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Closing the Circle:

The Department of Energy and Environmental Management 1942-1994

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Our mission at the Department of Energy is no less significant than trying to close the circle on the splitting of the atom begun a half-century ago by [the Manhattan Project].

—Tom Grumbly

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Part I: Making of the Nuclear Weapons Complex, 1942-1955

The Manhattan Project: Genesis of the Complex

Efforts to develop the atomic bomb during World War II gave rise to the Nation's nuclear weapons complex. From 1939 through early 1942, civilian authorities headed up the effort to determine the feasibility of building an atomic bomb. Once it was clear that a weapon could be built, security considerations, envisioned construction requirements, and ultimate military ends suggested placing the atomic bomb project under the Army Corps of Engineers. The Corps established the Manhattan Engineer District (MED), which operated like a large construction company but on an unprecedented scale and with a tremendous sense of urgency. The MED spent $2.2 billion during the war while building a sprawling industrial complex of production, fabrication, and research facilities.

Decisions made during the Manhattan Project determined the initial size and shape of the nuclear weapons complex and influenced how that complex would be run over the next half century. Secrecy was perhaps the single most important defining factor of the Manhattan Project. Security needs, combined with fear of a major accident, dictated that the facilities be located at remote sites. Gaseous diffusion and electromagnetic facilities for separating uranium^{235}, as well as a pilot reactor (pile) and plutonium separating facility, were constructed at Oak Ridge, Tennessee. Hanford, Washington, became the site for three full-scale reactors and corresponding plutonium separation facilities. Design and fabrication of the first atomic bombs were the responsibility of the Los Alamos Scientific Laboratory in Los Alamos, New Mexico. The most significant exception to the remote siting rule was the University of Chicago's Metallurgical Laboratory (Met Lab), which conducted pioneering plutonium and pile design research and constructed the first chain-reacting pile under the stands of Stagg Field. Siting of the Met Lab, however, predated the MED. Suitability of the underlying geological structure for waste disposal was not a consideration in siting facilities.[1]

Secrecy, in addition to imposing remote siting, demanded compartmentalization. This meant the rigorous prohibition against unnecessary interchange of information between sites, between individuals and groups at a given site, and between sites and the outside world. Prior to the Army's takeover of the project, compartmentalization primarily applied to research and development. Afterwards, the Army incorporated it into virtually every activity. As General Leslie R. Groves, who headed the Army's atomic bomb program, explained, "Compartmentalization of knowledge . . . was the very heart of security. My rule was simple

and not capable of misinterpretation—each man should know everything he needed to know to do his job and nothing else. [This] not only provided an adequate measure of security, but . . . . it made quite clear to all concerned that the project existed to produce a specific end product."[2]

Compartmentalization did not necessarily imply decentralization. Consistent with the perceived needs of a military organization in wartime, Groves instituted an authoritarian system whereby he initiated all policy from his office in Washington. Colonel Kenneth D. Nichols, the MED's chief executive officer and Groves's aide and troubleshooter, made all important administrative decisions from his headquarters at Oak Ridge. As a result, MED officials in the field possessed very little authority.[3]

Lacking both the physical and intellectual resources to develop and build an atomic bomb, the Army Corps of Engineers required considerable assistance from both the private sector and academia. The MED administered contracts, maintained security, and oversaw the work. Urgency and the magnitude and complexity of the project dictated that some of the Nation's largest construction and industrial companies and most prestigious universities be brought in as contractors to build, operate, and man the facilities. E.I. du Pont de Nemours and Company built and operated the Hanford reactors. At Oak Ridge, the Stone and Webster Engineering Corporation designed and built the electromagnetic facilities, which were operated by the Tennessee Eastman Corporation. M.W. Kellogg Company designed and built the gaseous diffusion plant, while the Union Carbide and Corporation operated it. On the academic side, the universities of Chicago and California administered the Metallurgical and the Los Alamos laboratories, respectively. Scores of additional contractors provided equipment, materials, and other services.[4]

Health and Safety Concerns

The Manhattan Engineer District possessed a single purpose: to develop and produce a useable weapon. Due to the urgency of a project that, as Vannevar Bush informed President Franklin D. Roosevelt, could "be determining in the war effort," environmental and waste management concerns were decidedly secondary. Health and safety concerns received a higher priority. Project managers, nevertheless, were often tempted to implement solutions and techniques that promised speedy results but imposed greater health and safety risks. Secrecy, military command, and the foreshortened time period from inception to completion resulted in a major national industry unlike any other. No industrial precedence or procedures existed for dealing with high levels of radioactivity and large amounts of radioactive waste. At the same time, facilities were constructed and operated without scrutiny and review by local populations or public regulatory agencies. Under normal conditions, municipal or state health departments reviewed all health and sanitation matters. The Manhattan Project, by contrast, set its own standards and established its own maximum tolerance allowances. As a further complicating factor, compartmentalization within the complex prevented widespread sharing of information and experience in dealing with special hazards.[5]

Manhattan Project officials understood, at least theoretically, the environmental, health, and safety implications of nuclear technology. Fear of a major accident, as much as secrecy, prompted the remote siting of facilities. In addition, project officials made a significant effort to promote health and safety. Routine industrial safety required the most intensive effort throughout the complex, but already in July 1942 the Met Lab established the Chicago Health

Division, whose primary task was to institute a health physics program to monitor radiation hazards. Plutonium with its high levels of radioactivity and toxicity quickly became the focus of attention. Almost nothing was known about the health and biological effects of exposure to plutonium, but health physicists were able to draw on over four decades of experience in dealing with X rays, radium, and radon. On the basis of prewar research and standards, which were adapted as needed and applied on a vastly larger scale, health physicists took, in the words of one historian, a "prudent course," acting "almost as if they believed any exposure could be harmful, as if no threshold existed, as if any body burden might cause damage." Consequently, health physicists made a concerted effort to shield radiation sources, instill careful work habits, scrutinize workplaces, and screen workers to detect early signs of damage.[6]

