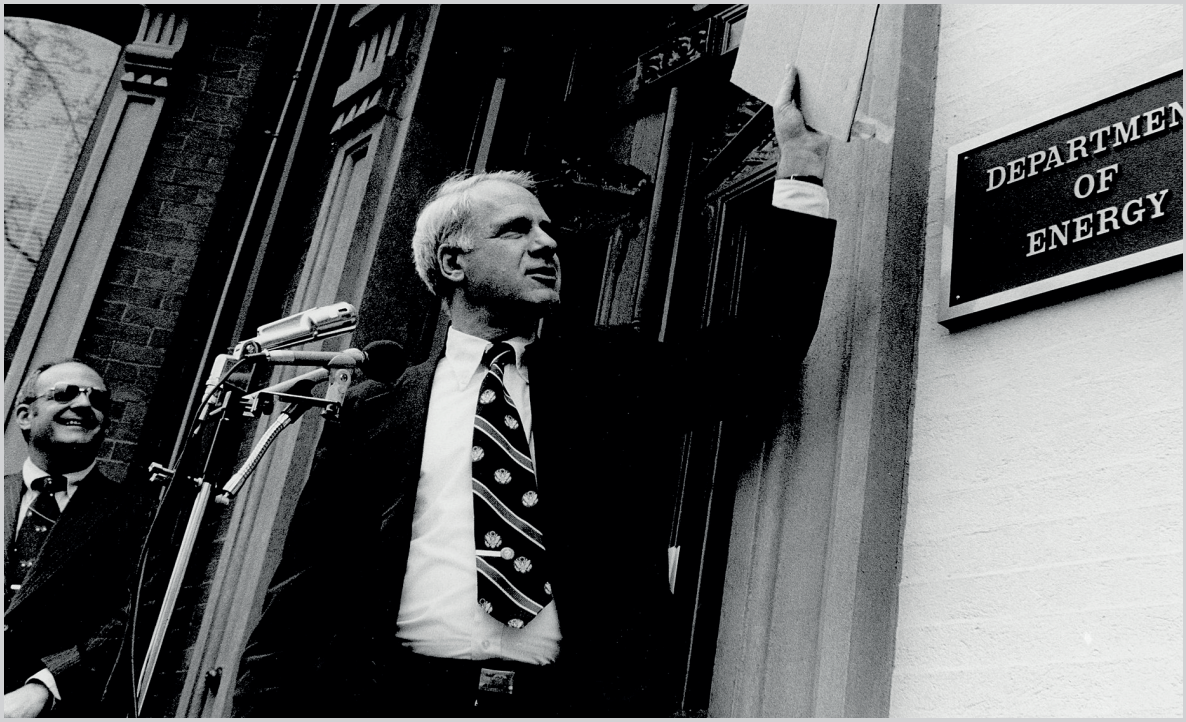
The confluence of shifting executive priorities, legislative requirements, and energy organizations created management challenges and confusion for ERDA. The ERA had created ERDA to focus the Federal Government's energy-related activities within a unified agency. Its major function was to promote the speedy development of technologies, but ERDA had also been given the responsibility for developing a national energy plan. Meanwhile, the legislation established the Energy Resources Council, which was also given the mandate to develop a single national energy policy and program. Chaired by the Secretary of the Interior and made of up other department Secretaries, the Attorney General, the Director of the OMB, the Administrator of the EPA, the Director of the National Science Foundation, and anyone else the president chose to designate, the Energy Resources Council struggled to synthesize the viewpoints of its members into a single national energy policy and program. Meanwhile, another agency created in 1974, the Federal Energy Administration, had adopted the functions of the Federal Energy Office before it, including fuel allocation, pricing regulation, energy data collection, energy supply expansion, and conservation activities. The relationships among these energy agencies had never been clearly defined.[173]

Questions about leadership and management were especially apparent when it came to nuclear programs inherited from the AEC. For example, the ERA required the Administrator of ERDA and the Secretary of Defense to review the feasibility of transferring the military functions formerly vested in the AEC to the Department of Defense or to other Federal agencies. The transfer of functions, which included not just nuclear weapons but certain related programs such as naval reactors, space nuclear systems, military power reactors, and the production of special nuclear materials, reflected the continuing congressional concern over the issue of civilian control of the military atom.[174]

The study was conducted by an ERDA task force consisting of representatives from ERDA headquarters and field operations offices, the weapons laboratories, the production facilities, and the Department of Defense. The report included nine different alternatives involving different funding and management options, but ERDA Administrator Seamans concluded that a split in the management and funding responsibilities between agencies would be detrimental to a strong nuclear weapons program. He recommended that the nuclear weapons program and complex be retained within ERDA but have a budget of its own, separate from the budget for energy programs. The Assistant Administrator for National Security would be responsible for seeing that the weapons program received priority in the use of laboratories and production facilities, while the Assistant Administrator for Nuclear Energy would manage nonweapons defense-related programs. The unique capability of the weapons research laboratories to perform important nonnuclear research to support energy development factored into the final decision to leave the division of military applications and related nuclear activities within ERDA.[175]

During his first year as ERDA Administrator, Seamans also faced the daunting task of formulating a plan for coordinating and administering the large contractor-operated, government-owned laboratories and field operations offices that came from the AEC, along with a few small, highly specialized, government-staffed energy research centers inherited from other agencies. In July 1975, Seamans asked Michael Yorymovych, Assistant Administrator for Laboratory and Field Coordination, to establish a special study group to recommend ways to optimize the use of ERDA's laboratory and field resources. Field facilities consisted of some 55 plants and laboratories, staffed by over 90,000 contractor personnel. Major contractors

President Carter signed the Department of Energy Organization Act on August 4, 1977 in the Rose Garden at the White House. (DOE



The first Secretary of Energy, James R. Schlesinger, standing in front of one of the first Department of Energy building signs, October 1977. (DOE)

included universities, university consortia, nonprofit organizations, and private industry. Each of the operations offices administered the operating contracts for the ERDA facilities in its own region.[176]

Following the recommendations of the Field and Laboratory Utilization Study Group report of December 1975, Seamans supported the establishment of additional field offices around the country so that certain projects could be handled locally rather than through headquarters. The group had concluded that the operations offices should not only procure but also manage projects in the engineering development and demonstration categories, while the laboratories and energy research centers should perform work in the R&D categories in their assigned area. Following headquarters involvement with initial planning, the laboratories and research centers should be given freedom to carry out their missions, and that work would be supported by appropriate regional operations offices. Seamans encountered OMB resistance to establishing additional field offices. The OMB's reluctance to increasing the size of ERDA field operations may have been influenced by the serious consideration given at the time to the creation of a department of energy.[177]

On the campaign trail in September 1976, Democratic candidate Jimmy Carter presented his case for energy reorganization. He maintained, "two and one half years after the oil embargo, our country still has no energy policy. We have had a parade of energy czars, a fragmentation of responsibility, an absence of accountability, and an ill-conceived proposal for energy independence." Taking aim at his opponent, he continued, "Rather than creating an effective structure to manage the energy problem, a structure which is capable of producing and implementing an energy policy, the President has allowed new agencies, special energy offices and special assistants for energy to proliferate throughout the government. Right now there are no less than 20 departments, agencies and commissions that are directly involved and have their separate views on energy policy development."[178]

President Carter insisted that, to implement a coherent and effective energy program, the "bureaucratic jumble of Washington" had to be straightened out. He promised to create a cabinet-level department of energy, under a secretary who would report to the president. The new department would merge "all current offices or agencies that presently perform the energy functions of policy and analysis, conservation, research and development, data collection and economic regulation of oil, gas, utilities and pipelines." From Carter's perspective, the "entire slant of" ERDA was "toward the nuclear industry," because it was an "offshoot of the Atomic Energy Commission" and was not accountable to other energy programs. He noted: "Sixty-five percent of its research resources for fiscal year 1977 are oriented toward nuclear fission and fusion, while only 5% will go to energy conservation and 6% for solar power. This distribution is folly." Carter characterized the Energy Resource Council as "the Ford Administration's excuse for energy policy coordination…made up of the heads of virtually every agency in Washington so that it is top-heavy with officials having little knowledge of or interest in energy policy." He proposed scrapping ERDA, the Energy Resources Council, and the Federal Energy Administration and combining their missions, "eliminating in the process the overlap, duplication and inconsistency of our present structure."[179]

Shortly after his inauguration, President Carter announced that James R. Schlesinger would be acting as White House Energy Advisor to hammer out the President's energy policy and reorganization plans, which would include the new cabinet-level department of energy promised by Carter during the campaign.[180] Schlesinger, who had served as chairman of the AEC, Director of the Central Intelligence Agency, and Secretary of Defense under Presidents Nixon and Ford, worked with Congress to ease a natural gas shortage as Carter proclaimed a national emergency as defined in the Emergency Natural Gas Act of 1977, which he had just signed. On the evening of February 2, in a televised address, Carter stressed the need for national sacrifice, conservation, and patience and promised to present a comprehensive energy plan to Congress by mid-April.[181]

In March, President Carter presented Congress with his proposed energy reorganization legislation, which created the DOE, and in April, he brought his National Energy Plan to Capitol Hill. The plan consisted of approximately 100

proposals, ranging from administrative actions to new laws and new regulations. None of the key elements were original. Some were similar to proposals made by Ford; others drew from Democratic counter-proposals. The difference was that Carter combined these elements into a unified policy framework and placed much greater emphasis on conservation. Presidents Nixon and Ford had focused primarily on increasing domestic energy supplies. Carter, through an exceedingly complex package of regulatory and tax measures, concentrated on making scarce resources go further by using less. In a somber note to the American people, the President said that the energy challenge would test not only American character but also the very ability of the President and Congress to govern. Borrowing from the philosopher William James, Carter described America's testing as the "moral equivalent of war." Carter's rhetoric was significant because only during actual wartime had the Federal Government imposed energy management similar to what he was proposing.[182]

Reflecting an emphasis on management, the new DOE, officially activated on October 1, 1977, did not simply organize existing agencies and offices under new leadership but reshaped many programs and functions to fit the national energy policy of the Carter administration. By law, the DOE would be led by three principal officers—the Secretary, Deputy Secretary, and Under Secretary. Energy technologies would not be divided by fuel type, such as fossil, nuclear, or solar, but grouped under assistant secretaries according to their evolution from R&D through application and commercialization. This approach reflected not only Schlesinger's organizational approach at the AEC but also the administration's decision to formulate a comprehensive energy policy rather than to simply engage in fuel development or management. A cadre of assistant secretaries were designated to promote efficiency and productivity. Individual R&D projects were placed under the Assistant Secretary for Resource Applications or under the Assistant Secretary for Conservation and Solar Applications, who had specialized expertise in commercialization and energy markets. The Assistant Secretary for Defense Programs would inherit responsibility for the nuclear weapons program. The Assistant Secretary for Environment would ensure that all departmental programs were consistent with environmental and safety laws, regulations, and policies.[183]

The DOE's approach to organization and management reflected a desire to avoid some of the problems that had plagued ERDA. Congress, the General Accounting Office (GAO), experts in the industries concerned, and some scientists and engineers who followed the agency had all pointed out specific management issues. The watchdog group Common Cause reported, in 1976, that a study of employment backgrounds of top ERDA and NRC officials concluded that a potential for serious conflict of interest existed for both agencies. Nine executive level positions in ERDA were filled by individuals previously employed by commercial firms who were currently ERDA contractors. Another recurring allegation was that too much money was being spent on overhead activities and too little on actual R&D. Critics also identified a lack of urgency and failure to identify priorities. ERDA's productivity may have been limited by a built-in tendency among scientists and engineers to regard the R&D effort as an end in itself, but a recurring theme from critics had been that the ERDA plan was not reflected in ERDA programs; that studies, planning, and laboratory work absorbed the funds; and that demonstrations of new energy sources or approaches as the final step toward commercial use were delayed. Critics suggested the number of layers in the ERDA chain of command reduced productivity. Others expressed concern with whether the agency's elaborate planning function actually guided and controlled the work that was done.[184]

Leadership at the NRC

The NRC was plagued by the ERA's failure to clearly define leadership at the Commission and staff levels. The ERA made the NRC a well-resourced, independent agency focused exclusively on nuclear safety, but it did not explain how a collegial, deliberative commission structure with a coequal Chairman and Commissioners could lead the agency. The same weakness existed at the staff level, where a weak EDO had little power to impose discipline on office directors, who could choose to bypass the EDO and go directly to the Commission.

Consumed with the issue of new reactor licensing, the ERA's authors had not given significant attention to how the new agency should organize itself. They assumed licensing would improve by eliminating the dual mandate that had undermined the AEC's legitimacy. Abhorring the concentration of power, the ERA retained the AEC model of equality among the Chairman and Commissioners. That the AEC and the NRC were very different commissions was not carefully considered. Civilian safety regulation was only one of the AEC's many responsibilities, and its five members tended to defer to the one Commissioner assigned to oversee regulatory activities almost as a de facto single administrator. At the NRC, such deference was not possible, as all Commissioners had equal responsibility for nuclear safety. Adding to the cacophony of Commissioner opinions were multiple voices from the staff. The NRC's EDO was a weak replacement for the AEC's General Manager and Director of Regulation. The position was more of a liaison between the Commission and office directors. No individual office had clear leadership on safety issues, resolving staff disagreements, or responding to a crisis.

In drafting the ERA, some consideration was given to this issue. A Senate amendment attempted to strengthen the Chairman by making him the "principal officer" for executive and administrative functions. The conference report on the final legislation explained the deletion of this amendment: "The conferees believe that the duties and responsibilities of the chairman and the members, and the administrative arrangements, as provided in this Act, are fully adequate to effectuate its purposes." It may have been that Chet Holifield and House conferees eliminated the Senate language in light of the JCAE's battles with Lewis Strauss in the 1950s. "Chairman" at the NRC was a distinction without much difference.[185]

The weakness of the Chairman's office might have been solved by collegiality, if any was to be found. The strong-minded Commissioners vied for influence on policy and administrative issues. Just months after the NRC began operations in January 1975, the industry press reported that the NRC staff had become demoralized by the lack of direction from a Commission that bickered constantly and was so anxious to establish its independent credentials that it struggled to make any decisions. Personality conflicts on the Commission grew so intense that Commissioner Richard Kennedy forbade his staff from contact with Commissioner Victor Gilinsky's. The Commissioners' female staff members evaded the prohibition by meeting in the women's restroom.[186]

The legislative efforts to ensure Commissioner access to information also had unanticipated influence on management. Allowing office directors to bypass the EDO to speak to the Commission directly was done, the conference committee explained, to prevent the EDO from being able "to suppress or limit information needed for the commission's discharge of its collective responsibilities." Congress imagined such end runs would be rare, but it became so common that, as one GAO official later testified, the EDO became "ineffective and almost superfluous" in directing day-to-day operations. Office directors ruled over "independent fiefdoms," a report later noted. It was a problem made worse by Congress's failure to provide a central NRC headquarters to house all of its staff. The NRC rented space in over a dozen buildings across Maryland and the Capital with connecting shuttle

buses. It could take more than an hour for the staff to ride a shuttle bus to the Commissioners' offices on H Street in Washington.[187]

After the NRC opened its doors in January 1975, Congress had second thoughts about the Chairman's power. A 1975 amendment recharacterized the Chairman as the "chief executive officer" but confusingly left unaltered the language in the 1954 act that conferred equal power to the Chairman and Commissioners. NRC Commissioners resented the new designation for the Chairman, and subsequent Chairmen did not seek more power. To little effect, Congress also passed an amendment in 1978 that required office directors to keep the EDO "fully and currently informed" when they communicated with the Commission.[188]

Existential Crisis at the NRC and the DOE

The ERA represented a victory for the nuclear establishment in creating, from the AEC's foundation, ERDA/DOE and the NRC. But the NRC's existence as a Commission was threatened by its confused response to the 1979 TMI accident. The DOE's crisis came from the election of Ronald Reagan to the presidency in 1980. He favored market forces, not Federal energy programs, as the solution to the energy crisis. In 1982, he proposed terminating the DOE and merging it into the Department of Commerce. Both agencies survived but were deeply changed by their crises.