The MED in summer 1943 formed a Medical Section tasked with developing a project-wide health program. The section's Industrial Medicine Branch prepared industrial hygiene standards and procedures. Contractors bore responsibility for implementation but were subject to periodic inspection by Industrial Medicine Branch personnel. The Met Lab's health physics program, at the same time, remained the wellspring of Manhattan Project radiological safety. The Chicago Health Division undertook health and safety responsibilities for the pilot reactor at Oak Ridge. The Medical Section abjured most Hanford health responsiblities, which were assumed by Du Pont with the considerable assistance of the Met Lab's health physicists. Los Alamos, too, essentially conducted its own health physics program. Tight security, however, hampered cooperation and data exchange between the two laboratories' health physicists.[7]

Chicago Health Division experts accompanied Medical Section personnel on inspection tours of dozens of contractor facilities across the country. The inspections were met, as Medical Section Chief Stafford L. Warren noted, with "apprehension and at first with open hostility." Success at upgrading health and safety at contractor facilities was limited. Many contractors performed work under conditions that would not have been allowed by the Met Lab or Du Pont.[8]

Environmental and Waste Management Concerns

Public safety ranked with worker protection as a health and safety concern. At Oak Ridge, Hanford, and Los Alamos, sizable security-controlled buffer zones protected the public from major accidents and releases. Monitors with survey meters patrolled the open areas. Health and safety personnel collected and tested air and water samples for radioactive contamination. Environmental research complemented environmental monitoring at some sites. At Oak Ridge, for example, scientists examined effects on animals exposed to reactor waste products or stack emissions. At Hanford, researchers attempted to determine what would happen if "a pile" blew up during a weather inversion. In addition, the MED contracted with the University of Washington for a major study of the effects of discharged radioactive reactor cooling water on Columbia River fish.[9]

Management of waste activities tended to be more idiosyncratic than the Manhattan Project's health and safety efforts. The MED provided little, if any, central direction other than the health and safety assistance provided by the Medical Section. Sites and contractors developed waste management programs largely in isolation both from each other and from headquarters control. According to a later analysis by the Atomic Energy Commission's sanitary engineers, "self-auditing" of waste practices was the rule throughout the complex.

As "justifiable" as such wartime operations might have been, they were "definitely unorthodox."[10]

This did not mean, however, that local site officials ignored waste management. The dangers posed by radioactive waste were well-understood. At Hanford, for example, officials recognized that certain long-lived fission by-product elements could not simply be disposed of into either the soil or the Columbia River. As a stopgap measure, Du Pont placed high-level liquid wastes in underground storage tanks, which would, according the the Army's official history of the Manhattan Project, "permit appropriate action to be taken at a later date." Du Pont, for its part, assumed no apparent long-term liability. In its contract with the MED, the government agreed to take possession of all products, including wastes.[11]

Health and safety concerns generally received a higher priority than waste management issues because of their immediacy. Inattention to health and safety could put workers and the public directly at risk. Interim waste management measures were not perceived as putting anyone at risk in the near term. Furthermore, health and safety measures made sense from the perspective of cost-benefit analysis. Contamination meant loss of scarce resources, whether material or human. Savings from better practices, in Stafford Warren's view, "amply repaid the cost of the changes necessary to tighten up the program and carry out the safety and health precautions."[12] Long-term waste management solutions were not considered immediately cost effective. Production thus took precedence over waste management, not only at Hanford but throughout the complex. Waste management activities were held to the minimum necessary to prevent serious health and safety hazards. Officials anticipated that ultimate waste management solutions awaited the winning of the war.

The Atomic Energy Commission: Expansion of the Complex

If nuclear weapons complex officials were hoping for a period of calm and stability in which to deal with waste management issues, they were sorely disappointed. The breathing space between two wars—World War II and the Cold War—was very brief. Already in March 1946, Winston Churchill warned of the "Iron Curtain" that had descended on Eastern Europe as the Soviet Union sought to expand its influence. A year later, President Harry S. Truman proclaimed the Truman Doctrine and asked for funds for overseas military assistance. The times did not seem propitious for dismantling the complex or even focusing on what were perceived to be pressing but less critical issues. In fact, by summer 1947 further expansion of the complex was in the wind.

As new international antagonisms and potential hostilities loomed, Congress debated the future of the nuclear weapons complex. The crux of the debate was civilian versus military control of atomic energy. The Atomic Energy Act of 1946 decided the issue by transferring Manhattan Engineer District facilities and responsibilities to a civilian-controlled Atomic Energy Commission (AEC). Activated on January 1, 1947, the new agency consisted of five civilian commissioners, with David E. Lilienthal, former head of the Tennessee Valley Authority (TVA), designated as chairman. Military influence nonetheless remained very strong. A Military Liaison Committee was created to "advise and consult" on "military applications," and atomic energy remained a government monopoly, with the control of information, materials, and technology thoroughly entrenched. In addition, the Commission's paramount objective, the 1946 act stressed, remained "assuring the common defense and security."[13]