The NRC and the Three Mile Island Accident

The TMI accident near Harrisburg, Pennsylvania, happened at a time of mounting concern and debate over the safety of nuclear power. Large nonviolent direct action antinuclear groups, such as the Clamshell and Abalone Alliances, staged massive protests at the sites of plants under construction in New Hampshire and California. By amazing coincidence, the film *The China Syndrome* opened in theaters 12 days before the accident. The movie followed a television reporter and her cameraman who discover safety coverups at a nuclear plant that experiences a near-miss accident.

Government reports also expressed concern. A GAO report to Congress was, also coincidentally, published 2 days after the March 28, 1979, accident. Entitled "Areas Around Nuclear Facilities Should Be Better Prepared for Radiological Emergencies," the GAO report warned that "there is only limited assurance that persons living or working near nuclear facilities would be adequately protected in case of a serious—although unlikely—nuclear accident."[189]

Two months before the accident, the NRC Commissioners had humiliatingly rescinded their endorsement of the executive summary of its *Reactor Safety Study*. Touted as a groundbreaking probabilistic assessment that demonstrated the very low probability and consequences of a major reactor accident, the NRC conceded that some of the report's calculational techniques were flawed and the potential errors in its estimates were much larger than it claimed.[190]

These developments amplified the effect the accident had on both public perception and government action. Defenders of nuclear power pointed out that the accident demonstrated the wisdom of the NRC's approach to safety—the plant released a negligible amount of radiation and caused no injuries or deaths—but the fact that the accident occurred at all shocked the Nation. The result of a combination of flawed training, poor analysis of operational history,

An NRC Commission meeting shortly after the Three Mile Island Accident on March 28, 1979. Receiving poor marks for its performance during the crisis, critics called for disbanding the Commission and converting to a single administrator agency. (NRC)

design deficiencies, and component malfunction, the accident at TMI was widely perceived as a failure of nuclear technology and cited as "an example of technocracy overriding democracy, of the failure of scientists to communicate risk to the public, of the end of a nuclear utopia of risk-free energy." For long-time adversaries of nuclear power, TMI appeared to be a vindication.[191]

The partial meltdown of the reactor core had uneven consequences for the DOE and the NRC. Arguably, no one was well prepared for the accident. The Interagency Radiological Assistance Plan had been in place since 1961 but was never adequately tested. Under the plan, the successive nuclear agencies—the AEC, ERDA, the NRC, and the DOE—assumed primary responsibility for implementing and administering an emergency response in cooperation with other Federal and State agencies. With the abolition of the AEC, the NRC and ERDA reached an agreement that divided responsibilities between the two agencies. The NRC would be the lead agency in responding to an emergency, and ERDA (later, the DOE) was to provide evacuation and medical assistance and radiological monitoring. These plans were mostly untested before the accident at TMI.[192]

For the NRC, the accident was a searing crisis in its history. Established as a deliberative body without clear lines of authority, it did not act like the lead agency it was supposed to be according to the Interagency Radiological Assistance Plan. It lacked adequate communications tools and well-developed emergency response plans, and its dysfunctional leadership was exposed by intense press coverage. Transcripts of accident deliberations revealed the Commissioners to be indecisive at critical moments. For example, Pennsylvania Governor Richard Thornburgh waited with concern while Commissioners debated whether pregnant women and children should evacuate areas near the plant; eventually they issued a "recommendation" that they do so.[193]

The most prominent post-accident investigation, the President's Commission on the Accident at Three Mile Island led by John G. Kemeny, president of Dartmouth College, handed down a damning indictment of the NRC. The Kemeny Commission concluded the NRC did not "possess the organizational and management capabilities necessary for the effective pursuit of safety goals." To avoid future accidents, "fundamental changes must occur in organizations, procedure and, above all, in the attitudes of people." The report included the controversial recommendation to abolish the five-member Commission and replace it with a new agency headed by a single administrator. Kemeny found that the NRC had not escaped the AEC's "old promotional philosophy" and was "so preoccupied with the licensing of plants that it has not given primary consideration to overall safety issues. ... With its present organization, staff, and attitudes, the NRC is unable to fulfill its responsibility for providing an acceptable level of safety for nuclear power plants." Kemeny told

an audience that the NRC was "a total disaster," and he believed only a purge of the Commission and senior management by a single administrator could restore public faith.[194]

Two other reports buttressed Kemeny's pessimistic assessment. The NRC had commissioned its own report on the accident led by Mitchell Rogovin, a prominent civil liberties lawyer and government counsel. The NRC, Rogovin wrote, was "an organization that is not so much badly managed as it is not managed at all. In our opinion, the Commission is incapable, in its present configuration, of managing a comprehensive national safety program for existing nuclear powerplants adequate to ensure public health and safety. A radical reorganization of the Commission's structure and management is called for, now."[195]

Unrelated to the accident, a 1980 GAO report on the NRC's progress identified similar challenges. While it leaned toward retaining the Commission structure, the GAO agreed with Kemeny and Rogovin that NRC leadership was "slow, indecisive, and cautious—in a word, complacent."[196]

Kemeny and, especially, Rogovin energetically pressed for a single administrator. Rogovin firmly disputed the long-held belief that nuclear safety benefitted from the deliberative process of a commission. Safety required a regulator decisive in oversight and swift in action. Instead, chaos ensued from five combative political appointees. Rogovin told the Commissioners his recommendation for a single administrator was largely "the result of your inabilities to deal with one another." He also pointed out that the NRC's Commission structure was an outlier among agencies tasked with public health and safety, which, like the EPA, the Food and Drug Administration, and the Occupational Safety and Health Administration, usually had single administrators. Commissions typically regulated economic activity.[197]

Kemeny and Rogovin proved unpersuasive. After the Kemeny Commission reported its findings in late October 1979, the President, Congress, the NRC, and opinion shapers in the press praised its findings generally but swiftly rejected its proposal for single administrator. Four of the NRC's Commissioners expressed strong disapproval of the idea, with only interim NRC Chairman John Ahearne in support. Editorials in the *Washington Post* and *New York Times* said the Nation needed to retain the advantages of a commission in maintaining regulatory continuity, independence, and diverse views on controversial safety issues. The *Times* warned "bureaucratic reorganizations are routine medicines. Sometimes they work; more often they don't."[198]

President Carter responded to the Kemeny findings on December 7, 1979. He acknowledged the Kemeny Commission's findings of "very serious shortcomings in the way that both the government and the utility industry regulate and manage nuclear power." Yet, the Nation did not "have the luxury of abandoning nuclear power or imposing a lengthy moratorium on its further use." A nuclear power plant could displace 35,000 barrels of oil per day, or roughly 13 million barrels per year. Amidst a protracted energy crisis characterized by oil and gas shortages, nuclear power remained a necessity. Once the Nation had reached its goals "on conservation, on the direct use of coal, on the development of solar power and synthetic fuels, and enhanced production of American oil and natural gas," Carter argued, "then we can minimize our reliance on nuclear power." The future envisioned for nuclear power by the Carter administration appeared to be murky, but in the immediate aftermath of the TMI accident, it was clear that the NRC's leadership model had to change.[199]

The White House staff advised President Carter that the Kemeny Commission had provided no analytical basis for a single administrator, had not considered alternative approaches, and was politically insensitive to the value of the commission process. They feared the consequences of abrupt policy changes enforced by politically appointed single administrators as Republican and Democratic administrations changed hands. Far less fickle, they believed, was a five-member commission with staggered terms in office and members who could only be removed by the president for cause. With little support for a single administrator, Carter announced, in late November 1979, he would submit a reorganization plan to Congress that would retain the commission structure but strengthen the powers of the chairman.[200]

In March 1980, the White House released its Reorganization Plan No. 1 of 1980. President Carter agreed with post-accident reports that the NRC had failed to exert unified leadership due to longstanding historical practice and "conflicting and ambiguous" legislative provisions. The NRC's collective management practices "[constitute] a continuing nuclear safety hazard." He proposed an alternative not much considered by Kemeny or Rogovin, a "strong chairman" Commission. To allow the Commission to focus on policy, rulemaking, and adjudication, the Chairman would become responsible for agency management and emergency response. If a question arose over what constituted policy or its faithful execution, the Commission as a whole remained the ultimate authority.[201]

The reorganization plan also strengthened the role of the EDO with powers comparable to a chief operating officer in charge of daily operations. Appointed by the five Commissioners, the EDO was to report directly to the Chairman and execute functions delegated by the Chairman. Hiring, firing, and reporting requirements for staff offices were also clarified. Two Commission offices—the Office of Congressional Affairs and the Office of Public Affairs—reported to the Chairman, but the others, such as the Office of the General Counsel and the Office of the Secretary of the Commission, reported to the whole Commission. The three "program offices" created by the ERA—the Office of Nuclear Reactor Regulation, the Office of Nuclear Material Safety and Safeguards, and the Office of Nuclear Regulatory Research—retained their ability to report safety concerns directly to the Commission, but those office directors reported to the EDO.[202]

President Carter's plan received generally positive reviews, and there was no objection to its designation of the Chairman to act for the Commission in the event of an emergency. Several NRC Commissioners, however, disputed what they saw as an overcorrection; in vesting so much authority in the Chairman, the Commission would become, as Commissioner Joseph Hendrie testified, "the Chairman and four eunuchs." In April 1980, Commissioner Victor Gilinsky took to the *Washington Post* with an opinion editorial entitled, "One-Man Rule Over Nuclear Safety?" The Chairman, Gilinsky warned, would enjoy "near absolute control over hiring and firing of the agency's safety staff," as well as advisory committees. This would have a chilling effect on the staff's willingness to share information with the Commission, especially if their views were at variance with the Chairman's. By making the Chairman, in effect, a single administrator dependent on the president's appointment and removal power, the plan would destroy the NRC's independence and subject it to the dictates of the executive branch, especially the DOE, which set executive energy priorities. Gilinsky implied that such influence from the DOE—the former promotional branch of the AEC—might revive the dual mandate. Gilinsky concluded, "It is difficult to believe the public will draw comfort from the effort to clip the wings of its independent regulators." Unimpressed, Rogovin suggested the Commissioner's criticisms were rooted in a "fear that their individual opportunities to manage one-fifth of the agency will be diminished."[203]

As they had been during the Strauss controversies of the 1950s, arguments to preserve Commission access to information were compelling. On May 5, 1980, the White House submitted amendments to the reorganization plan that expanded the full Commission's authority over the appointment and removal of certain senior staff. The White House also added language to ensure that the flow of information to the Commission would not be impeded by making the Chairman and EDO responsible to "keep the Commission fully and currently informed."[204]

President Carter's reorganization plan strengthened the Chairman and the EDO, but the lines between the Commission's policymaking role, the Chairman's executive authority, and the delegated powers of the EDO remained contested. In 1984, at the request of a congressional committee, Chairman Nunzio Palladino established a study group on the Chairman's authority under the reorganization plan. The group interviewed former Chairmen and Commissioners and found broad agreement that the reorganization plan had empowered the Chairman hardly at all. By a majority vote, the Commission could redefine its policymaking authority at any time, and Commissioners sometimes took an expansive view of their latitude to do so. There was, the study group reported, "a rich menu of operational activities to which individual Commissioners have been attracted and in

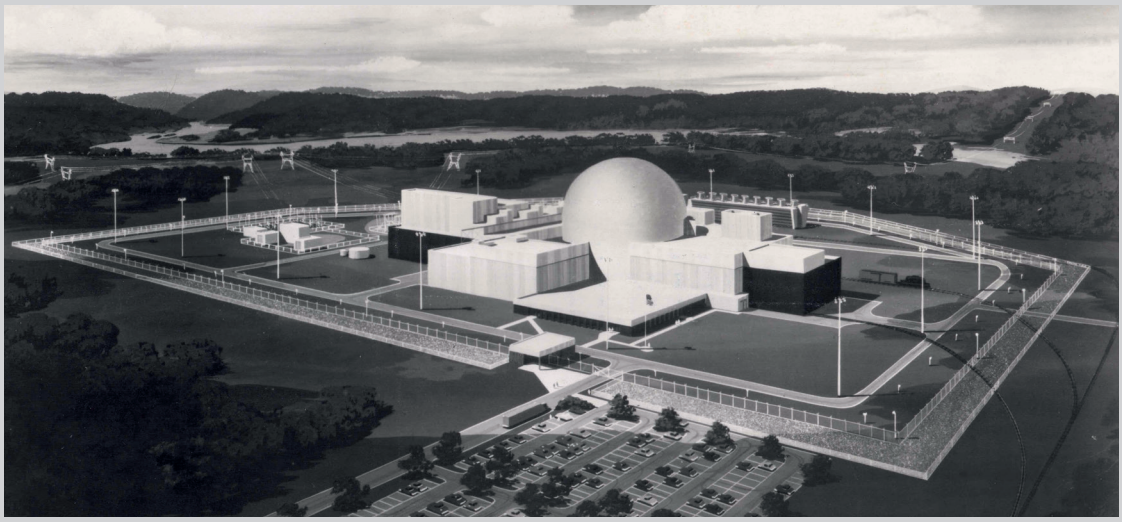
which they intervene at will, further impairing the Chairman's, as well as the EDO's locus of authority, responsibility and accountability." To avoid a revolt, Chairmen had to be attentive to the views of individual Commissioners. Palladino testified that even a majority of the current Commission favored a single administrator. Nevertheless, Congress took no action. The NRC's commission structure and "collegial" decision-making process was, for the time being, settled.[205]

The DOE in Reagan's America

Despite the TMI accident, DOE Secretary Schlesinger reaffirmed that the Nation had "no real alternative if we are going to maintain energy production than to make effective use of nuclear power." But the administration's second national energy plan sent to Congress in early May 1979 did declare that, during the last quarter-century, the Federal Government had placed a "disproportionate emphasis" on the nuclear production of electricity.[206]

For the DOE, the accident complicated matters for a relatively new agency struggling to deal with a re-emerging energy crisis. By 1979, new orders for nuclear power plants were nonexistent, and problems with licensing, nuclear waste, and a growing antinuclear public plagued the nuclear industry. The Carter administration had been ambivalent in its approach to nuclear power. While President Carter had affirmed that nuclear power had reduced petroleum imports and fuel shortages, throughout his 4year tenure, he tried to stop construction of the Clinch River Breeder Reactor—long the centerpiece of nuclear fission R&D program—because of the increased dangers breeders presented to nuclear weapons proliferation. The TMI accident had an additional cooling effect on the DOE's approach to nuclear matters for the remainder of Carter's term but was not tackled with urgency.

The DOE survived the TMI investigation unscathed. The investigations included interviews with DOE officials, but the role that the DOE had played in the emergency response—primarily in the form its Radiological Assistance Team and the Aerial Measuring System/Nuclear Emergency Search Team—was barely mentioned. The Assistance Team took soil, plant, and water samples to test for radioactivity, while the Search Team's aircraft monitored the area around the reactor to detect the presence of a radioactive plume. The DOE also provided technical assistance in determining the root of the problem, the potential for an explosion, and estimates of the damage done to the reactor. The DOE reported the results to the NRC, which made decisions about reporting out information to the media, so there was little direct evidence of DOE involvement as far as most observers could tell. The Kemeny Commission's only direct critique of the DOE was part of a broader concern with poor planning by various Federal agencies before the accident.[207]



An artist's conception of the Clinch River Breeder Reactor in Tennessee. It would have been the world's first prototype of a large-scale breeder reactor, but Congress canceled the project in 1983 as "unnecessary and wasteful." (DOE)

The DOE did identify lessons learned from its response. While there was agreement within the DOE that there were benefits to a low-profile DOE response that allowed work to proceed without interruption, the negative result was a complete lack of public understanding of the very large operation that was monitoring the radiation releases to protect public health and safety. Additionally, there was some uncertainty whether the Interagency Radiation Assistance Plan had worked as effectively as it could have. While all the plan's provisions for support to the NRC and coordination with Federal and State agencies were implemented, this was done primarily among agency representatives in the field.