The increasingly grim international situation did nothing to lessen military influence. Expansion of the nuclear weapon complex came as the Cold War set in with earnest. The AEC between 1947 and 1952 initiated construction that increased production capacities enormously. New facilities included three additions to the Oak Ridge gaseous diffusion complex; new gaseous diffusion plants located at Paducah, Kentucky, and Portsmouth, Ohio; five additional reactors for producing plutonium at Hanford; and five heavy water reactors for producing tritium and plutonium at the new Savannah River, South Carolina, site. In addition, the AEC constructed auxiliary facilities to enlarge and strengthen the production chain from ore to weapons. These included a feed material production center at Fernald, Ohio, and component and assembly plants at Rocky Flats, Colorado, and Amarillo, Texas. Increased weapons research and development efforts resulted in the establishment of a second weapons laboratory at Livermore, California, and a continental testing site in the Nevada desert outside of Las Vegas. The need to test at a remote site new reactor designs, including those for naval nuclear propulsion, prompted the creation of a reactor testing station near Idaho Falls, Idaho. As with the MED, suitability for waste disposal was not a criteria in siting facilities.[14]

Managing the AEC: Decentralization and Contracting

Under the leadership of Chairman Lilienthal, the Atomic Energy Commission pursued a management policy of decentralization. Lilienthal believed decentralization was essential to the working of democracy in modern society. During his tenure at TVA, he had brought Tennessee farmers into consultation with agency engineers, federal authorities into cooperation with state and local governments, in an effort to rebuild democracy "at the grass roots." Decentralization was the key. "The task of harmonizing and from time to time adjusting the intricate, detailed maze of pieces that make up the unified development of resources in a world of technology," he observed, "is something that simply cannot be done effectively from some remote government or business headquarters."

Lilienthal was convinced that the newly formed AEC would serve as an adequate vehicle for instituting decentralization. The MED inheritance would help steer the way. Facilities and sites of the nuclear weapons complex were already widely dispersed geographically. Inherited Washington staff numbered about one hundered, and, like General Groves, Lilienthal envisaged only a small, core headquarters staff. Unlike Groves's military authoritarianism, however, Lilienthal advocated true decentralization. The AEC's field offices had to have the authority to make important decisions and the talent necessary for these reponsibilities.[15]

The organization set up by the Commission reflected Lilienthal's approach. The Commission created five field offices at Los Alamos, Oak Ridge, New York, Chicago, and Hanford. Field managers were given broad authority. Each manager could hire and fire personnel, issue wide-ranging directives, and negotiate contracts worth up to $5 million. Managers needed to report to Washington only matters involving policy or other field offices. Finally, field managers reported directly to Carroll L. Wilson, the AEC general manager. Program offices in Washington had no line responsibility.[16]

Use of contractors complemented the policy of decentralization. The Atomic Energy Act empowered the Commission to operate its facilities with federal employees. The Commission decided, however, to continue the MED's practice of maintaining government-owned, contractor-operated (GOCO) facilities. Paucity of available federal employees to man the

massive, far-flung complex contributed to the decision, as did the need to tap private industry's expertise. But the Commission also wanted, in concert with the policy of decentralization, to permit and encourage private enterprise's involvement in the government monopoly of the atom.

Contractor operation, for Lilienthal, implied contractor responsibility. Comparing the government/contractor relationship to a wise parent who hesitates to help a child, he contended that the Commission had to refrain from trying to solve contractors' problems. The danger was that excess meddling by the government would dilute contractor responsibility.[17]

Decentralization and contractor operation thus became the major management principles of the AEC. Throughout the existence of the Commission, they remained at the heart of the agency's management philosophy. Decentralization was dealt a blow in August 1948 when discontent with AEC management forced Lilienthal and Wilson to reorganize so that field managers reported through headquarters program offices, but the concept—and the reality—of a semi-independent field continued and, for all practical purposes, became entrenched. Similarly, the transition of the complex from military to civilian control in the late 1940s brought a shake up of major contractors. Du Pont, which early had limited itself solely to wartime service, left Hanford in 1946 and was replaced by the General Electric Company. The University of Chicago and Tennessee Eastman opted out of their operating responsibilities at Oak Ridge. Replacement contractors, as well as holdovers from the war years, tended to remain for the duration, however, and for the next two decades management stability was the hallmark of the complex. General Electric was at Hanford until 1965. Union Carbide not only continued to operate the gaseous diffusion plants but also took over from Tennessee Eastman both industrial facilities at Oak Ridge and ran them until 1984. Du Pont returned to design, build, and operate the Savannah River facility and stayed until 1989. The University of California became operating contractor at the new Livermore laboratory in 1952 and remains the contractor at both weapons labs. Patterns of managment therefore quickly fell into place in the late 1940s and solidified. As Harold Orlans in his study of AEC contracting noted with only some exaggeration, once major operating principles were set there was "little significant history to be written about them."[18]

The Safety and Industrial Health Advisory Board

The Atomic Energy Commission inherited from the MED the "comprehensive accident prevention and health program" in effect, to varying degrees, throughout the complex. The Commission termed the safety and health protection of the MED and AEC as "excellent," but physical deterioration of facilities and equipment and difficulties in transition to a civilian agency convinced the Commission of the need for "independent judgments and recommendations." In August 1947, the Commission established the Safety and Industrial Health Advisory Board to survey health, safety, and fire protection throughout the complex. Composed primarily of outside experts from various health and safety professions, the board initially lacked a sanitary engineer to focus on problems of public health such as water supply and waste disposal.