Some confusion at the beginning of the accident over the roles of the Federal agencies and State authorities persisted. Joe Deal, the DOE Chief of the Environmental Protection and Public Safety Branch, identified one clear message from the accident at TMI: "despite a successful response to the TMI accident, there is a need for much more preplanning between the Federal, State, and local agencies to assure the necessary resources can be quickly mobilized and effectively applied." In the wake of the accident, the DOE and the NRC worked out a series of agreements designed to ensure improved responses in the future.[208]

Meanwhile, the DOE faced an even bigger challenge during the spring and summer of 1979, as gasoline shortages again plagued American motorists and the country confronted another energy crisis. In his July 15 energy address, commonly known as his "Crisis of Conscience" or "Malaise" speech, President Carter soberly and insistently argued that the United States stood at a crossroads but had lost its self-confidence. As he had predicted 2 years earlier, the energy crisis tested the very mettle of the Nation, and now he hoped it could serve as a standard around which Americans could rally.[209]

Shortly thereafter, President Carter regretfully accepted Secretary Schlesinger's resignation and selected Charles W. Duncan, Jr. to be the second Secretary of Energy. A Texan with a background in chemical engineering and management, Duncan had previously been Deputy Secretary of Defense. On the DOE's second anniversary, October 1, 1979, he announced he was reorganizing the Department on a more traditional basis that would manage programs by technologies or fuels, moving away from the DOE's existing structure according to the evolution of technologies from R&D through commercialization.[210]

Duncan declared that his task was to carry out an energy program accomplishing the national objectives set forth by the President and assuring all Americans of a "secure energy future." Pivoting away from more interventionist policies, he emphasized that "market forces must be allowed to regulate the price and allocation" of energy sources such as petroleum. The DOE, he noted in a speech on October 29, "should not be in the energy business." This was up to the private sector, which had "the strength, the technology, the skills, the management, and the marketing experience" to do the job. The proper role of the Federal Government, Duncan concluded, was directing, managing, and allocating Federal resources, as well as providing "appropriate incentive for private enterprise" to undertake the necessary investments in the transition from an "oil-dependent economy" to an "energy-diversified economy."[211]

Duncan's arguments landed softly because the energy crunch had abruptly eased by the end of summer 1979, as Americans adjusted their energy-consuming habits to decreased supply and increased prices and long lines at gasoline service stations evaporated. The country's energy situation brightened considerably as the Carter administration came to an end. In 1980, energy consumption declined and oil imports decreased. President Carter emphasized the energy accomplishments of his administration in his acceptance speech at the Democratic national convention, noting that nothing was more crucial to the future of America than energy. With the enactment of his energy program, he pronounced that the "battle to secure America's energy future has been fully and finally joined." Nevertheless, as the earlier crisis waned, neither Federal energy policy nor the DOE became a major political issue during the 1980 presidential campaign.[212]

Ronald Reagan, the Republican candidate and former governor of California, criticized President Carter's energy policy and advocated abolishing the DOE. Reagan cited an increasing threat to the Nation's security due to a dangerous dependence on imported oil, and he asserted that

his administration would "get America producing again." Free enterprise, he declared, could do a better job of production than government. In Reagan's opinion, the DOE, with its large budget, had not "produced a quart of oil or a lump of coal or anything else in the line of energy."[213]

Within its first 100 days, the Reagan administration took major steps to return the Federal Government to its historically limited role in national energy management. While the DOE had been established in 1977 as a symbol of the Federal Government's commitment to playing a central role in the energy field and solving the Nation's energy crisis, 5 years later, the Department had become an equally potent symbol for critics of the ineffectiveness of "big government." Speaking to the Edison Electric Institute in April 1981, Secretary of Energy James B. Edwards, a former governor of South Carolina, signaled a major shift from President Carter's energy policies. Noting that no sector of the economy suffered more from inflation, high interest rates, and regulation than the utility industry, Edwards asserted that it was not the responsibility of the DOE to engineer any changes. Rather, "it is an article of faith within the Reagan Administration that the reverse must be true," Edwards stated, "that the Federal Government's role in the management of the Nation's business has been too large, for too long; and that it is now time to return to the original source of American greatness: The skills, the talent, the vision, the ingenuity of the Nation's private business and industrial leaders."[214]

Edwards moved quickly to formulate a new budget and reorganize the Department to reflect two previous major priorities of the Reagan administration: a determination to bring the Federal budget under control as a necessary step in controlling inflation and economic stagnation and a commitment to reducing or eliminating government activities in areas where private industry and the free marketplace could set energy priorities. The new strategy included ending government regulations and price controls that the administration believed had inhibited domestic energy production. It also encouraged private capital, and not the Federal Government, to demonstrate the commercial viability of energy technologies. The Federal Government's proper role was to support long-term, high-risk energy R&D in which industry would not invest. Edward's emphasized, "only in areas where these market forces are not likely to bring about desirable new energy technologies and practices within a reasonable amount of time is there a potential need for federal involvement."[215]

While the direction the Reagan Administration wished to take in the energy field was clear, the ultimate fate of the DOE was thrown into question when President Reagan announced his intention to deliver on his campaign promise to abolish the Department in December 1981. Initially, the administration proposed dismantling the DOE by establishing an Energy Research and Technology Administration (ERTA) within the Department of Commerce. The new ERTA would continue the DOE's defense responsibilities and energy R&D activities, similar to the former ERDA, but under the broad direction of the Department of Commerce. Other functions would be assigned to the Departments of the Interior, Justice, and Agriculture, as appropriate. The power marketing administrations would be returned to the Department of the Interior, and the Federal Energy Regulatory Commission would again become an independent agency like the old Federal Power Commission.[216]

The President's dismantlement plan was followed shortly thereafter by the publication of the DOE's *Sunset Review* to Congress. The Department of Energy Organization Act, which had created the agency in 1977, also included a "sunset provision" that required the President to submit to Congress a comprehensive review of the Department and its programs by January 1982. The *Sunset Review* reiterated the President's determination to dismantle the DOE and suggested that interventionist policies under the Carter administration like price and allocation controls on crude oil and petroleum products had "subsidized more expensive imports while eliminating domestic market incentives to develop new technologies and alternative energy sources." The review nevertheless gave the Department generally good marks in achieving its past and

current objectives. This apparent contradiction was explained by the fact that administration reviewers conceded that, for the most part, the DOE's "program activities reflected the intent of the enabling legislation" and indeed showed some "progress toward achieving objectives." But, the *Sunset Review* continued, "whether the objectives and activities of many departmental programs were appropriate, then and now, is another question."[217]

On February 15, 1982, the *New York Times* reported that "the Reagan Administration's plan to abolish the Department of Energy has met so much resistance in Congress that legislative approval of such a measure seems unlikely this year." At a hearing before the House Committee on Energy and Commerce a few days later, some of the Nation's leading experts on Federal reorganization weighed in. The Director of the Office of Personnel Management, Donald J. Devine, asserted there was no personnel reason why the DOE "couldn't be abolished and its remaining functions transferred to different departments." Dr. Harold Siedman, the Assistant Director for Management and Organization of the Bureau of the Budget during the Kennedy and Johnson administrations, suggested that support or opposition to the Reagan administration's plan should be based on analysis of the underlying policy assumptions, not on personnel questions, or expectations of major savings or more effective performance, which would be unlikely results. He also noted that President Reagan's approach ran counter to all three of the previous administrations. Presidents Nixon, Ford, and Carter had all cited the fragmentation of responsibilities for energy policies and programs among multiple Federal agencies as a major obstacle to the formulation and implementation of a sound and well-balanced national energy strategy. Alan L. Dean, who had helped coordinate the Nixon administration's reorganization efforts to create the DNR, agreed that abolishing the DOE was fundamentally unwise because it would recreate the conditions that had already proven to contribute to problems concerning energy policy and programs.[218]

As late as March 1982, the Republican National Committee reported the administration's intentions to dismantle the DOE through the ERTA plan; yet, when Delaware's Republican Senator William Roth finally introduced the Federal Energy Reorganization Bill in May, the ERTA idea had been dropped. Instead, the two major activities of the Department, defense programs involving nuclear weapons and energy R&D, were to be placed under the Department of Commerce, while the remaining pieces of the DOE would be split among the Departments of the Interior, Agriculture, and Justice.[219]

Attempts to move the Senate bill forward included a series of hearings in summer 1982. Initial hearings appeared to build some momentum for the Federal Energy Reorganization Act of 1982. In June, the Secretary of Defense, the Secretary of Energy, and the Secretary of Commerce all testified in favor of the proposed legislation, emphasizing cost savings and improved efficiency as key benefits. In August, Senator Robert W. Packwood, Chairman of the Committee on Commerce, Science and Transportation; James T. Lynn, former Director of the OMB; Alexander Trowbridge, president of the National Association of Manufacturers; and Frank Zarb, former Administrator for the Federal Energy Administration, all added their support.[220]

During two September hearings, the tide turned. Connecticut Governor William O'Neill, representing the National Governors' Association, recognized the administration's desire to reorganize the Federal Government according to its preferences, but he argued "a proposal that may accomplish that reorganization at the expense of the kind of effective and balanced energy program our Nation needs cannot be supported." In his testimony, former DOE Secretary Schlesinger maintained the proposal was a "poor idea" that would downgrade and undermine the energy functions of the Federal Government. According to Schlesinger, merging the DOE into the Department of Commerce would privilege commercial goals and thereby undermine conservation efforts and the work done by the national laboratories, while compromising national security and non-proliferation efforts.

Similar concerns were expressed by a variety of experts working in various energy fields. In his testimony, Schlesinger also revealed that a few months earlier, he had asked a senior official at the Executive Office of the President whether or not he expected the DOE dismantling to go through. "He responded that he did not expect it to go through at all; that there was no chance; there was no support in the House and little enough support in the Senate." When Schlesinger asked why he was pressing for the DOE's dismantlement, the senior official replied that it made "splendid headlines" in conservative publications like *Human Events* and the *National Review*.[221]

President Reagan had publicly insisted that transferring the responsibilities of the DOE to more "appropriate agencies" would "preserve and, in important ways, strengthen essential government-related energy activities," but most members of Congress remained unconvinced. Some cited a report from the GAO, which found that the "administration has not developed reliable information on key aspects of the proposed reorganization," including important matters like costs and savings estimates and implementation plans. Ultimately, the reorganization/ dismantlement legislation went nowhere. While this would not be the last call to abolish the DOE, the agency had survived its first major threat intact.[222]

Conclusion

The power of the JCAE and AEC rested on a consensus that nuclear power was special and required a unique congressional oversight committee and an agency with an expansive grant of authority over nearly all activities involving the use of and safety of nuclear energy, including both promotion and regulation. By the early 1970s, that consensus was breaking down. It is taken for granted that the NRC and the DOE of today were the logical outcome of a new consensus that the AEC's dual mandate should end. While true in part, a close look at the histories of the NRC and the DOE reveals that several very different outcomes were possible from the complicated interplay of events, luck, and competing interests between presidents, congressional factions, nuclear critics, and the broad coalition of pronuclear advocates. While each group had its own ideas of how to dispense with the AEC, it was the latter that largely wrote the ERA to favor nuclear energy. This is explained by the immense power of the establishment's congressional allies, as well as President Nixon's Watergate folly and the energy crisis, which contributed greatly to their good fortune.

While the nuclear establishment achieved political victory, it could not overcome nuclear energy's myriad economic, technological, and regulatory hurdles. In authoring the ERA, the nuclear establishment created successor agencies to the AEC that were expected to, like the Manhattan Project, achieve transformative outcomes. The NRC would become a highly capable independent regulator that would speed the licensing process and resolve safety issues efficiently and with public support. ERDA's breeder reactor development would transform the Nation's energy resources for a millennium. That neither agency satisfied those expectations is not surprising.

Nevertheless, 50 years after the abolition of the AEC, the NRC and the DOE continue to be shaped by their shared history, and their work today will have important repercussions for U.S. energy choices as the Nation pursues net-zero carbon production by 2050. The DOE, not a more divided DNR, serves as the locus of energy development. Despite many shocks to the nuclear dream—the end of orders for the original generation of plants, the TMI accident, the termination of the breeder program in 1983, a failed "nuclear renaissance" in the 2000s, and the Fukushima accident in 2011—nuclear power options remain an essential mission for the DOE, and a plurality of its R&D budget invests in nuclear power.[223] And, if a new generation of advanced nuclear reactors becomes economically competitive, it will be the NRC's independent decisions on safety that will be necessary to win public approval. If the NRC's decisions have never been fast, they are respected at home and abroad. Its regulatory counterparts around the world are swayed by its decisions, its principles are written into international safety conventions, and many nations have modeled their regulatory agency's independence on that of the NRC.[224]

Meanwhile, the DOE continues to lead the Federal research effort to develop diverse energy technologies while ensuring that nuclear energy remains an option for the United States. The DOE has also become a pivotal international partner in supporting the safe, secure, and peaceful use of nuclear energy across the globe. Over two-thirds of the DOE budget is still devoted to the legacy of nuclear weapons development, from the management of the Nation's stockpile to non-proliferation and environmental cleanup. As an R&D agency, the DOE effectively accomplishes one of the central goals of the ERA of 1974, by playing an important role in catalyzing cutting-edge research and the deployment of innovative energy technologies. The national laboratories, another inheritance from the AEC and ERDA, continue to serve as leading institutions for scientific innovation in the United States, tackling the critical scientific challenges of modern times and addressing large-scale, complex R&D challenges with a multidisciplinary approach that places an emphasis on translating basic science to innovation.225 Today's search for a safe and secure energy future is shaped by the critical legislative debates of 1974.

Endnotes

1 George T. Mazuzan and J. Samuel Walker, *Controlling the Atom: The Beginning of Nuclear Regulation, 1946–1962* (Berkeley, California: University of California Press, 1984), 11–12; "JCAE May be Reorganized—or Abolished—in Wake of Energy Shakeup," *Nucleonics Week*, July 12, 1973, 1.

2 "Background Material on the Organization of the Atomic Energy Commission," 1961, AEC/DOE Archives, RG 326, U.S. Atomic Energy Commission (AEC) Secretariat, Box 7997, Job 9, Folder 9, Organization of the Atomic Energy Commission, 8–9.

3 History Associates Incorporated, *Production Reactors: An Outline Overview, 1944–1988* (Washington, DC: U.S. Department of Energy (DOE), 1992); U.S. Department of Energy, Office of Environmental Management, *Linking Legacies: Connecting the Cold War Nuclear Weapons Production Processes to Their Environmental Consequences* (Washington, DC: DOE, 1997), 12 and 18–19; Terrence R. Fehner and F.G. Gosling, *Battlefield of the Cold War: The Nevada Test Site, Volume I: Atmospheric Nuclear Weapons Testing, 1951–1963* (Washington, DC: DOE, 2006), 203–219; Charles R. Loeber, *Building the Bombs: A History of the Nuclear Weapons Complex* (Albuquerque, New Mexico: Sandia National Laboratories, 2005), 80–89.

4 Siegel v. Atomic Energy Commission, 400 F.2d 778 (D.C. Circuit 1968); "Background Material on the Organization of the Atomic Energy Commission," 39.

5 Press accounts and scholars generally agree that the AEC's demise represented a failure of the AEC and its allies. Thomas O'Toole, "AEC Fades to Oblivion: Victim of Energy Crisis," *Washington Post*, January 20, 1975; AEC's Double Duties Coming to an End," *Newsday*, January 12, 1975; James R. Temples, "The Politics of Nuclear Power: A Subgovernment in Transition," *Political Science Quarterly* 95 no. 2 (Summer 1980), 239–260; Brian Balogh, *Chain Reaction: Expert Debate and Public Participation in American Commercial Nuclear Power, 1945–1975* (Cambridge, United Kingdom: Cambridge University Press, 1991), 16–17, 19, 282–83, 310; Frank M. Baumgartner and Bryan D. Jones, "Agenda Dynamics and Policy Subsystems," *The Journal of Politics* 53 no. 4 (November 1991), 1044–1074. 1063 and 1068; Robert J. Duffy, *Nuclear Politics in America: A History and Theory of Government* (Lawrence, Kansas: University Press of Kansas, 1997), 1–4; Martin V. Melosi, *Atomic Age America* (New York, New York: Routledge, 2012).

6 Temples, "Politics of Nuclear Power," 249; Duffy, 4, 112–13; and "Jan. 1 Goal Set for Creation of ERDA/NRC; No Word on Top Appointees," *Nucleonics Week*, October 17, 1974, 1.

7 B.C. Hacker, "Fallout from Plowshare: Peaceful Nuclear Explosions and the Environment, 1956–1973," LLNLCONF464374, *Organization of American Historians Annual Meeting*, Washington, DC, March 30, 1995, to April 2, 1995, 5.

8 Mazuzan and Walker, *Controlling the Atom*, 4; Glenn T. Seaborg, *The Atomic Energy Commission under Nixon: Adjusting to Troubled Times* (New York, New York: St. Martin's Press, 1993), 216–17.