Coincidentally, the National Academy of Sciences was growing increasingly concerned that the Commission was not giving adequate attention to sanitary engineering issues involving protection of workers and the general public. The academy delegated Abel Wolman, chairman of the academy's Committee on Sanitary Engineering and head of the

Department of Sanitary Engineering at Johns Hopkins University, to approach Lilienthal. The AEC chairman informed Wolman that the academy's concerns were unwarranted. Lilienthal, nonetheless, asked Wolman to become a member of the Safety and Industrial Health Advisory Board.[19]

The board met in Washington in September for orientation and general discussion with AEC staff. Three weeks of visits followed to various AEC facilities, including Oak Ridge, Los Alamos, Chicago, and Hanford. In late fall, the board made a draft report available to the Commission, and AEC managers and field staff discussed the report in a meeting on December 5. The board delivered the final report to the Commission on April 2, 1948. The document consisted of a general report summarizing comments and making recommendation and attached supplementary reports written by individual board members on their specific areas of expertise.[20]

The Board's Report

In its final report, the Safety and Industrial Health Advisory Board agreed with the Commission's assertion that the AEC had inherited an "excellent" health and safety program and record. Although noting that "deferred health injury was not measurable," the board claimed that radiation protection for employees had been "excellently handled" on most production projects. The board, nonetheless, warned that there were indications that the program was "deteriorating." Hazards on certain projects seriously threatened "continuity of operation." In addition, measures that might have been "acceptable and effective" during the war were no longer appropriate. The board found that the deterioration was partly attributable to executives, both AEC and contractor, who "either do not fully accept their responsibility for safety and health or do not know how to carry out responsibility."

The board observed that conditions throughout the complex varied "from extremely good to extremely bad." In general, industrial contractors, in terms of conditions and practices, were "far ahead" of the construction and service contractors who were, in turn, ahead of the universities. At Hanford, for example, health and safety had been "built into the plant to a degree rarely found in private industry." At the other extreme was Los Alamos with its "sloppy conditions" and "sloppy habits." The board speculated that the more positive conditions were partly due to the close supervision of the MED. Even the best contractors, the board noted, at times had to be pressured into taking needed steps. Los Alamos, with the worst record in the complex, had not been subject to health and safety control from headquarters.

The board singled out public protection against radiation and other hazards for its severest criticism. Particularly negligent, in the board's view, was the management of waste disposal. Continued disposal of waste "in present quantities and by present methods," the board noted, in the long term presented "the gravest of problems."

The board's criticism of waste management was based primarily on the supplementary report on environmental sanitation written by Wolman and his protege Arthur E. Gorman. In their report, Wolman and Gorman expressed surpise as to the limited number of "excellent demonstrations" of environmental sanitation throughout the complex. They noted that the "whole problem" of the disposal of both toxic and radioactive wastes required immediate laboratory and field study. They pointed out that wartime risks and shortcuts involving waste disposal were predicated on the understanding that more effective control measures would subsequently ameliorate the risks and hazards. They lamented the lack of data

available on the health status of persons exposed to "the so-called 'calculated risk.'" Similarly, they contended that the absence of data on environmental releases raised "many issues of a moral and of a legal character." They also cast a jaundiced eye on the lingering wartime organizational structures called into question by "democratic living in general in the United States." Facilities had been built and operated "without scrutiny and review by public regulatory agencies."

Wolman and Gorman reserved their most detailed criticism for waste disposal practices at specific sites in the complex. Oak Ridge discharged liquid wastes of varying degrees of radioactivity and toxicity directly into the Clinch River upstream from a major water supply intake. Hanford was spending "hundreds of thousands of dollars" for holding tanks of high-level liquid wastes, a measure that, Wolman and Gorman noted, "certainly provides no solution to a continuing and overwhelming problem. The business of constructing more and more containers for more and more objectionable material," the authors added, "has already reached the point both of extravagance and of concern in most of the areas." Los Alamos simply dumped radioactive and toxic materials into adjacent canyons, a procedure that could not be "continued for very long in the future." The various laboratories discharged materials into the air "quite indiscriminate[ly]."[21]

The Board's Recommendations

Wolman and Gorman concluded their report on environmental sanitation with a long list of complex-wide problems requiring "immediate investigation." The AEC and its contractors needed to determine 1) the extent of migration toward underground water supplies by radioactive and toxic wastes disposed of in wells, cribs, and pits; 2) the extent of travel in rivers and streams by wastes and their deposits in banks or beds; and 3) the extent of dispersion of gaseous wastes from vents or stacks. Waste disposal support studies were needed in reference to an area's biology, geology, meteorology, and hydrology. Equipment and sampling techniques were necessary to monitor air, soil, and water.

Wolman, Gorman, and the board as a whole clearly believed that a significantly upgraded environment, safety, and health effort was a priority for the complex. The key lay in organization and management. Diffused responsibility for health matters was a major problem. Throughout the complex, for example, officials focused considerable attention on radiation hazards and ignored the release of chemically toxic wastes. The board attributed this to radiation being a health physics responsibility and chemical toxicity control being primarily an industrial medicine or safety responsibility. A headquarters element dealing solely with health was needed. A sizeable portion of Wolman and Gorman's paper thus offered a detailed proposal for a division of health protection. One of the new division's central tasks would be the investigation of waste disposal problems. So critical did the new division appear that the board forwarded the recommendation to the Commission in late 1947, well before the draft report was available. Because setting up a health division would take time, Wolman and Gorman suggested an early assignment of a sanitary engineer to the AEC's Engineering Division. "Urgent decisions," they wrote, "require his attention now."

The board also pressed for field office and contractor reform. The board did not oppose the Commission's push for decentralization. In fact, the Commission needed to emphasize and apply the principle of contractor responsibility for health and safety. "Maximum freedom" showed be allowed for contractors "showing best operating conditions and results." The board maintained, nonetheless, that withdrawal of "detailed" central control

should be gradual. In addition, decentralization "clearly necessitates maximum interchange of information" between headquarters, field offices, and contractors. Close liaison with various federal and state public health authorities was essential as well, not only because of the obvious value added in dealing with concrete problems but also because "no other course is consistent with American practice." Ultimate responsibility, however, remained with the Commission. The agency had "a definite statutory (as well as a moral) responsibility, accentuated by the special hazards involved, to see that its arrangements with contractors and others 'shall contain such provisions to protect health [and] to minimize danger from explosions and other hazards to life or property.'"[22]