9 "Background Material on the Organization of the Atomic Energy Commission," 57–58.

10 Mazuzan and Walker, *Controlling the Atom*, 60.

11 J. Samuel Walker, *Containing the Atom: Nuclear Regulation in a Changing Environment, 1963–1971* (Berkeley, California: University of California Press, 1992), 50–53; Mazuzan and Walker, *Controlling the Atom*, 122–182; AEC, *The Regulatory Program of the Atomic Energy Commission* (Washington, DC: AEC, November 1960), 25.

12 Walker, *Containing the Atom*, 51–53; "At AEC: Some Unfinished Business, *Nucleonic*s, 24, October 1966, editorial; John B. Anderson, "Nuclear Power—Progress and Prospects," remarks to the Essex County Bar Association, Downtown Club, Newark, New Jersey, December 4, 1967, NRC Agencywide Documents Access and Management System Accession No. ML20118D287.

13 AEC, *The Regulatory Program of the Atomic Energy Commission*, 421, 435, 450, and 462; and Robert Turtz to Mr. Shapar, "History Re Separation of the Regulatory Functions of the Atomic Energy Commission, AEC 948/8," March 5, 1968, ML20118D284.

14 Mazuzan and Walker, *Controlling the Atom*, 27–28, and 103; Elie Abel, "Three on AEC Thrust at 'One-Man Rule," *New York Times*, June 4, 1954; "The Strauss Affair," *Time,* June 15, 1959; and Leonard Bickwit, Jr. to the Commission, "Commission Procedures," July 12, 1979, in U.S. Senate, *Reorganization Plan No. 1 of 1980, to Strengthen Management of the Nuclear Regulatory Commission, Pursuant to 5 U.S.C. 903*, Hearings before the Committee on Governmental Affairs, 96th, 2nd Session, April 17, 18, and 29, 1980 (Washington, DC: U.S. Government Printing (now Publishing) Office (GPO), 1980), 108–117.

15 Bickwit to the Commission, "Commission Procedures," 108–117.

16 A.J. Goodpaster, "Memorandum of Conference with the President, August 15, 1960," August 19, 1960, Office of Staff Secretary File, Subject-Alphabetical Series, AEC Volume III (4), Dwight D. Eisenhower Presidential Papers; Goodpaster, "Memorandum of Conference with the President, September 12, 1960," September 13, 1960, Office of Staff Secretary File, Subject-Alphabetical Series, AEC Volume III (4), Dwight D. Eisenhower Presidential Papers; Peri E. Arnold, *Making the Managerial Presidency: Comprehensive Reorganization Planning, 19051980* (Princeton, New Jersey: Princeton University Press, 1986), 240–243; Mazuzan and Walker, *Controlling the Atom*, 389; Seaborg, *The Atomic Energy Commission under Nixon*, 216 and 227; Glenn T. Seaborg, *Journal of Glenn T. Seaborg: Chairman, U.S. Atomic Energy Commission, 1961-1971* (Berkeley, California: Lawrence Berkeley Laboratory, University of California, 1989), Open Access Publications from the University of California, https://escholarship.org/uc/item/944822cv, vol. 12, , January 5, 1966, 6-14; January 10, 1966 , 18-24; and January 11, 1966, 24-29; "Failure to Fill Commissioner Vacancy Strengthens 3-Member-AEC Proposal," *Nucleonics Week*, March 31, 1966, 2–3; "At AEC: Some Unfinished Business, *Nucleonics*, 24, October 1966, editorial.

17 Craig Hosmer, "The Science Establishment: Where Is It Headed?" March 5, 1968, Neutron Cross Sections and Technology Conference, Washington, DC, ML20118D287; and W.G. Dooly to Chris [?], May 26, 1970, ML24218A081. Alvin Weinberg, the head of Oak Ridge National Laboratory, had the same idea in pursuing nonnuclear environmental research. Balogh, *Chain Reaction*, 298–99.

18 Peter Westwick, *The National Labs: Science in an American System* (Cambridge, Massachusetts: Harvard University Press, 2003); Richard G. Hewlett and Jack M. Holl, *Atoms for Peace and War, 1953–1961* (Berkeley, California: University of California Press, 1989), 71–73, 183–270, 403–429; "1974 Annual Report to Congress of the Atomic Energy Commission," Commission Approval Version, AEC/DOE Archives, RG 326, AEC Secretariat, Box 8015, Job 9, Folder 2, Organization & Management, II13; Atomic Energy Commission, *1974 Annual Report to Congress of the Atomic Energy Commission* (Washington, DC: GPO, 1975), 27.

19 AEC, *1974 Annual Report to Congress of the Atomic Energy Commission*, 15–17.

20 AEC, *1974 Annual Report to Congress of the Atomic Energy Commission*, 17.

21 "1974 Annual Report to Congress," II-13.

22 Seaborg, *The Atomic Energy Commission Under Nixon*, x; Interview with Richard G. Hewlett, March 7, 1988, DOE Archives; AEC, *Atomic Energy and the Physical Sciences* (Washington, DC: GPO, 1950), 51–52; "AEC Information for Industry, AEC 184–37," March 29, 1954, AEC/DOE Archives, RG 326, AEC Secretariat, Box 7973, Job 9, Folder 2, Information and Publications 4-2, News Releases.

23 Glenn T. Seaborg, "The Proliferation of the Peaceful Atom," Remarks at the 24th Annual National Conference of the American Power Association, Denver, Colorado: May 11, 1967, 1–2; Necah Stewart Furman, *Sandia National Laboratories: The Power Decade* (Albuquerque, New Mexico: University of New Mexico Press, 1990), 670–78; Mary Beth Reed, Mark T. Swanson, Steven Gaither, J.W. Joseph, and William R. Henry, *Savannah River at Fifty* (Washington, DC: GPO, 2002), 428; AEC, *Major Activities in the Atomic Energy Programs* (Washington, DC: GPO, 1972), 149–50.

24 "1974 Annual Report to Congress," II-15; Joint Committee on Atomic Energy, *The Future Role of the Atomic Energy Commission Laboratories*, 86th Congress, 2nd Session, October 1960 (Washington, DC: GPO, 1960), 33. "Text-H.R.938892nd Congress (1971–1972): An Act to authorize appropriations to the Atomic Energy Commission in accordance with section 261 of the Atomic Energy Act of 1954, as amended, and for other purposes." August 11, 1971, https://www.congress.gov/bill/92nd-congress/house-bill/9388/text; Balogh, *Chain Reaction*, 298–300; AEC, *1974 Annual Report to Congress of the Atomic Energy Commission* (Washington, DC: GPO, 1975), 27.

25 Jack Holl, *Argonne National Laboratory, 1946–1996* (Urbana-Champaign, Illinois: University of Illinois 1997), 248–49.

26 United States Code, 2014 Edition, Title 42, The Public Health and Welfare, Chapter 23—Development and Control of Atomic Energy, GPO, Public Law 90–190, December 14, 1967, https://uscode.house.gov/statutes/pl/90/190.pdf, 577; Holl, *Argonne National Laboratory*, 545–56; "ORNL: The First 50 Years," *Oak Ridge National Laboratory Review*, 25 (1992), 140–42.

27 Robert W. Seidel, "A Home for Big Science: The Atomic Energy Commission's Laboratory System," *Historical Studies in the Physical and Biological Sciences* 16/1 (1986), 135–75; Glenn T. Seaborg and William R. Corliss, *Man and Atom: Building a New World Through Nuclear Technology* (New York, New York: E.P. Dutton and Co., 1971), 34–50 and 266–279; "1974 Annual Report to Congress of the Atomic Energy Commission," II13; AEC, *1974 Annual Report to Congress of the Atomic Energy Commission*, 27.

28 Seaborg, *The Atomic Energy Commission Under Nixon*, x; Interview with Richard G. Hewlett, March 7, 1988, DOE Archives.

29 Barton Hacker, *Elements of Controversy: The Atomic Energy Commission and Radiation Safety in Nuclear Weapons Testing, 1947–1974* (Berkeley, California: University of California Press, 1994), 6–7; J. Samuel Walker, "The Controversy over Radiation Safety: A Historical Overview," *JAMA* 292 (August 4, 1989), 664–668; Spencer R. Weart, *Nuclear Fear: A History of Images* (Cambridge, Massachusetts: Harvard University Press, 1988), 155–240; Richard T. Sylves, *The Nuclear Oracles: A Political History of the General Advisory Committee of the*

Atomic Energy Commission, 1947–1977 (Ames, Iowa: Iowa University Press, 1987), 171–88.

30 Scott Kaufman, *Project Plowshare: The Peaceful Use of Nuclear Explosives in Cold War America* (Ithaca, New York: Cornell University Press, 2013), 2–6; David A. Kirsch, "Project Plowshare: The Cold War Search for a Peaceful Nuclear Explosive." In *Science, Values, and the American West*, edited by Stephen Tchudi (Reno, Nevada: Nevada Humanities Committee, 1997), 191–222; Sylves, *The Nuclear Oracles*, 189–212. Project Plowshare took its name from the Bible's book of Isaiah 2:4: "They shall bear their swords into plowshares, and their spears into pruning hooks: nation shall not lift up their sword against nation, neither shall they learn war anymore."

31 Arnold Kramish, *The Peaceful Atom in Foreign Policy* (New York, New York: Harper & Row, 1963), 117–38; Glenn T. Seaborg with Eric Seaborg, *Adventures in the Atomic Age: From Watts to Washington* (New York, New York: Farrar, Straus and Giroux, 2001), 229.

32 Seaborg, *The Atomic Energy Commission under Nixon*, 18–20; Kaufman, *Project Plowshare*, 199–205; Samuel Glasstone, *Public Safety and Underground Nuclear Detonations* (Washington, DC: AEC, 1971), 213–227; and Crowther v. Seaborg, 415 F.2d 437 (10th Circuit 1969).

33 Seaborg, *The Atomic Energy Commission under Nixon*, 21–22; Kaufman, *Project Plowshare*, 204; Frank Kreith and Catherine B. Wrenn, *The Nuclear Impact: Case Study of the Plowshare Program to Produce Gas by Underground Nuclear Stimulation in the Rocky Mountains* (Boulder, Colorado: Westview, 1976).

34 Seaborg, *The Atomic Energy Commission under Nixon*, 25–26; Dan O'Neill, *The Firecracker Boys: H-Bombs, Inupiat Eskimos and the Roots of the Environmental Movement* (New York, New York: Basic Books, 2007).

35 J. Samuel Walker and Thomas R. Wellock, *A Short History of Nuclear Regulation, 1946-2009*, NUREG/BR-0175, Rev. 2 (Washington, DC: NRC, October 2010), 49–50; Douglas Brinkley, *Silent Spring Revolution: John F. Kennedy, Rachel Carson, Lyndon Johnson, Richard Nixon, and the Great Environmental Awakening* (New York, New York: Harper, 2022).

36 J. Samuel Walker, *Permissible Dose: A History of Radiation Protection in the Twentieth Century* (Berkeley, California: University of California Press, 2000), 32–35; Walker, *Containing the Atom*, 309–17; Seaborg, *The Atomic Energy Commission Under Nixon*, 101–104.

37 Philip M. Boffey, "Radioactive Pollution: Minnesota Finds AEC Standards Too Low," *Science* 163 (March 7, 1969), 1043–45; Walker, *Permissible Dose*, 32.

38 Seaborg, *The Atomic Energy Commission Under Nixon*, 140–41; Walker, *Permissible Dose*, 35.

39 Walker, *Containing the Atom*, 394–97; Seaborg, *The Atomic Energy Commission Under Nixon*, 116.

40 Walker, *Permissible Dose*, 36–44; Walker, *Containing the Atom*, 405–06; Seaborg, *The Atomic Energy Commission Under Nixon*, 123–37.

41 Walker, *Containing the Atom*, 406 and 119–32; Interview with David Okrent, July 6, 1992, DOE Archives.

42 "A Nuclear Graveyard," *Washington Post* (March 19, 1971) cited in Walker, *Containing the Atom*, 406–07; Gerard H. Clarfield and William M. Wiecek, *Nuclear America: Military and Civilian Nuclear Power in the United States, 1940–1980* (New York, New York: Harper and Row, 1984), 350–62; Ted Greenwood, "Nuclear Waste Management in the United States, in E. William Colglazier, ed. *The Politics of Nuclear Waste* (New York, New York: Pergamon Press, 1982), 6–7.

43 Walker, *Containing the Atom*, 407–08; Clarfield and Wiecek, *Nuclear America*, 359–60 and 368–70; Brinkley, *Silent Spring Revolution*, 656–720.

44 Stephen B. Shepherd, "The Atomic Establishment," *New York Times* (October 28, 1972).

45 Walker, *Containing the Atom*, 398–405; Seaborg, *The Atomic Energy Commission Under Nixon*, 117–21; Harry Foreman, *Nuclear Power and the Public* (New York, New York: Doubleday, 1972); "FY 1974 Summary of Citizens' Workshop Program," AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7973, Folder 7, Information & Publications 46 Articles; Glenn Seaborg, "Looking Ahead in Nuclear Power: Remarks at the 37th Annual Convention of the Edison Institute," June 9, 1969, AEC Press Release S-20-69; James T. Ramey, "Nuclear Power—Facts Instead of Fiction: Remarks at a Briefing for News Media at the Connecticut Yankee Nuclear Power Plant," June 2, 1969, AEC Press Release S-19-69; and Riley E. Dunlap, "Trends in Public Opinion Toward Environmental Issues: 1965–1990," *Society and Natural Resources* 4, no. 3 (1991), 285–312.

46 Nelson L. Dawson to Dixy Lee Ray, July 12, 1974; James A. Griffin, AEC Public Information Officer to Nelson L. Dawson, July 18, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7972, Folder 3, Communication & Records 2 Mail and Correspondence.

47 Steven Danner to President Gerald Ford, August 22, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7972, Folder 3, Communication & Records 2 Mail and Correspondence.

48 James D. Lyman, AEC Public Information Officer, to Steven Danner, August 30, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7972, Folder 3, Communication & Records 2 Mail and Correspondence.

49 Seaborg, *The Atomic Energy Commission Under Nixon*, 117; Atomic Energy Commission, *The Nuclear Industry—1969* (Washington DC: Government Printing Office, 1969), 19; "For Peace: Public Outcry Rises," *New York Times*, July 16, 1970.

50 C.A. Harnist to Dixy Lee Ray, August 30, 1974; Frank K. Pittman to C.A Harnist, September 24, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7972, Folder 3, Communication & Records 2 Mail and Correspondence.

51 Johanna Stadler to President Gerald Ford, August 15, 1974; James A. Griffin to Johanna Stadler, September 19, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7972, Folder 3, Communication & Records 2 Mail and Correspondence.

52 Walker, *Containing the Atom*, 411–13. On the differences in perceived risk by experts and the public, see Paul Slovic, *The Perception of Risk* (London, United Kingdom: Earthscan Publications, 2000).

53 Seaborg and Seaborg, *Adventures in the Atomic Age,* 242; Seaborg, *The Atomic Energy Commission Under Nixon*, 249–50.

54 Seaborg, *The Atomic Energy Commission Under Nixon*, 249.

55 Richard Hewlett, "Interview with Chairman Schlesinger," December 8, 1971, ML24218A106.

56 Arnold, *Making the Managerial Presidency*, 293-301; and Lester M. Salamon, "The Presidency and Domestic Policy Formulation," in *The Illusion of Presidential Government*, ed. Hugh Helco and Lester M. Salamon (Boulder, Colorado: Westview Press, 1981), 177–202.

57 Arnold, *Making the Managerial Presidency*, 293–301; and Salamon, "The Presidency and Domestic Policy Formulation," in *The Illusion of Presidential Government*, 177–202.

58 Arnold, *Making the Managerial Presidency*, 287–88; and Seaborg, *The Atomic Energy Commission under Nixon*, 220.

59 Arnold, *Making the Managerial Presidency*, 274; Seaborg, *Journal of Glenn T. Seaborg*, vol. 21, https://escholarship.org/uc/item/4qh560v4, April 8, 1970, 664-701; and Seaborg to Peter M. Flanigan, May 22, 1970, ML24218A111; Seaborg, "For a U.S. Energy Agency," *Science*, Vol. 175, no. 4040, June 16, 1972, 1189; and Seaborg, *The Atomic Energy Commission under Nixon,* 221–22, 227.