Waste Managment as a Low Priority

The Commission and its contractors began acting on the Safety and Industrial Health Advisory Board's findings and recommendations even before the final report was submitted. The board kept appropriate Commission and contractor personnel actively informed, and minor safety hazards were sometimes rectified within twenty-four hours of the board's fact-finding inspection. Action on more serious and deeply-rooted problems, however, was not always forthcoming. Recommendations for organizational change were largely ignored. The Commission did not create a health division. The Commission was in the process of setting up a Division of Biology and Medicine, but this new division was geared more toward research than day-to-day health and safety requirements.[23]

The board's waste management recommendations did not fare much better. Commissioners, other agency officials, and contractors simply did not view waste management as a high priority. As Wolman later recalled, J. Robert Oppenheimer, head of the Los Alamos laboratory during the war and chairman of the AEC's prestigious General Advisory Committee (GAC), was "one of the major obstacles" to advancing sound waste management practices. He considered waste management, Wolman noted, as unimportant. But Oppenheimer was not alone in this view. Following a presentation by Wolman, Hood Worthington of the GAC remarked that the seriousness of the problem was "overemphasized." Few of the commissioners, as well, grasped the magnitude of the problem. The Commission generally was content to let waste management be handled locally. Nor was the field adverse to this solution. Only a month after the board submitted its report, a group representing all Commission laboratories voted in favor of letting each laboratory solve its own waste disposal problems.[24]

Not all AEC and contractor officials were inimical to the waste management views expressed by Wolman and the board. A few lonely voices joined with the board in calling for an increased focus on waste management. Walter H. Zinn, director of the new Argonne National Laboratory, successor to the Met Lab, opposed the move to let laboratories handle their own waste problems because it would dilute efforts to establish effective, complex-wide standards. "The disposal of radioactive waste materials," Zinn told his staff in summer 1948, "constitutes one of the greatest and most important problems being faced by this laboratory." Also at Argonne, Austin M. Brues, head of the lab's bio-medical research effort, stressed that "perhaps the chief problem yet unsolved is the disposal of radioactive wastes."[25]

Even had there been a more widespread and heightened awareness concerning waste disposal, no consensus existed as to how the waste problem should be resolved. Scientists and engineers whose areas of expertise overlapped with waste management offered dissimilar and often contradictory advice. Nuclear and chemical engineers, for example,

viewed radioactive waste as a relatively unimportant technical problem and proposed dilution and environmental disposal for low-level wastes and permanent tank storage for high-level wastes. Health physicists, by contrast, saw radioactive waste as an important technical problem requiring safe and uniform standards for environmental disposal of low-level wastes and containment by tank storage for high-level wastes. Sanitary engineers, such as Wolman, took perhaps the most expansive perspective. They argued that radioactive waste was both a technical and social problem. For low-level waste, sanitary engineers advocated uniform radiation standards and disposal methods, long-term containment allowing for decay, and treatment prior to disposal. For high-level wastes, they urged interim long-term tank storage, removal of the most radioactive elements, concentration of the remaining materials, and development of safe final disposal methods.[26]

Wolman was undoubtedly the most persistent outside critic of the AEC's early waste disposal practices. Undaunted by the Commission's failure to establish a health division, he persuaded Lilienthal to appoint Gorman as staff sanitary engineer in the Division of Engineering. Gorman, with his one staff member, Josef A. Lieberman, a student of Wolman at Johns Hopkins, composed the Sanitary Engineering Branch within the division. The branch was tasked with advising and assisting headquarters, field offices, and contractors on sanitary engineering issues in general and waste disposal problems specifically. The branch was to examine and evaluate the environmental safety of waste disposal practices and formulate programs to "return to nature or ultimate storage radioactive materials on a controlled, hazard-free basis in conformance with established standards." In 1949, the Commission transferred the Sanitary Engineering Branch to the newly-created Division of Reactor Development.[27]

The Sanitary Engineering Branch exercised little direct control outside the powers of persuasion. In the late 1940s and into the 1950s, Wolman did his utmost to promote the branch and push the agenda that he himself had largely articulated. He served as a member of the Safety and Industrial Health Advisory Board until 1951. He was chairman of the AEC's Stack Gas Working Group from 1948 to 1951 and a member of the Reactor Safeguards Committee from 1947 to 1960. Always he pressed the importance of environmental safety and public health in radioactive waste management.[28]

Waste Management as a Public Relations Problem

Commission officials thus were not unaware of the potential magnitude of the radioactive waste disposal problem. The highest levels of the agency, nonetheless, dealt with the issue largely as a public relations problem. However justifiable from a national security perspective, secrecy and self-auditing waste practices stimulated the interest and concern of public officials as to environmental hazards. The unique characteristics of radioactive waste and the public's paucity of knowledge incited, in the words of Chairman Lilienthal, both "hysteria and fear." Thus, the Commission focused its attention not on waste practices but on reassuring the public.[29]

In October 1949, the AEC released its first major statement on waste management, a "non-technical" report entitled *Handling Radioactive Wastes in the Atomic Energy Program*. In the report, the Commission stated that the agency's waste practices had "successfully protected workers and the public." Even with the urgency of maintaining high production, the Commission boasted, discharge standards had been set so low that no environmental or health hazards had resulted.[30]

Waste Management Routinized

By the mid-century mark, the Atomic Energy Commission's waste management was becoming routinized and, as a result, was largely ignored by high-level officials. Nonetheless, regulatory responsibilities, according to a staff critique, were not "too well defined." Contractors generally followed "conservative" waste practices, even though the standards they sought to comply with were "set by their own staff," "usually" following consultation with the AEC staff. The AEC guidelines limited exposures of employees to the maximum permissible limits recommended by the National Committee on Radiation Protection. Off-site exposures were to be held to one tenth or one hundredth of the maximum permissible limits. Because of the "inherent differences" between sites and types of wastes, disposal practices varied considerably. Large, remote sites operated "safely" under less restrictive standards for effluent discharge than smaller sites in urban areas. The Commission also distinguished between the two methods of handling low-level and high-level wastes. Low-level wastes, whenever possible, were diluted and dispersed to the environment. High-level wastes were concentrated and contained.[31]