60 Thomas O'Toole, "Once-Immune AEC Drawing Heavy Fire," *Washington Post*, June 15, 1970, A1, A6.

61 Edward J. Bauser to Glenn T. Seaborg, March 10, 1970, Archives II, Files of Chairman Glenn Seaborg, Box 163, AEC 326; Tom Korologos through William E. Timmons to the President, Administratively confidential, "Energy/Scoop Jackson," December 19, 1973, Archives II, Nixon Presidential Materials, White House Special Files, Staff Member & Office Files, President's Office Files, Box 24, "President's Handwriting, December 16–31, 1973." On the Ash Council's disapproval of commissions in favor of single administrator agencies, see The President's Advisory Council on Executive Organization, *A New Regulatory Framework: Report on Selected Independent Regulatory Agencies* (Washington, DC: GPO, 1971).

62 Seaborg, *Journal of Glenn T. Seaborg,*, vol. 20, https://escholarship.org/uc/item/7ss0h7mv, December 23, 1969, 712-15, and vol. 22, https://escholarship.org/uc/item/5f60b2b2, June 17, 1970, 265-71.

63 "Congressman Chet Holifield Flatly Opposes the Ash Commission Recommendations," *Nucleonics Week*, 12, February 25, 1971, 6; Richard Wayne Dyke, *Mr. Atomic Energy: Congressman Chet Holifield and Atomic Energy Affairs, 1945–1974* (New York, New York: Greenwood Press, 1989) 232–33 and 295–96.

64 "Congressman Chet Holifield Flatly Opposes the Ash Commission Recommendations," *Nucleonics Week*, 12, February 25, 1971, 6; Dyke, *Mr. Atomic Energy*, 232–33 and 295–96.

65 "A Good Budget, But..." *Nuclear Industry* 17 (February 1970), 3–13; Seaborg, *The Atomic Energy Commission under Nixon*, 157–59; and Will Kriegsman to John Ehrlichman, "Chet Holifield and the Breeder Reactor/DNR Problem," April 16, 1971, Nixon Papers, White House Special File, White House Central File, [CF] FG 78, AEC.

66 Seaborg, *The Atomic Energy Commission under Nixon*, 162–63.

67 Seaborg, *The Atomic Energy Commission under Nixon,* 164–65; R.K. Price, Jr. "Notes for the President's File, Meeting of the Cabinet, Tuesday, April 13, 1971, White House Special File, President's Office Files, Box 84, Memoranda for the Pres. January 24, 1971–April 25, 1971.

68 Jay Hakes, *Energy Crises: Nixon, Ford, Carter, and Hard Choices in the 1970s* (Norman, Oklahoma: University of Oklahoma Press, 2021), 28; Seaborg, *The Atomic Energy Commission under Nixon,* 164–65; John C. Whitaker, Memorandum for the President's File, April 21, 1971, White House Special File, President's Office Files, Box 84, Memoranda for the Pres. January 24, 1971–April 25, 1971.

69 "Nixon's 1971 Proposals for Clean Energy," *Energy Crisis in America* (Washington, DC: Congressional Quarterly, 1973), 88–91.

70 John C. Whitaker, *Striking a Balance: Environment and Natural Resources Policy in the Nixon-Ford Years* (Washington, DC: American Enterprise Institute for Public Policy Research, Washington, DC, and the Hoover Institution on War, Revolution, and Peace, Stanford, California: Stanford University, 1976), 44–45.

71 Seaborg, *The Atomic Energy Commission under Nixon,* 164–65; Dyke, *Mr. Atomic Energy*, 296; Whitaker, Memorandum for the President's File, April 21, 1971,

White House Special File, President's Office Files, Box 84, Memoranda for the Pres. January 24, 1971–April 25, 1971; and Whitaker, *Striking a Balance*, 58–66.

72 Hakes, *Energy Crises*, 29; "Hostile Committee Chairmen, Lobbies Pledge Fight Against Reorganization Plan," *National Journal Reports*, October 16, 1971, 2072–2081.

73 Walker, *Containing the Atom*, 382; *see Calvert Cliffs Coordinating Committee, Inc. v. AEC*, 449 F.2d 1109 (D.C. Circuit, 1971) (finding that the AEC's rules implementing the National Environmental Policy Act were inadequate and requiring the AEC to consider the environmental impacts of licensing a nuclear power plant). Nuclear plant licensing was halted for approximately 18 months while the AEC addressed the decision.

74 "Schlesinger to Head Republican-Dominated and Politically-Minded AEC," *Nucleonics Week*, 12, no. 28, July 15, 1971, 1–2; "The Future of the AEC," *The Los Angeles Times*, July 23, 1971, editorial; "A Tough Manager Takes Over at AEC," *Business Week*, July 24, 1971, 20; "The AEC's Conflicting Double Assignments," *Niagara Falls Gazette*, August 3, 1971.

75 Walker, *Containing the Atom*, 15; Hewlett, "Interview with Chairman Schlesinger," December 8, 1971, ML24218A106; and James L. Cochrane, "Carter Energy Policy and the Ninety Fifth Congress," in *Energy Policy in Perspective: Today's Problems, Yesterday's Solutions*, eds. William J. Barber and others (Washington, DC: The Brookings Institution, 1981), 552; and James Naughton, "Schlesinger in Key Role Serving 3d President," *New York Times*, April 22, 1977, 29.

76 Richard G. Hewlett, "Interview with Commissioner William O. Doub," July 31, 1972, ML24218A114; and Interview with Julius H. Rubin, December 8, 1971, ML24218A115.

77 Hewlett, "Interview with Commissioner William O. Doub.".

78 "The AEC Reorganization of 1971," 1973, ML24218A122.

79 Energy Research and Development Administration, *Report of the Field and Laboratory Utilization Study Group* (Washington, DC: Energy Research and Development Administration (ERDA), 1975), 47.

80 Walker, *Containing the Atom*, 55; F.T. Hobbs, "Memorandum for the Record, Chairman's Meeting with Regulatory Staff, 8:15 A.M. Friday October 1, 1971, Bethesda Office," October 19, 1971, ML24218A125; W.B. McCool, "Secretary's Meeting Report," October 21, 1971, ML24218A129; "New Director of Regulation Heads AEC Personnel Changes," *Nuclear Industry* 18 (October–November 1971), 5–6.

81 "Atomic Energy: Schlesinger's Bomb," *Newsweek*, 78, November 1, 1971, 76–77; James R. Schlesinger, "Expectations and Responsibilities of the Nuclear Industry," Remarks at the All-Conference Banquet of the Atomic Industrial Forum–American Nuclear Society Annual Meeting, Bal Harbour, Florida, October 20, 1971; "Doub Makes Clear to Utilities New AEC Attitude Toward Public, *Nucleonics Week*, October 19, 1971, 1–2; "What Has Happened in the Year Since Schlesinger Laid It on the Line?" *Nucleonics Week*, October 26, 1972, 6–7.

82 "AEC Shifts to More Efficient (It Hopes) Reactor License Review," *Nucleonics Week*, February 3, 1972, 3.

83 John O. Pastore to James R. Schlesinger, June 6, 1972, John Pastore Papers, General Files—Atomic Energy (Pastore outgoing mail, interoffice memos, exchanges with other members of Congress).

84 Chet Holifield to Richard M. Nixon, November 28, 1972, NARA/DC, RG 128, JCAE, General Correspondence, Box 282, "Energy"; "Administration Readies Plan to Remake AEC into Energy Agency," *Nucleonics Week*, June 8, 1973, 1–2; "Transferring Part of JCAE's Function to Two House Committees," *Nucleonics Week*, March 14, 1974, 7; "JCAE Leaders Drafting Legislation for Joint Committee on Energy," *Nucleonics Week*, March 28, 1974, 1; Melvin Price to Richard Bolling, May 1, 1974, NARA/DC, RG 128, JCAE, General Correspondence, Box 197, "JCAE Outgoing Mail May 1974 & June 1974;" Richard Bolling to Melvin Price, May 8, 1974, NARA/DC, RG 128, JCAE, General Correspondence, Box 420, "H.R.9090 Holifield, S.2135 Jackson 1973"; Melvin Price to Julia Butler Hansen, May 20, 1974, NARA/DC, RG 128, JCAE, General Correspondence, Box 197, "JCAE Outgoing Mail May 1974 & June 1974."

85 Chet Holifield to Richard M. Nixon, November 28, 1972, NARA/DC, RG 128, JCAE, General Correspondence, Box 282, "Energy"; "Hosmer Urges Nixon to Study Creation of an Energy Agency," *Nucleonics Week* 9, 12, December 19, 1968, 51–52; Congress.gov. "Text—H.R.9388—92nd Congress (1971–1972): An Act to authorize appropriations to the Atomic Energy Commission in accordance with section 261 of the Atomic Energy Act of 1954, as amended, and for other purposes," August 11, 1971, https://www.congress.gov/bill/92nd-congress/house-bill/9388/text; "1974 Annual Report to Congress of the Atomic Energy Commission," II-15 and I3; U.S. Atomic Energy Commission, Mining—Coal and Oil Shale (Washington, DC: Bureau of Mines, AEC, 1972); AEC, Analysis of Hydrogen Energy Systems: Report to Subgroup on Synthetic Fuels, Office of Science and Technology (Brookhaven National Laboratory, 1973); AEC, *Preliminary Design and Performance Evaluation Study of a Solar Thermoelectric Flat Plate Generator* (San Diego, California: John Jay Hopkins Laboratory for Pure and Applied Science, 1961); AEC, *A Theoretical Study of Geothermal Energy Extraction* (Los Alamos, New Mexico: Los Alamos Scientific Laboratory of the University of California, 1972); AEC, *Graphite-hydrogen-methane Kinetics Above 1600K* (Los

Alamos, New Mexico: Los Alamos Scientific Laboratory of the University of California, 1963).

86 Congressional Awareness of Energy Crisis, 1969–72," *Energy Crisis in America* (Washington, DC: Congressional Quarterly, 1973), 81–82.

87 "AEC Seeks to Be Energy Agency, Wants to Push Coal Gasification Work," *Nucleonics Week*, November 2, 1972, 3; *Washington Post* article cited in Corbin Allardice and Edward R. Trapnell, *The Atomic Energy Commission* (New York, New York: Praeger, 1974), 131.

88 Dick Fairbanks to Ken Cole, March 23, 1973, attachment William A. Morrill, Memorandum for the Record, "Meeting with Senator Jackson on DENR," March 24, 1973, Archives II, Nixon Presidential Materials, Subject Files, "UT" [Utilities], Box 1, "[Ex] UT 3/1.733/31/73"; "Talking Points," Domestic Council Energy Subcommittee, November 9, 1972, Archives II, Nixon Presidential Materials, White House Central Files, Staff Member Office Files, Energy Policy Office, Box 44, "Energy Message—Background"; and "Future of AEC as Energy Agency in Balance at White House," *Nucleonics Week*, November 14, 1972, 2.

89 John Ehrlichman, "Cab Mtg." April 20, 1973, Archives II, Nixon Presidential Materials, White House Special Files, Staff Member and Office Files, John D. Ehrlichman, Box 7, "JDE-Notes-Meetings with President
January 4–May 2, 1973; Roy L. Ash Memorandum for the President, "Executive Branch Energy Organization," May 24, 1973, Archives II, Nixon Presidential Materials, White House Central Files, Subject Files, UT (Utilities), Box 2, "[Ex] UT 5/1/735/30/73"; and Richard P. Nathan, *The Administrative Presidency* (New York, New York: Macmillan Co., 1986), 56.

90 "Dixy Ray: Another Non-Nuclear Face Among the AEC Commissioners," *Nucleonics Week*, July 20, 1972, 4; and Hill Williams, "A.E.C. has changed vastly in past year," *Seattle Times*, July 16, 1972.

91 Richard M. Nixon to Dixy Lee Ray, April 18, 1973, AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration 761 Plan, Job 1208, Box 1558, Folder 1, Management By Objectives.

92 Dixy Lee Ray to Roy Ash, June 8, 1973, AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration 761 Plan, Job 1208, Box 1558, Folder 1, Management By Objectives.

93 "AEC Operational Reorganization Creates Independent Safety Division," *Nuclear Industry* 20 (May 1973), 3–6; Dixy Lee Ray to Melvin Price, May 14, 1973, ML24218A132; Press Release, "AEC Makes Organizational Changes," May 15, 1973, no. R209, ML24218A131; John W. Finney, "New AEC Chairman Moves Against Dominance of Congressional Joint Panel," *New York Times*, May 22, 1973, 17; Ramey's Term on AEC Expires After Intense Political Struggle," *Nucleonics Week*, July 5, 1973; and Thomas R. Wellock, "Engineering Uncertainty and Bureaucratic Crisis at the Atomic Energy Commission, 1964–1973," *Technology and Culture* 53, no. 4 (October 2012), 846–884.

94 Dick Fairbanks to Ken Cole, "Meeting with Dixie Lee Ray on DENR," April 12, 1973, Archives II, Nixon Presidential Materials, White House Central Files, Subject Files, FG78 (Atomic Energy Commission), Box 2, "Ex FG78 Atomic Energy Commission 1/1/1971[1/2/737/24/74]"; Dick Fairbanks to John Ehrlichman, "Energy Organization—DENR," April 12, 1973, Archives II, Nixon Presidential Materials, White House Central Files, Subject Files, SP (Speeches), Box 71, "Ex Sp 2362 Energy Message 4/18/73 [1 of 2]": Dixy Lee Ray to John D. Ehrlichman, "Proposal to Transfer AEC Functions," April 13, 1973, Archives II, Nixon Presidential Materials, White House Presidential Files, Subject Files, SP (Speeches), Box 71, "Ex Sp 2363 Energy Message 4/18/73 [1 of 2]"; "Energy: Policies and Problems," "Energy III: Government Reorganization," *National Journal Reports*, Vol. 5, no. 41, October 13, 1973, 1518, 1505–1550.

95 George A.W. Boehm, "Extraordinary First Lady of the AEC," *Readers Digest*, 105, July 1974, 81–85; "After 14 months, They're No Longer Laughing at Dixy Lee Ray," *Nucleonics Week*, April 4, 1974, 4–5; and Llewellyn King, "Dixy Lee Ray: New Boss at AEC," *Washington Post*, February 17, 1973.

96 Richard Nixon, "Special Message to the Congress on Energy Policy," April 18, 1974, online by Gerhard Peters and John T. Woolley, *The American Presidency Project*: https://www.presidency.ucsb.edu/node/255364.

97 "Executive Order 11712—Special Committee on Energy and National Energy Office," April 18, 1974, online by Peters and Woolley, *The American Presidency Project*: https://www.presidency.ucsb.edu/node/307061; Dixy Lee Ray, *The Nation's Energy Future: A Report to Richard M. Nixon, President of the United States* (Washington, DC: AEC, 1973); "Executive Order 11726—Energy Policy Office," online by Peters and Woolley, *The American Presidency Project*: https://www.presidency.ucsb.edu/node/30708.

98 White House, "Statement by the President," June 29, 1973, in Denise Diggin, *Legislative History on P.L. 93438, to Reorganize and Consolidate Certain Functions of the Federal Government in a New Energy, Research and Development Administration and in a New Nuclear Regulatory Commission in Order to Promote More Efficient Management of Such Functions* (Washington, DC: ERDA, 1974), Vol. 6, 3829–36, https://www.osti.gov/servlets/purl/5013580.

99 "Draft of Proposed Legislation to Promote More Effective Management of Certain Related Functions of the Executive Branch," House Document No. 93119, in Denise Diggin, *Legislative History on P.L. 93438* Vol. 1, 1–78, quote on 6, https://www.osti.gov/servlets/purl/5073393.

100 "Impact of the President's Proposed Energy Reorganization," AEC Announcement No. 141, June 29, 1973, in Diggin, *Legislative History on P.L. 93438*, Vol. 6, 3853–55, https://www.osti.gov/servlets/purl/5013580.

101 "AEC Slated for Split Up Under New Federal Energy Structure," *Nuclear Industry* 20 (June 1973), 3–4; "Outlook for ERDA, NEC: Congressional Approval Early Next Year," *Nucleonics Week*, August 9, 1973, 5–6; Q's and A's for Governor Love/Charles Dibona, [June 29, 1973], Archives II, Nixon Presidential Materials, Staff Member Office Files, Energy Policy Office, Box 45, "Energy June 29, 1973 Statement"; "Energy: Policies and Problems," "Energy III: Government Reorganization," *National Journal Reports*, Vol. 5, no. 41, October 13, 1973, 1519; and JCAE, *Nuclear Reactor Safety*, Hearings before the Joint Committee on Atomic Energy, Congress of the United States, 93rd Congress, 1st Session, On the Status of Nuclear Safety, January 28, September 25, 26, 27, and October 1, 1973, 391–92.