Commission officials, when they gave the matter any thought, tended to be well-satisfied with the waste disposal program. The AEC's public relations efforts had resulted in a "marked lessening of concern" by public regulatory officials over waste releases. Waste disposal was "under control" at all Commission sites. Officials estimated total complex-wide investment in waste facilities at $100 million. Total annual operating costs were between $3 and $5 million. These costs were "relatively high," but this was because disposal practices had been "conservative." Low-level wastes presented "no serious hazards," and any problems involving low-level wastes were "generally solvable by available engineering or environmental means." Officials cited high-level liquid wastes as "*the* major waste problem . . . measured by dollars, curies of radioactivity and potential health hazard." Although significant, all other types of wastes were "several orders of magnitude less important."[32] □

Part II: The AEC: Two Decades Wandering in the Wilderness, 1954-1975

Atomic Energy Act of 1954: AEC Opens Up

The Atomic Energy Act of 1954 effectively ended the government monopoly of the atom and made possible the private development of nuclear power. Low-level wastes, according to Commission officials, would be the direct responsibility of companies engaged in nuclear activities. Government involvement would be limited to promulgating standards and licensing. High-level wastes were a different matter. Long-term protection of public health and safety required government responsibility for ultimate waste disposal.[33]

The 1954 act and the advent of a civilian nuclear power industry increased public scrutiny as security barriers came down. In early 1959, the Joint Committee on Atomic Energy held public hearings on industrial radioactive waste disposal. Waste managers and experts from the Commission's larger sites gave detailed testimony, including descriptions of ground disposal techniques at Hanford, dispersion methods into streams and rivers at Oak Ridge, and direct discharge activities into the water table via injection wells at Idaho. Both low- and high-level waste practices were discussed in depth. Industry spokesmen, officials from other federal agencies such as the Public Health Service, and state regulators testified. Recognized scientific and technical experts appeared. Discordant voices were few. The general conclusion of the hearings was that waste disposal practices had not yet resulted in any harmful effects. In the words of an Illinois official, the Commission and its contractors had "made every effort to prevent hazardous conditions from developing in the environment."[34]

High-level Waste Fixation

Convinced that low-level wastes were essentially under control, AEC waste management officials focused attention on the considerable problems of high-level waste disposal. High-level liquid defense wastes totaled some 65 million gallons by the mid-1960s. High-level liquid civilian wastes were nonexistent before the first commercial reprocessing facility opened in 1966 at West Valley, New York. The AEC projected that high-level civilian wastes would amount to 22 million gallons by the year 2000. The AEC, nonetheless, made the civilian program its priority.[35]

Although the line dividing civilian and defense wastes was not always clear, especially with the public, the AEC viewed the two as separate problems. Waste operations within the agency were divided between the production and reactor development divisions, which managed defense and civilian wastes respectively. There were good technical reasons for distinguishing between the two. Chemically, defense wastes were different from civilian wastes and required different methods of processing and disposal. In addition, defense wastes were already voluminous, and the production division had no intention of transferring high-level wastes to an off-site repository. Since civilian wastes did not yet exist in significant quantities, the reactor development division sought to establish a central, federal repository. In the 1960s, Oak Ridge National Laboratory examined the technical and economic feasibility of establishing a prototype repository in bedded salt deposits. In 1970, the Commission approved a demonstration project for a salt mine at Lyons, Kansas. The intent was to use the Lyons site for the permanent, irretrievable disposal of high-level solid wastes.[36]

Meanwhile, the production division pursued a methodical, unhurried approach to high-level waste disposal. Real technical progress was made, even as each site pursued its own idiosyncratic effort. Idaho built a prototype Waste Calcining Facility using a fluidized bed principle to evaporate and convert high-level liquid wastes from experimental reactors into a relatively inert granular calcine. Hanford sought to deal with high-level liquid wastes directly in the storage tanks by reducing the volume and solidifying the residual material by evaporation in place. Savannah River took still a different tack, proposing the disposal of high-level wastes in caverns mined in the crystalline bedrock below the aquifer.[37]

Independent Criticism Not Well Received

Throughout most of the 1960s, the AEC's waste management program received little of either scrutiny or criticism. AEC waste management officials confidently stated that waste management operations had been "more satisfactory than essentially any other facet of the nuclear fuel cycle."[38]

Criticism was not muted entirely, however. In early 1955, the reactor development division contracted with the National Academy of Sciences-National Research Council (NAS-NRC) to provide independent advice and assessment on the geology of high-level radioactive waste disposal. The resulting NAS-NRC committee, in the course of its investigations, examined low-level as well as high-level waste practices. In June 1960, the committee informed AEC Chairman John A. McCone that no existing AEC site generating high- or intermediate-level wastes possessed suitable geological conditions for the safe disposal of these wastes. In addition, none of the waste disposal practices observed by the committee satisfied its criterion for safe disposal. The committee recommended "as urgent" that the AEC establish waste-disposal facilities at separate and suitable geological sites.[39]

The AEC's waste management officials responded unfavorably to the NAS-NRC committee's comments. They rejected the recommendation to relocate waste disposal facilities because of the high costs and practical difficulties, especially in transferring millions of gallons of wastes from Hanford and Savannah River to reprocessing and disposal sites.[40]