102 Energy Research and Development Administration Act, H.R.9090, 93rd Congress, 1973, in Diggin, *Legislative History on P.L. 93438*, Vol. 1, 86–129, quote on 87, https://www.osti.gov/servlets/purl/5073393; Energy Research and Development Administration Act, S.2135, 93rd Congress, 1973; in Diggin, *Legislative History on P.L. 93438*, Vol. 1, 130–171, quote on 131, https://www.osti.gov/servlets/purl/5073393.

103 "H.R.9090 Hearings, July and August 1973," in Diggin, *Legislative History on P.L. 93438*, Vol. 3, 1936, https://www.osti.gov/servlets/purl/5013600.

104 "Statement of Rogers C.B. Morton, Secretary of the Interior," July 25, 1973, "H.R.9090 Hearings, July and August 1973," in Diggin, *Legislative History on P.L. 93438*, Vol. 3, 1988–89, https://www.osti.gov/servlets/purl/5013600.

105 "Statement of J. Phil Campbell, Under Secretary of Agriculture, U.S. Department of Agriculture," July 25, 1973, "H.R.9090 Hearings, July and August 1973," in Diggin, *Legislative History on P.L. 93438*, Vol. 3, 2018–2019, https://www.osti.gov/servlets/purl/5013600.

106 "Statement of Dr. Robert M. White, Administrator, National Oceanic and Atmospheric Administration, U.S. Department of Commerce," July 26, 1973, "H.R.9090 Hearings, July and August 1973," in Diggin, *Legislative History on P.L. 93438*, Vol. 3, 2037, https://www.osti.gov/servlets/purl/5013600.

107 "Statement of Dixy Lee Ray, Chairman, U.S. Atomic Energy Commission," July 31, 1973, part of "H.R.9090 Hearings, July and August 1973," in Diggin, *Legislative History on P.L. 93438*, Vol. 3, 2669–2671, https://www.osti.gov/servlets/purl/5013600.

108 House, *Department of Energy and Natural Resources and Energy Research and Development Administration*, Hearings Before a Subcommittee of the Committee on Government Operations, House of Representatives, 93rd, 1st Session on H.R.9090, July 24, 25, 26, 31, and August 1, 1973. GPO 1973, 175–177; AEC, "Licensing and Regulation of ERDA Activities by NEC (SECYS745)," August 23, 1973, RG 326, AEC Secretariat, Job 8, Box 7943, Folder 9, O&M 12 Presidential Executive Reorganization Vol. 1; Bill McCormick to John A. Love, "Your Wednesday Meeting with Representatives from the National Coal Association," September 11, 1973, Archives II, Nixon Presidential Materials, White House Central Files, Subject Files, FG 999, Box 16, "Ex FG 99945 Energy and Natural Resources Department."

109 U.S. House, Department of Energy and Natural Resources and Energy Research and Development Administration, Hearings Before a Subcommittee of the Committee on Government Operations, House of Representatives, 93rd Congress, 1st Session, on H.R.9090, July 24, 25, 26, 31, and August 1, 1973. GPO 1973, 174–75, 204, 210–12.

110 Richard M. Nixon, "Remarks on the Nation's Energy Policy," September 8, 1973, 69–72, and "Meeting the Energy Challenge: Excerpt from Message to Congress," September 10, 1973, 73–76, as reprinted in *Executive Energy Documents* published by the Senate Committee on Energy and Natural Resources, July 1978, 13–47. (Hereafter cited as SCEN *Energy Documents*.)

111 "Jackson Still Supports ERDA Plan—But as a Part of Cabinet Department," *Nucleonics Week*, September 27, 1973, 3–4; Richard Corrigan, Claude E. Barfield, and James A. Noone, "Administration Congress Move Swiftly to Counter Shortages of Fuel Supplies," *National Journal Reports*, November 17, 1973, 1722–1730; "ERDA as Part of Cabinet Depart.: 'Over My Dead Body,' Dr. Ray Says," *Nucleonics Week*, October 11, 1973, 2–3; "Energy: Policies and Problems, Energy III: Government Reorganization," *National Journal Reports*, Vol. 5, no. 41, October 13, 1973, 1519; "Administration Readies Plan to Remake AEC into Energy Agency," *Nucleonics Week*, June 8, 1973, 1–2; and Donald C. Kull to Chairman Glenn T. Seaborg, "Proposed Executive Reorganization," April 22, 1970, 4–5, DOE Archives.

112 Jack M. Holl, "The United States Department of Energy: A History," *Institutional Origins of the Department of Energy*, Energy History Series, Vol. 1, No. 4, 1981, 2; Alice Buck, "A History of the Energy Research and Development Administration," DOE, 1982, 1–2; Roger Anders, "The Federal Energy Administration," DOE; James W. McKie, "The United States," in Raymond Vernon, ed., *The Oil Crisis* (New York, New York: W.W. Norton, 1976), 83–84; John Blair, *The Control of Oil* (New York, New York: Vintage Books, 1978), 261; Richard M. Nixon,

"Address on the Energy Emergency," SCEN Energy Documents, 81–93; Richard M. Nixon, "Message to Congress," November 8, 1973, SCEN *Energy Documents*, 95–98; Federal Energy Administration (FEA), *Project Independence: A Summary* (Washington, DC: GPO, 1974), 18.

113 "Energy: Policies and Problems, Energy III: Government Reorganization," *National Journal Reports*, Vol. 5, no. 41, October 13, 1973, 1519; "Administration Readies Plan to Remake AEC into Energy Agency," *Nucleonics Week*, June 8, 1973, 1–2; and "The Energy Emergency: The President's Address to the Nation Outlining Steps to Deal with the Emergency," November 7, 1973, *Presidential Documents, Richard Nixon 1973*, Vol. 9, no. 45. 1312–18.

114 Roy L. Ash to the President, January 10, 1974, Archives II, Nixon Presidential Materials, White House Central Files, Staff Member & Office Files, Roy Ash, Box 7, "Ash Memos to President, Jan 1974 to August 9, 1974"; Roy L. Ash to Al Haig, "The Energy Problems and Energy Organization," January 16, 1974, Archives II, Nixon Presidential Materials, White House Central Files, Staff Member & Office Files, Roy Ash, Box 4, "Roy Ash Chrono., Dec. 1972–Aug 9, 1974, H [folder 2 of 2]"; Ken Cole to the President, "Energy Legislation," Archives II, Nixon Presidential Mat'ls White House Central Files, Subject Files, "UT" Box 5 "[ex] UT 1/16/74–1/20/1974"; Claude E. Barfield, "Energy Report/Fuel Crisis Management Produces Reorganization Debate," *National Journal Reports*, February 16, 1974, 230, 229–237.

115 FEA, *Project Independence: A Summary*; Federal Energy Administration, *Project Independence: An Historical Perspective* (Washington, DC: GPO, 1974).

116 Holl, "The United States Department of Energy: A History," 2; Buck, "A History of the Energy Research and Development Administration," 1; McKie, "The United States," in Raymond Veron, ed., *The Oil Crisis*, 83–84; John Malcolm Blair, *The Control of Oil* (New York, New York: Vintage Books, 1978), 261; Richard M. Nixon, "Address on the Energy Emergency," November 7, 1973, SCEN *Energy Documents*, 81–93; Richard M. Nixon, "Message to Congress," November 8, 1973, SCEN *Energy Documents*, 95–98.

117 Richard M. Nixon, "Address on the Energy Emergency," November 7, 1973, SCEN *Energy Documents*, 81–93; Richard M. Nixon, "Message to Congress," November 8, 1973, SCEN *Energy Documents*, 95–98.

118 Richard M. Nixon, "Address to the Nation About National Energy Policy." Online by Peters and Woolley, The American Presidency Project, https://www.presidency.ucsb.edu/node/255623.

119 Ray, *The Nation's Energy Future*, 1–13; "Report No. 93707, Energy Reorganization Act of 1973," Committee on Government Operations, in Diggin, *Legislative History on P.L. 93438*, Vol. 1, 414–415, https://www.osti.gov/servlets/purl/5073393; U.S. Atomic Energy Commission, "Summary Chapter, Physical Research," September 24, 1973, 2–3, DOE Archives.

120 Anders, "The Federal Energy Administration," 1–2; on the interaction of the AEC with the Federal Energy Office and the task force established by Ray to examine the feasibility of eight energy demonstration concepts, including oil shale, methanol from coal, synthetic fuels, a nuclear power center, solar for heating and cooling buildings, new coal extraction methods, and rapid deep drilling methods, see Dixy Lee Ray to William Simon, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 8014, Folder 3, Energy Demonstration Projects.

121 Lee V. Gossick to O'Leary and others, December 11, 1973, ML24218A204; "Testimony of Theodore B. Taylor, Chairman of the Board, International Research & Technology Corp.; Ralph E. Lapp; Edward Radford, M.D., Professor of Environmental Medicine, Johns Hopkins University School of Hygiene and Public Health; and Samuel Love, on Behalf of the Environmental Action Foundation," in Diggin, *Legislative History on P.L. 93438*, Vol. 5, 3611, https://www.osti.gov/servlets/purl/5009246; John A. Erlewine, "Note to Dr. Ray," February 22, 1974, DOE/AEC Archives, RG 326, AEC Secretariat, Job 8, Box 7943, Folder 12, O&M12 President Executive Reorganization Vol. 4.

122 "Memorandum for the Record," February 20, 1974, ML24218A205; Abe Ribicoff to Roy L. Ash, February 26, 1974, RG 326, AEC Secretariat, Job 8, Box 7943, Folder 12, O&M12 President Executive Reorganization Vol. 4; Claude E. Barfield, "Energy Report/ Compromise Is Expected on Reorganization Plans," *National Journal Reports*, March 23, 1974, 442–444.

123 "Statement of Dr. Dixy Lee Ray, Chairman, AEC," in Diggin, *Legislative History on P.L. 93438*, Vol. 5, 3610–3611, https://www.osti.gov/servlets/purl/5009246.

124 "Statement of Dr. Dixy Lee Ray, Chairman, AEC," in Diggin, *Legislative History on P.L. 93438*, Vol. 5, 3570–3571, https://www.osti.gov/servlets/purl/5009246.

125 "Statement of N.C. Rasmussen, Director, Reactor Safety Study," in Diggin, *Legislative History on P.L. 93438*, Vol. 5, 3620–3623; Reynold Bartel, *WASH1400—The Reactor Safety Study: The Introduction of Risk Assessment to the Regulation of Nuclear Reactors*, NUREG/KM-0010 (Washington, DC: NRC, 2016). The NRC would publish the Rasmussen study, in 1975, as the "Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," commonly known as WASH1400.

126 "Statement of Dr. Dixy Lee Ray, Chairman, AEC," in Diggin, *Legislative History on P.L. 93438*, Vol. 5, 3612–3614, https://www.osti.gov/servlets/purl/5009246.

127 Claude E. Barfield, "Energy Report/Fuel Crisis Management Produces Reorganization Debate," *National Journal Reports*, February 16, 1974, 229–237; "AEC Still Supports Independent ERDA, Despite Jackson Doubts," *Nuclear Industry* 21 (March 1974), 20–21; Claude E. Barfield, "Energy Report/Compromise Is Expected on Reorganization Plans," *National Journal Reports*, March 23, 1974, 440, 439–444; "Congressional Jockeying Indicates an Independent ERDA and Nuclear Regulatory Agency are Coming," *Nuclear Industry* 21 (April 1974), 10–11; and Chet Holifield to Abraham Ribicoff, April 15, 1974, NARA/DC, RG 128, JCAE, General Correspondence, Box 178, Holifield, Chet, Vol. 11, April 1974.

128 John C. Ryan and L.V. Gossick, "Licensing and Regulation of ERDA Activities by NEC," SECYS745, August 20, 1973, AEC/NRC 431-86-0155, Box 2; "Testimony of Steven Ebbin, George Washington University Program of Policy Studies in Science and Technology; George Freeman, Attorney for Utilities and Nuclear Industry, Richmond, Virginia; Anthony Roisman, Attorney for Citizen Intervenor Groups, Washington, DC; and Harold Green, Professor, George Washington University," in Diggin, *Legislative History on P.L. 93438*, 3457–62, https://www.osti.gov/servlets/purl/5009246; "Simpson Testifies for Forum on New House Bill for ERDA, NEC," *Nuclear Industry* 20 (November 1973), 56–57; and "Some Form of AEC Reorganization Bill Will Emerge from the Senate," *Nucleonics Week*, March 14, 1974, 4.

129 "Senate Subcommittee Revisions of S.2744 (ERDA/NEC Bill) SECYS7463," April 16, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 8, Box 7944, Folder 1, O&M-12, President Executive Reorganization, Vol. 5; and Paul C. Bender to the Commissioners, "Meeting of ERDA/NEC Implementation Steering Group, SECY-S-74-69," April 25, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 8, Box 7944, Folder 1, O&M-12 President Executive Reorganization Vol. 5.

130 Diggin, *Legislative History on P.L. 93438*, 4169–71, https://www.osti.gov/servlets/purl/5013580.

131 "Bill Would Give Aid to Nuclear Critics," *Public Utilities Fortnightly*, May 9, 1974, 46; Roy L. Ash to Charles H. Percy, June 18, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 8, Box 7944, Folder 2, O&M-12 President Executive Reorganization Vol. 6; and "Senate Committee Approves Major Changes in New Licensing Commission," *Nucleonics Week*, June 6, 1974, 5–6.

132 Glenn Schleede to Frank Zarb, "Draft Paper for the ERDA/NEC Implementation Steering Group," April 23, 1974, Archives II Nixon Papers, WHCF; SMOF, Glenn Schleede, Subj. Files, Box 21, ERDA/NEC Steering Group."

133 "Senate ERDA Bill Said to Be in Trouble; Some Aver It Will Never Pass," *Nucleonics Week*, July 25, 1974, 1–2; and "Senate Finally Passes ERDA Bill, Allows Public Funds for Intervenors," *Nucleonics Week*, August 22, 1974, 4–5.

134 ERDA Outlook: Holifield Stews Over Senate's 'Anti-Nuclear' Bill," *Nucleonics Week*, September 5, 1974, 6–7; and "Despite a Nudge from President Ford, There's Still No Movement on ERDA," *Nucleonics Week*, September 19, 1974, 4–5; and "Holifield Bows Out with AEC, Pleading for Positive National Energy Leadership, No Retreat on Breeder," *Nuclear Industry* 21 (November 1974), 3–5.

135 E.G. English to Chairman Ray, Commissioner Kriegsman, Commissioner Anders, "SECY-75-254," October 3, 1974, DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7987, Folder 5, O&M12, President Executive Reorganization.

136 "ERDA, Regulatory Commission Created by Energy Reorganization Bill," *Nuclear Industry* 21 (October 1974), 3–5; and "Report of Proceedings, Hearing Held Before Government Operations Committee and House of Representatives Government Operations Committee," October 2, 1974, in Diggins, *Legislative History on P.L. 93438*, 1884–85, 1885–1895, https://www.osti.gov/servlets/purl/5013600.

137 "Joint Explanatory Statement of the Committee of Conference," in Diggins, *Legislative History on P.L. 93438*, 1413–38, https://www.osti.gov/servlets/purl/5009261; Diggins, *Legislative History on P.L. 93438*, 1853, https://www.osti.gov/servlets/purl/5009261; Diggins, *Legislative History on P.L. 93438*, 4258, https://www.osti.gov/servlets/purl/5013580; "ERDA/NRC Bill Reported to Congress as Senators Surrender to Holifield," *Nucleonics Week*, October 10, 1974, 1–2; and "ERDA, Regulatory Commission Created by Energy Reorganization Bill," *Nuclear Industry* 21 (October 1974), 3–5. Although the NRC later considered providing resources and services to intervenor groups, Congress prohibited the practice. U.S. Senate, Agency Comments on the Payment of Reasonable Fees for Public Participation in Agency Proceedings, Committee on Commerce (Washington, DC: GPO, 1977), 73–75; John F. Ahearne to John Myers, February 4, 1980, ML19296C949; Energy and Water Development Appropriation Act, 1981, Pub. L. No. 96367, 94 Stat. 1331; and Pub. L. No. 102–377, Title V, 502, 106 Stat. 1315, 1342 (1992).

138 Llewllyn King, "The AEC is Dead; Long Live the AEC," *New Scientist*, October 10, 1974, 328–329.

139 Between the House's favored name, the Nuclear Energy Commission, and the Senate's Nuclear Safety and Licensing Commission, AEC General Counsel, Marcus Rowden suggested the compromise name. E.G. English to John Erlewine, L. Manning Muntzing, and Marcus A. Rowden, "Status of Negotiations on

S.2744—Reorganization Bill," May 8, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 8, Box 7944, Folder 2, O&M12, President Executive Reorganization Vol. 6.

140 "ERDA/NRC Bill Reported to Congress as Senators Surrender to Holifield," *Nucleonics Week*, October 10, 1974, 1–2; and "ERDA, Regulatory Commission Created by Energy Reorganization Bill," *Nuclear Industry* 21 (October 1974), 3–5.

141 "Twenty-Eight Good Years," *Rapport: You and & A.E.C*, 4, no. 2, December 1974, 5.

142 "Industry's View of NRC: Some Skepticism but Mostly Buoyant Optimism," *Nucleonics Week*, October 17, 1974, 4–5.

143 "Industry's View of NRC: Some Skepticism but Mostly Buoyant Optimism," *Nucleonics Week*, October 17, 1974, 4–5.

144 Paul Turner to Public Affairs Liaisons, November 18, 1974, UCS Papers, Box 57, "Critical Mass '74"; and Carl [Walske] to the Board of Directors, Atomic Industrial Forum, December 18, 1974, UCS, MC 434, Box 32.

145 Carl [Walske] to the Board of Directors, December 18, 1974, UCS, MC 434, Box 32.

146 Melvin Price to Richard Bolling, May 1, 1974, NARA/DC, RG 128, JCAE, General Correspondence, Box 197, "JCAE Outgoing Mail May 1974 & June 1974"; John Reich to Chet Holifield, March 25, 1974, NARA/DC RG 128, JCAE, General Correspondence, Box 197, "JCAE Outgoing Mail, March 1974"; Richard Bolling to Melvin Price, May 8, 1974, NARA/DC, RG 128, JCAE, General Correspondence, Box 420, "H.R.9090 Holifield, S.2135 Jackson 1973"; "JCAE Leaders Drafting Legislation for Joint Committee on Energy," *Nucleonics Week*, March 28, 1974, 1; and "Critical Mass on Capitol Hill," *Bulletin of the Atomic Scientists*, 30, no. 4, April 1974, 8–9.

147 Mary Russell, "House to Debate Panel Reform," *Washington Post*, July 18, 1974, A19; "House Votes to Preserve JCAE Jurisdiction—Partially and Temporarily," *Nucleonics Week*, October 10, 1974, 3–4; "JCAE Piqued by Move to Erode Its Authority," *Nuclear Industry* 23 (September 1976), 11; "Committee to Study Committees: Other Panels May Get Senate JCAE Jurisdiction," *Nuclear Industry* 23 (September 1976), 31; and SES/HM to MKU, September 29, 1976, Udall Papers, Box 346, Interior Committee, Environment and Energy Subcommittee, Henry Myers Corres., June–December, 1976.

148 Mary Russell, "House to Debate Panel Reform," *Washington Post*, July 18, 1974, A19; J. Dicken Kirschten, "Is Doomsday at Hand for the Joint Atomic Energy Committee?" *National Journal,* November 20, 1976, 1658–1665; "JCAE Piqued by Move to Erode Its Authority," *Nuclear Industry* 23 (September 1976), 11; "Committee to Study Committees: Other Panels May Get Senate JCAE Jurisdiction," *Nuclear Industry* 23 (September 1976), 31; SES/HM to MKU, September 29, 1976, Udall Papers, Box 346, Interior Committee, Environment and Energy Subcommittee, Henry Myers Corres., June–December 1976; and "JCAE: Full House Vote Makes Demise Official," *Nuclear News* 20 (February 1977), 35–36. The NRC's current oversight committees are the Senate Committee on Environment and Public Works and the House Committee on Energy and Commerce. House, *Historical Information of the Committee on Resources and Its Predecessor Committees 1807–2002 Preparation for a Bicentennial,* 107th Congress, 2nd Session (Washington, DC: GPO, 2002), 16–18.

149 "Holifield Bows Out with AEC, Pleading for Positive National Energy Leadership, No Retreat on Breeder," *Nuclear Industry* 21 (November 1974), 3–5.

150 Buck, "A History of the Energy Research and Development Administration," (DOE, History Division, 1982), 12; "Dr. Seaman Sworn in as Administrator of ERDA," AEC Announcement No. 262, December 30, 1974, and "Activation of the Energy Research and Development Administration," ERDA 1, January 20, 1975, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7971, Folder 20, Headquarters Announcements.

151 Ed English to Chairman Ray, "General Considerations, Initial Establishment, and Longer-Range Considerations for the Organization and Management of ERDA," October 15, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7981, Folder 1, O&M—ERDA, 1–21.

152 Robert W. Fri to Richard W. Roberts, Breeder Reactors—Issue Paper, December 9, 1976, AEC/DOE Archives, RG 434, DOE, Organizational Materials, Job 1937, Box 1, Folder 7, 1976, ERDA Historical Documentation Book 2A.

153 Buck, "A History of the Energy Research and Development Administration," 12–13; Seaborg, *The Atomic Energy Commission Under Nixon*, 182; "Liquid Metal Fast Breeder Reactor Program Final Environmental Impact Statement, Chapters 1–3," 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 8017, Folder 5, LMFBR Program Final EIS; Bruce Agnew, "Dim-out for the fast breeder," *Business Week*, August 17, 1974.

154 James G. Phillips, "Energy Report/Breeder Reactor Continues to Receive Administration Priority," *National Journal Reports* (March 1975), 305–313; General Accounting Office, *Cost and Schedule Estimates for the Nation's First Liquid Metal Fast Breeder Reactor Demonstration Power Plant, RED75358* (Washington, DC: Government Accounting Office (GAO), 1975); Seaborg, *The Atomic Energy Commission under Nixon*, 185.

155 Richard G. Hewlett, *Federal Policy for the Disposal of Highly Radioactive Wastes From Commercial Nuclear Power Plants: An Historical Analysis*, DOE/MA-0153 Draft (DOE, History Division, 1978), 5; ERDA, *Nuclear Fuel Cycle: A Report by the Fuel Cycle Task Force,* ERDA-33 (March 1975), iv, 23–24, 45–46.

156 F.G. Gosling and Terrence R. Fehner, *Closing the Circle: The Department of Energy and Environmental Management 1942–1994* (DOE, History Division, 1994), 29.

157 Gosling and Fehner, *Closing the Circle*, 21–22; Hewlett, *Disposal of Highly Radioactive Wastes*, 33–38; on the variety of waste management alternatives still being considered at this time, including seabed disposal, geologic disposal, ice sheet disposal, extraterrestrial disposal, and transmutation, see K.J. Schneider and A.M. Platt, eds, *High-Level Radioactive Waste Management Alternatives* BNWL–1900, Vol. 1 (Richland, Washington: Pacific Northwest Laboratory, 1974); on the popular perception of the waste management problem, see Dennis Farney, "The Awesome Problem of Nuclear Wastes," *Reader's Digest* (August 1974), 83–87; Statement of Monte Canfield, Jr., Director, Energy and Minerals Division Before the Subcommittee on Environment, Energy and Natural Resources House Committee on Government Operations on "Nuclear Energy's Dilemma: Disposing of Hazardous Radioactive Waste Safely," September 12, 1977, GAO, https://www.gao.gov/assets/103414.pdf.

158 Buck, *The History of the Energy Research and Development Administration*, 4; "Reports Required of ERDA by 1974 Energy R&D Legislation," AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration Kizm Files, Job 1234, Box 1, Folder 4, General—Office of Congressional Relations; Section 6(a), Federal Nonnuclear Energy Research and Development Act of 1974, PL 93577, December 31, 1974; Ray, *The Nation's Energy Future*, 1–2.

159 Office of Technology Assessment (OTA), *An Analysis of the ERDA Plan and Program* (Washington, DC: GPO, 1975), 1–6.

160 OTA, *An Analysis of the ERDA Plan and Program*, 4–6; John Heritage, "Energy Report/Congressional Review group calls ERDA 'hardware-oriented,'" *National Journal*, November 1, 1975, 1518; To Members of Senior Staff Planning Group from Roger W.A. LeGassie, Assistant Administrator, re: OTA Testimony on ERDA-48, September 22, 1975, AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration Kizm Files, Job 1234, Box 1, Folder 6, General—ERDA National Plan; Comments on ERDA Creating Choices Report, AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration 76b Research and Development Plan, Job 1206, Box 1555, Folder 1, ERDA-48.

161 OTA, *Comparative Analysis of the 1976 ERDA Plan and Program* (Washington, DC: GPO, 1976), 1–14; Subcommittee on Energy Research and Water Resources of the Committee on Interior and Insular Affairs, *A Review of the Energy Research and Development Administration's Plan* (Washington, DC: GPO, 1976), 1–7; ERDA 76/1 (PM5), *Fifth Public Meeting on A National Plan for Energy, Research, Development, and Demonstration: Synopsis of Proceedings*, September 20–22, 1976.

162 "Anders: A New Regulator Enters a Critical Situation," *Science*, 187, March 28, 1975, 1173–75; and "NRC Commissioners Unhappy That Their Words Are Being Misread," *Nucleonics Week*, June 19, 1975, 3–5.

163 "Ex-Commissioner Doub: AEC Can't Regulate Every Aspect of Nuclear Power," *Nucleonics Week*, October 3, 1974, 5–6; "Dixy Lee Ray Reviews Two-Year Record in Farewell Speech," *Nuclear Industry* 21 (November 1974), 5–6; and "Senate Acts Swiftly: NRC Leaders Confirmed," *Nuclear Industry* 21 (December 1974), 3–4.

164 L. Manning Muntzing to the Commissioners, "Remarks by the Director of Regulation, SECY-R-75-207," January 15, 1975, ML24219A028, 431-86-0155, Box 6; "'Show Warts and All,' Muntzing Warns in Swan Song, 'Assume an Incident,'" *Nuclear Industry* 21 (December 1974), 4.

165 "Anders: A New Regulatory Enters a Critical Situation," *Science*, 187, March 28, 1975, 1173–75; and James G. Philips, "Anders Rejects Charges of NRC Bias Against Industry," *National Journal Reports*, June 28, 1975, 968–972.

166 Walker, *Three Mile Island*, 65–68.

167 Walker, *Three Mile Island*, 65–68.

168 NRC, *U.S. Nuclear Regulatory Commission Annual Report 1977*, NUREG0400 (Washington, DC: NRC, 1978), 186–87; NRC Press Release, "NRC Investigates Employee's Allegations," January 20, 1976, ML19240A676; and "Meanwhile at the NRC...Pollard Resigns Over Safety Concerns," *Nuclear News* 19 (March 1976), 46–47; and Thomas R. Wellock, *Critical Masses: Opposition to Nuclear Power in California, 1958–1978* (Madison, Wisconsin: University of Wisconsin Press, 1998), 165–167.

169 "Moments in NRC History: Establishing an Independent Regulator, 1975–1979," January 16, 2015, NRC https://www.youtube.com/watch?v=qZK23MKo4Bk.

170 J. Samuel Walker, "Nuclear Power and Nonproliferation: The Controversy Over Nuclear Exports, 1974–1980," *Diplomatic History* 25, no. 2 (Spring 2001), 215–249.

171 Walker, "Nuclear Power and Nonproliferation," 240; and "Nuclear Non-Proliferation Act of 1978," 22 USC 3201, March 10, 1978.

172 Walker, "Nuclear Power and Nonproliferation," 246.

173 Executive Order: Activation of the Energy Resources Council, October 1974; Testimony of E.D. Kenna, President, National Association of Manufacturers, Before the Energy Resources Council International Conference Room, U.S. Department of State, December 9, 1974; Richard Hanna to President Ford, December 4, 1974, AEC/DOE Archives, RG 326, AEC Secretariat, Job 9, Box 7985, Folder 26, Organization and Management, Energy Resources Council; Anders, "The Federal Energy Administration," 1–2; Neil De Marchi, "The Ford Administration: Energy as a Political Good," in Craufurd D. W. Goodwin, ed., *Energy Policy in Perspective* (Washington, DC: Brookings Institute, 1981), 475–545.

174 Buck, *The History of the Energy Research and Development Administration*, 11; Roger M. Anders, *The Office of Military Applications*, Institutional Origins of the Department of Energy History Series, Vol. 1. No. 1 (Washington, DC: DOE, 1980), 1–4; Section 307(b), Energy Reorganization Act of 1974, as reprinted in Compilation of Energy-Related Legislation, published by the House Committee on Interstate and Foreign Commerce.

175 Buck, *The History of the Energy Research and Development Administration*, 11; ERDA97, *Funding and Management Alternatives for ERDA Military Applications and Restricted Data Functions* (Washington, DC: ERDA, 1976), 1–2, 51–79. On the continued debate over separation of funding, see Bella S. Abzug to John O. Pastore, March 21, 1976; John O. Pastore to Bella S. Abzug, May 6, 1976; "New ERDA Study Supports Concept of Separating Nuclear Weapons and Energy Programs," *Congressional Record*, May 17, 1976; President Gerald Ford to the Congress of the United States, May 12, 1976, AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration Kizm Files, Job 1234, Box 2, Folder 5, Division of Military Application.

176 Buck, *The History of the Energy Research and Development Administration*, 11–12; Report of the Field and Laboratory Utilization Study Group, December 1975, AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration Public Affairs Office, Job 1244, Box 12, Folder 2, Field & Laboratory Utilization Study; Memo, Administrator to Assistant Administrators, "Management Goals," January 23, 1976, AEC/DOE Archives, RG 430 ERDA, Energy Research and Development Administration—Garber Field and Lab, Job 1239, Box 2, Folder 12, Management Goals.

177 Buck, *The History of the Energy Research and Development Administration*, 11–12; Paul H. O'Neill, Office of Management and Budget, to Dr. Robert C. Seamans, Jr., October 7, 1976, AEC/DOE Archives, RG 430 ERDA, Energy Research and Development Administration Programs, Job 1226, Box 1951, Folder 20, Office of Management & Budget; Staff Work Plan, Office of the Assistant Administrator for Field Operations, April 21, 1977, AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration—Assist. Admin. Field Ops, Job 1237, Box 10, Folder 18, Staff Work Plan—General.

178 "Jimmy Carter on Energy Reorganization," Released September 21, 1976, AEC/DOE Archives, RG 434, DOE, Organizational Materials, Job 1937, Box 1, Folder 7, 1976 ERDA Historical Documentation Book 1.

179 "Jimmy Carter on Energy Reorganization," 1–4; Jimmy Carter, "Remarks on Nuclear Policy," September 25, 1976, AEC/DOE Archives, RG 434, DOE, Organizational Materials, Job 1937, Box 1, Folder 7, 1976 ERDA Historical Documentation Book 1.

180 Robert W. Fri, John W. King, Philip White, Donald Beattie, and Merwyn C. Greer, "News Briefing on National Energy Plan Impact and Implications for Energy Research and Development Administration," April 21, 1977, AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration Kizm Files, Job 1234, Box 2, Folder 20, News Briefing.

181 Terrence R. Fehner and Jack M. Holl, *Department of Energy 1977–1994 A Summary History* (Washington, DC: DOE, 1994), 21; Jimmy Carter, "Remarks on Signing the Emergency Natural Gas Act of 1977," in SCEN *Energy Documents,* 351–64; Cockrane, "Carter Energy Policy and the Ninety-fifth Congress," in Goodwin, ed., *Energy Policy in Perspective,* 547–600.