In the mid-1960s, the NAS-NRC committee drafted a report reviewing ground disposal activities at various AEC sites. The reactor development division long-delayed finalizing the report because of discomfort with its committee's criticism of production division practices. Frustrated with the delays and the perceived complacency of the AEC, committee members vented their criticisms individually. M. King Hubbert declared that although he was "very favorably impressed" with progress being made with high-level wastes, the handling of low-level wastes was "not yet satisfactory." At most AEC sites, he observed, practices which might have been "barely permissible in the initial stages . . . are a part of the daily operation." Hubbert noted that the NAS-NRC committee had "repeatedly" protested the local handling of low-level wastes and "invariably the defense offered was that any other method would be more costly." Similarly, John E. Galley, chairman of the NAS-NRC committee, noted the "sincerity" of the AEC's efforts but scored the AEC for its "misdirected" program with its "reluctance to recognize inadequacies of disposal requisites at existing plant sites" and its "over-emphasis on economy when selecting preferred disposal procedures."[41]

In May 1966, the NAS-NRC finally forwarded the report, which expanded on the committee's 1960 comments and recommendations, to the AEC. AEC waste management officials implemented some of the specific, technical recommendations but again rejected the overall thrust of the committee's criticism. AEC Chairman Glenn T. Seaborg characterized the

report as "unfavorable in an uninformed way." Within a year, the AEC dissolved the NAS-NRC committee.[42]

Enter the GAO

By the late 1960s, the AEC's attempts both to portray the management of defense wastes as a problem largely solved and to keep the waste issue out of the public limelight were becoming increasingly tenuous. The burgeoning environmental movement had as yet not discovered nuclear waste. Congressional attention, nonetheless, was growing more focused. In early 1968, the Joint Committee on Atomic Energy asked the General Accounting Office (GAO) to review the high-level waste activities of the AEC. The GAO criticized the AEC's waste management organizational structure, called on the agency to devote greater management attention and financial resources to waste management, and asserted the need for independent evaluation of the AEC's policies and practices.

The GAO review prompted the AEC to form a task force to review the waste management program. The task force, however, recommended only minor changes in the program and concluded that waste practices needed to be neither uniform at all AEC sites nor in conformity with the practices and standards set for the civilian sector.[43]

Rocky Flats, Idaho, and Transuranics

The event that shattered the AEC's complacency and irrevocably made defense nuclear wastes a public issue was the Rocky Flats fire of May 11, 1969. Monitoring following the blaze, which caused $45 million in damages, revealed previous contamination from a fire in 1957 and stirred local environmentalists and scientists to press the AEC for additional information. Over the next several months, the AEC grudgingly acknowledged the presence of airborne off-site plutonium contamination and plutonium-contaminated wastes buried both inside and outside the gates of the plant. Public focus on the Rocky Flats facility has continued unabated to the present.[44]

Shortly after the fire, the *New York Times* reported that an estimated 330,000 cubic feet of plutonium-contaminated waste from the Rocky Flats blaze was to be buried at Idaho. An Idaho businessman complained to the governor that the state was becoming a "dumping ground" for atomic waste. Idaho public officials and the local press quickly picked up on the issue, which rapidly escalated into a state-wide cause celebre as it became public knowledge that burying transuranic waste from Rocky Flats at Idaho was a long-standing practice. Senator Frank Church (D-Idaho) requested four separate federal agencies—the Bureau of Sport Fisheries and Wildlife, the U.S. Geological Survey, the U.S. Public Health Service, and the Federal Water Quality Administration—to determine the long-range implications of waste burial for the underlying aquifer. He also began an exchange of correspondence with Chairman Seaborg that became increasingly "unfriendly."[45]

By early 1970, the four federal agencies began reporting their findings to Church. Three agencies openly criticized the AEC's waste management activities at Idaho. Two called for the ultimate removal of the burial site to a more suitable location. Under pressure from Church, the AEC decided to abandon long-term storage at Idaho in favor of placing transuranic wastes with civilian high-level wastes in the salt mine at Lyons, Kansas. When the salt mine repository was fully operative, Seaborg informed Church, the AEC planned not only to store currently generated transuranic wastes at the site but also to excavate, process, and ship such

wastes to Lyons that were being "temporarily stored" at Idaho. Seaborg added that a "number of years" would be required to complete the transfer that hopefully would start "within the decade."[46]

Civilian and Defense Wastes

With the decision to dispose of transuranic wastes at the Lyons site, the distinction between civilian and defense wastes became even more blurred. Disposal of a portion of the defense wastes was now dependent largely on the fate of the civilian waste program.

By the end of 1970, nonetheless, the AEC was confident that the essential elements for the disposal of civilian and defense high-level wastes, which the agency continued to view as by far the most significant waste management hurdle, were now in place.
Firstly, fuel elements from civilian nuclear power reactors would be processed by commercial plants, and the high-level liquid wastes would be solidified and shipped to a federal repository. Secondly, the AEC would build a federal repository for permanent, irretrievable storage in a bedded salt formation, with the Lyons site serving as a demonstration facility. Thirdly, high-level defense wastes would be disposed of on-site at Hanford, Savannah River, and Idaho.[47]

High-level Waste Program Unravels

Almost before it was in place, the AEC's high-level waste policy began to come apart. Commercial fuel reprocessing was perhaps the weakest link in the waste disposal plan. A small unit owned by Nuclear Fuel Services, Inc., at West Valley, New York, was the only commercial reprocessing plant then in operation. The plant, which began operations in 1966, generated high-level liquid wastes. When the AEC promulgated regulations in November 1970 requiring solidification of wastes in a suitable form for disposal in a federal repository, West Valley could not meet the new requirements. Shut down in 1972 ostensibly for modifications, West Valley never reopened. Other commercial plants—at Morris, Illinois, and Barnwell, South Carolina—were under design but far from completion.