182 Fehner and Holl, *Department of Energy 1977–1994,* 21; Jimmy Carter, "Remarks on Proposed Department of Energy Legislation," March 1, 1977; "Address to the Nation on the Energy Problem," April 18, 1977; "Address Before a Joint Session of Congress on the National Energy Program," April 20, 1977, all in SCEN *Energy Documents*, 371–77 and 393–417; "The Energy Crisis Is Just Beginning: Interview with James Schlesinger, White House Energy Adviser," *U.S. News & World Report* (February 14, 1977), 24–25; Executive Office of the President, Energy Policy and Planning, *The National Energy Plan* (Washington, DC: GPO, 1977); OTA, *Analysis of the Proposed National Energy Plan* (Washington, DC: GPO, 1977).

183 Fehner and Holl, *The Department of Energy 1977–1994*, 21–23; DOE, *Organization & Functions—FactBook* (September 1977).

184 ERDA Management Problems, 1976, AEC/DOE Archives, RG 434, DOE, Organizational Materials, Job 1937, Box 1, Folder 7, 1976 ERDA Historical Documentation Book 1; "Common Cause Study Reveals Industry Ties to Top Officials at ERDA and NRC," June 4, 1976, AEC/DOE Archives, RG 430, ERDA, Energy Research and Development Administration Kizm Files, Job 1234, Box 1, Folder 4, General, Office of Congressional Relations.

185 The NRC's first organization chart in 1975 underscored the weakness of the Chairmanship under the ERA. There was no Chairman box listed at the top of the chart, only the "Commission." "Report of Proceedings before Joint Conference Committee of House and Senate Operations Committees on H.R.11510," October 3, 1974; House Report 931445, 83rd Congress, 2nd Session,

October 8, 1974, 36; "Joint Explanatory Statement of the Committee of Conference," in Diggins, *Legislative History on P.L. 93438*, 1420, https://www.osti.gov/servlets/purl/5009261.

186 Roger Smith, "NRC Staff Confused by Lack of Commissioner Direction, Sources Say," *Nucleonics Week*, June 12, 1975; Walker, *Three Mile Island*, 136.

187 Senate, *Reorganization Plan No. 1 of 1980*, 186; "Report of Proceedings before Joint Conference Committee of House and Senate Operations Committees on H.R.11510," October 3, 1974; House Report 931445, 83rd Congress, 2nd Session, October 8, 1974, 36; and "Joint Explanatory Statement of the Committee of Conference," in Diggins, *Legislative History on P.L. 93438*, 1424, https://www.osti.gov/servlets/purl/5009261; Mitchell Rogovin, *Three Mile Island: A Report to the Commissioners and to the Public*, NUREG/CR-1250 (Washington, DC: NRC, 1989), 114.

188 Rogovin, *Three Mile Island*, 112–14; NRC, "In the Matter of: Report of the NRC/TMI Special Inquiry Group," January 24, 1980, ML19296B200, 87.

189 GAO, *Areas Around Nuclear Facilities Should Be Better Prepared for Radiological Emergencies EMD78110* (Washington, DC: GAO, 1979), i.

190 Philip L. Cantelon and Robert C Williams, *Crisis Contained*, *The Department of Energy at Three Mile Island* (Washington, DC: DOE, 1980), 26, 119; Samuel McCracken, "The Harrisburg Syndrome," *Commentary* (June 1979), 27–39; Alvin M. Weinberg, "Can we fix nuclear energy?," *Annals of Nuclear Energy* 6, Issue 910 (1979), 473–82; Office of Nuclear Energy, "5 Facts to Know About Three Mile Island," May 4, 2022, https://www.energy.gov/ne/articles/5-facts-know-about-three-mile-island.

191 Cantelon and Williams, *Crisis Contained*, 119.

192 Cantelon and Williams, *Crisis Contained,* 20–23; "The Department of Energy at Three Mile Island: A Summary Narrative," June 1979, AEC/DOE Archives, RG 434, DOE, Three Mile Island, Job 27, Box 2, Folder 4, Summary Narrative, 1–12.

193 J. Samuel Walker, *Three Mile Island: A Nuclear Crisis in Historical Perspective* (Berkeley, California: University of California Press, 2004), 136–137, 199–201.

194 *Report of the President's Commission on the Accident at Three Mile Island*, 18, 24, 51, 61–79; and Thomas R. Wellock, *Safe Enough? A History of Nuclear Power and Accident Risk* (Oakland, California, University of California Press, 2021), 76.

195 Rogovin, *Three Mile Island*, 112.

196 GAO, *The Nuclear Regulatory Commission: More Aggressive Leadership Needed*, EMD-80-17, January 15, 1980, 1.

197 Walker, *Three Mile Island*, 136; and NRC, "In the Matter of: Report of the NRC/TMI Special Inquiry Group," January 24, 1980, ML19296B200, 87. See also, Bruce Babbitt and Harry C. McPherson, "Why the NRC Should be Shut Down," *Washington Post*, November 2, 1979.

198 Editorial, "Shape Up, Shape Up, Shape Up," *Washington Post*, October 31, 1979; Editorial, "The Nuclear Indictment," *New York Times*, October 31, 1979.

199 Jimmy Carter, "Remarks Announcing Action in Response to the Commission's Report," December 7, 1979, online by Peters and Woolley, The American Presidency Project, https://www.presidency.ucsb.edu/node/248009; Jon R. Elliott, "The Kemeny Report on the Accident at Three Mile Island," *Ecology Law Quarterly* 8, Issue 4 (March 1980), 810–817.

200 Frank Press and John Deutch to the President, "Response to the Recommendations of the President's Commission on the Accident at Three Mile Island," November 26, 1979, Jimmy Carter Presidential Library Staff Offices, Office of Staff Secretary, Handwriting File, Box 157; Walker, *Three Mile Island*, 214–215.

201 White House, "Fact Sheet Reorganization Plan for the Nuclear Regulatory Commission," March 27, 1980, NRC ML20003G658.

202 White House, "Fact Sheet Reorganization Plan for the Nuclear Regulatory Commission," March 27, 1980, NRC ML20003G658.

203 Victor Gilinsky, "One-Man Rule Over Nuclear Safety?" *Washington Post*, April 7, 1980; Senate, *Reorganization Plan No. 1 of 1980*, Hearings Before the Committee on Governmental Affairs, 96th Congress, 2nd Session April 17, 18, and 29, 1980 (Washington, DC: GPO, 1980), 153, 157, and 189. For the Commissioners' suggested revisions to the reorganization plan, see Hearings, 147–151. Critics of nuclear power opposed the single administrator proposal and sided with the Commissioners against the original reorganization plan. Hearings, 249–63.

204 Jimmy Carter, "Message from the President of the United States Transmitting Amendments to Plan No. 1 of 1980," May 5, 1980, in "Disapproving Reorganization Plan No. 1 of 1980, 98th Congress, 2nd Session, Calendar No. 846, Report No. 96790, May 22, 1980, 33–34; and "Reorganization Plan No. 1 of 1980," *Federal Register*, 45 No. 117, June 16, 1980, 40561–40564.

205 Nunzio J. Palladino to Tom Bevill, January 23, 1985, ML20105B049; and Prepared Testimony of Nunzio J. Palladino to the Subcommittee on Nuclear Regulation, Committee on Environment and Public Works, United States Senate, Concerning Single Administrator and Other Matters, June 17, 1986, ML20206F945.

206 Fehner and Holl, *Department of Energy 1977–1994*, 26–27; James Schlesinger, "Remarks Before the Chamber of Commerce," May 1, 1979, DOE Archives; "Long-Term Planning Has Over Emphasized Nuclear Energy," *Inside DOE*, May 18, 1979, 9.

207 Stanley M. Gorinson, Chief Counsel to John M. Deutch, Acting Assistant Secretary, Office of the Assistant Secretary for Energy Technology, June 11, 1979, AEC/DOE Archives, RG 434, DOE, Three Mile Island, Job 27, Box 1, Folder 12, Energy Technology Memo, 1–5; *Report of the President's Commission on the Accident at Three Mile Island, The Need for Change: The Legacy of TMI* (Washington, DC: GPO, October 1979), 61–79; Cantelon and Williams, *Crisis Contained*, 41–42 and 77.

208 Critique of Response to Three Mile Island Accident, Memo to File, August 24, 1979, AEC/DOE Archives, RG 434, DOE, Three Mile Island, Job 27, Box 2, Folder 4, Environmental File, 1-; Robert A. Friesse to L.J. Deal, "RAP Response to Three Mile Island," May 23, 1979, AEC/DOE Archives, RG 434, DOE, Three Mile Island, Job 27, Box 2, Folder 2, Ken Baker's Memo, 1–2; Information Memo to the Secretary from Acting Assistant Secretary for Energy Technology, John M. Deutch, "Report of White House Meeting on Three Mile Island Nuclear Plant Situation," March 30, 1977, AEC/DOE Archives, RG 434, DOE, Three Mile Island, Job 27, Box 1, Folder 12, Energy Technology Memo, 1–3.

209 Holl, *The United States Department of Energy: A History*, 6–7; J. Yager, "Energy Battles of 1979," in Goodwin, ed. *Energy Policy in Perspective,* 625–631; Jimmy Carter, "Energy and National Goals, Address to the Nation," July 15, 1979, *Weekly Compilation of Presidential Documents*, 15, July 23, 1979, 1235–1241.

210 Fehner and Holl, *Department of Energy, 1977–1994: A Summary History*, 30.

211 "Duncan: DOE's Performance Essential to U.S.," *Energy Insider,* 2 (September 2, 1979), 1; "Duncan Boosts Private Sector Energy Efforts," *Energy Insider,* 1, November 12, 1979, 1, 5; Charles W. Duncan, "Address Before the Economic Club of Detroit," October 29, 1979, DOE Archives.

212 Holl, *The United States Department of Energy: A History*, 7; Fehner and Holl, *Department of Energy, 1977–1994: A Summary History*, 31; Energy Information Administration, *Monthly Energy Review,* February 1986, 1–7; *1980 Congressional Almanac*, 471; Jimmy Carter, "Remarks Accepting the Presidential Nomination at the 1980 Democratic National Convention," August 4, 1980, *Public Papers of the Presidents of the United States, Jimmy Carter, 1980* (Washington, DC: GPO, 1982), 1536.

213 Fehner and Holl, *Department of Energy, 1977–1994: A Summary History*, 31; "Reagan Charges Carter Misleads U.S. on Threat to Energy Security," *New York Times,* September 11, 1980; "Remarks at the 1980 Presidential Campaign Debate," October 28, 1980, *Public Papers, Carter, 1980,* 2393–2394.

214 Holl, *The United States Department of Energy: A History*, 9; James B. Edwards, Speech before the Edison Electric Institute, New Orleans, Louisiana, April 8, 1981, DOE Archives.

215 Holl, *The United States Department of Energy: A History*, 9; Statement of James B. Edwards, Secretary of Energy, before the Senate Committee on Energy and Natural Resources, February 23, 1981, DOE Archives.

216 Holl, *The United States Department of Energy: A History*, 9; White House Press Release, December 17, 1981, DOE Archives; "Statement About the Plan Selected To Dismantle the Department of Energy," December 17, 1981, Ronald Reagan Presidential Library and Museum, https://www.reaganlibrary.gov/archives/speech/statement-about-plan-selected-dismantle-department-energy; Howard Raines, "Reagan Adopts Plan to End Energy Dept and Shift its Duties," *New York Times*, December 17, 1981.

217 Fehner and Holl, *Department of Energy, 1977–1994: A Summary History*, 35; DOE, Office of Policy, Planning and Analysis, *Sunset Review*, Report to the Congress, Department of Energy Organization Act, Title X, February 1982, Vol. 1, viii.

218 Robert D. Hershey, Jr., "Department of Energy Stays Alive," *New York Times,* February 15, 1982; Hearing Before the Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce, House of Representatives, 97th Congress, 2nd Session, February 18, 1982, Serial No. 97122, 2 and 15–18.

219 Holl, *The United States Department of Energy: A History*, 10; "Administration Poised for Introduction of New Energy Reorganization Plan," *Inside Energy*, May 21, 1982.

220 Federal Energy Reorganization Act of 1982, Hearings Before the Committee on Governmental Affairs, United States Senate, 97th Congress, 2nd Session, on S.2562, 15–35, 110–13, 131–33 and 136–40.

221 Federal Energy Reorganization Act of 1982, Hearings Before the Committee on Governmental Affairs, United States Senate, 97th Congress, 2nd Session, on S.2562, 151–56 and 166–185.

222 Robert D. Hershey, Jr. "Energy Dept's End Proposed," *New York Times,* May 25, 1982; Holl, *The United States Department of Energy: A History*, 10; Ronald Reagan, "Message to the Congress Transmitting Proposed Federal Energy Reorganization Legislation," May 24, 1982, Ronald Reagan Presidential Library and Museum, https://www.reaganlibrary.gov/archives/speech/message-congress-transmitting-proposed-federal-energy-reorganization-legislation; Comptroller of the United States, "Analysis of Energy Reorganization Savings Estimates and Plans," August 2, 1982 (Gaithersburg, Maryland: GAO), i–ii; Jan B. Vlcek and Anita V. Spivey, "DOE Dismantlement: An Overview of the Federal Energy Reorganization Act of 1982," *Natural Resources Lawyer*, 15 (1982); and "White House Still Has No Sponsor in House for Energy Reorganization Bill," *Inside Energy*, May 26, 1982; John Graham, "Abolish DOE…," *Nuclear News* (March 1985), 51.

223 Congressional Research Service, "Renewable Energy R&D Funding History: A Comparison with Funding for Nuclear Energy, Fossil Energy, Energy Efficiency, and Electric Systems R&D," June 18, 2018, 4.

224 International Atomic Energy Agency, *Convention on Nuclear Safety, INFCIRC/449*, July 5, 1994, Article 8; Ann MacLachlan, "French Minister Sets Sights on Regulatory Agency Modeled on NRC," *Inside NRC*, July 21, 1997, 12; and Ann MacLachlan, "French Government Approves Bill Creating Independent Regulator," *Nucleonics Week*, February 23, 2006, 12.

225 DOE, "Office of Nuclear Energy: Strategic Vision," January 8, 2020, https://www.energy.gov/ne/articles/office-nuclear-energy-strategic-vision; DOE Office of Environmental Management, "EM Strategic Vision: 2024–2034," March 2024, https://www.energy.gov/sites/default/files/2024-03/DOE%20EM%20Strategic%20Vision%202024%20FINAL%20508_0.pdf; DOE, National Nuclear Security Administration, "Strategic Vision: Innovate, Collaborate, Deliver," May 8, 2022, https://www.energy.gov/sites/default/files/2022-05/20220502%20NNSA%20Strategic%20Vision.pdf; DOE, "National Laboratories," April 17, 2024, https://www.energy.gov/national-laboratories.

NRC FORM 335 (9-2004) NRCMD 3.7

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER
(Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.)

NUREG-/BR-0533

2. TITLE AND SUBTITLE

U.S. Nuclear Regulatory Commission
Atomic Fission: The Breakup of the Atomic Energy Commission and the Energy Reorganization Act of 1974

3. DATE REPORT PUBLISHED

MONTH	YEAR
February	2025

4. FIN OR GRANT NUMBER

5. AUTHOR(S)

Thomas Wellock, Historian, U.S.NRC
Eric Boyle, Historian, U.S. DOE

6. TYPE OF REPORT

Historical

7. PERIOD COVERED *(Inclusive Dates)*

1974

8. PERFORMING ORGANIZATION - NAME AND ADDRESS *(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)*

Thomas Wellock, Historian
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

9. SPONSORING ORGANIZATION - NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

Same as 8, above

10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

On October 11, 1974, President Gerald Ford signed the Energy Reorganization Act of 1974 (ERA), which separated the U.S. Atomic Energy Commission (AEC) into two new agencies, the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Energy Research and Development Administration (ERDA). ERDA and the NRC began operations on January 19, 1975. On October 1, 1977, ERDA was one of three agencies merged into the new U.S. Department of Energy (DOE). This history provides the first detailed account of the passage of the ERA and the challenges the NRC and ERDA/DOE faced in implementing the law. The story concludes in the early 1980s when the NRC and the DOE survived efforts to dismantle them.

The views expressed in this history are those of the authors alone and not necessarily those of the Nuclear Regulatory Commission or the Department of Energy, and they do not in any way represent an official position of the NRC or DOE.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

13. AVAILABILITY STATEMENT

unlimited

14. SECURITY CLASSIFICATION

(This Page)
unclassified

(This Report)
unclassified

15. NUMBER OF PAGES

16. PRICE

NUREG/BR-0533
February 2025

WWW.NRC.GOV

@NRCgov