More contested and conclusive in its outcome was the demise of the Lyons, Kansas, project. Kansas officials, led by Congressman Joe Skubitz (R–Kansas), launched a concerted attack on the project on the basis that the will of the people of Kansas, and not mere technical feasibility, should determine whether the Lyons facility would be built. Complicating matters for the AEC, technical problems involving the integrity of the site were indeed forthcoming. In September 1971, the AEC stopped work on the Lyons project and quietly began seeking alternate sites.

Nor was the defense high-level waste program spared, as disposal plans for Savannah River were abandoned and those for Hanford discredited. At Savannah River, both Governor Jimmy Carter (D-Georgia) and Senator Ernest F. Hollings (D-South Carolina) questioned the wisdom of disposing of high-level wastes in the underlying bedrock. The Natural Resources Defense Council, one of the most effective environmental groups, criticized the AEC's approach as well. When in early 1972 the House Appropriations Committee slashed funding for bedrock disposal at Savannah River, the AEC decided to halt the project altogether.

Hanford's long-term efforts to solidify wastes directly in storage tanks rested to a large extent on maintaining the integrity of the tanks. Although since 1958 fourteen tanks had leaked, the AEC's Hanford contractor was confident that close monitoring and tank

replacement would control any leak problems. In spring 1973, however, a fifteenth tank began leaking 115,000 gallons of high-level waste. Monitoring workers discovered evidence of the leak as early as April 20, but responsible supervisors did not become aware of the problem until June 8. Subsequent investigation indicated that the operating contractor had neither effective operating procedures nor a reliable quality assurance program.[48]

The incident prompted harsh criticism of the AEC. The Union of Concerned Scientists, in a letter signed by Ralph Nader and others, accused the agency of negligence in using "primitive" storage techniques. Protesting the AEC's "imprudence" in allowing radioactive wastes to accumulate without first resolving the waste storage problem, the group demanded emergency action to recover the lost waste and immediate steps to correct the careless handling of wastes at Hanford.[49]

Reaction in the press was equally adverse. Particularly troublesome for the AEC was a sensational, and to a large extent inaccurate, article in the Los Angeles *Times* charging the agency with "mismanagement" that threatened "extensive areas of the United States with massive contamination." Delineating waste hazards throughout the nuclear weapons complex, the article concluded that the scope of the problem was "staggering."[50]

Reevaluation of High-level Waste Policy

During the last few years of its existence, the AEC concentrated its efforts on getting the civilian high-level waste program back on track. As an interim solution, the AEC proposed to design and build surface storage facilities at Hanford for solidified high-level commercial wastes. The facilities would be available for use by the end of the decade when the first quantities of civilian waste were ready for delivery. Design capacity would be sufficient to contain all commercial wastes generated during the remainder of the century. The transuranic defense wastes that were to have gone into the Lyons repository would be stored in separate, specially designed facilities. At the same time, the AEC determined to reorient research and development on bedded salt repositories toward construction of a pilot plant. Wastes stored in the underground pilot plant, including possibly transuranic wastes, would be under surveillance and control and easily retrievable. Search for a site for the pilot plant would concentrate on worked-out potash mines in New Mexico.[51]

Meanwhile, the AEC planned to evaluate long-term disposal options that were not presently technically feasible but offered potential advantages for later use. These included storage in non-bedded salt deposits, storage in other types of geologic formations, deep-sea disposal, extraterrestrial disposal, and conversion of radionuclides to stable nuclides.[52]

Similar efforts were not forthcoming on the defense side of the high-level waste equation. The AEC applied makeshift, interim solutions. The agency improved storage methods at Hanford and Savannah River by constructing more and better tanks and instituting better procedures to reduce leaks. The AEC indefinitely postponed consideration of the ultimate disposal of defense wastes.[53]

Remedial Activities

Even as it focused on reorienting its high-level waste program, the AEC in the early 1970s began its first concerted remedial actions to eliminate health hazards and alleviate environmental damage done since the beginning of the Manhattan Project. The two most

significant early programs were the Grand Junction Remedial Action Project and the Formerly Utilized Manhattan Engineer District/AEC Sites Remedial Action Project (FUSRAP).

The Grand Junction Project grew out of the indiscriminate use of uranium mill tailings as fill under and around streets, buildings, and other structures in the Grand Junction, Colorado, area. In 1966, the Colorado Department of Health and the U.S. Public Health Service determined that using tailings as fill posed a potential radiological health hazard. In 1970, the U.S. Surgeon General issued guidelines for determining the need for corrective action at the many locations throughout Grand Junction with increased levels of radiation exposure. Two years later, Congress authorized the Grand Junction Project to remove the tailings or use other techniques to meet the Surgeon General's guidelines. The AEC and its successor agencies worked jointly with the Colorado Department of Health in carrying out the project. The Department of Energy (DOE) completed the project in 1988.

The AEC established FUSRAP in 1974 to identify former Manhattan Project and AEC sites that were now under private ownership but in need of remedial action. When these sites were no longer needed, the Manhattan Engineer District and the AEC had cleaned them up according to the health and safety guidelines then in use. As guidelines became more restrictive over time, some of the sites that had been released for unrestricted use now officially presented potential radiological hazards. The AEC and its successor agencies were responsible for the cleanup of these sites. FUSRAP is an ongoing project.[54]

Demise of the AEC

The Energy Reorganization Act of 1974 abolished the AEC. The act transferred the agency's waste management and remedial action functions to the Energy Research and Development Administration (ERDA).

The AEC's legacy in dealing with radioactive waste was, to say the least, not altogether positive. Convinced that low-level waste was under control and assured that a technical solution could be found for the high-level waste problem, the AEC produced, stored, dumped, and buried millions of tons, gallons, and curies of radioactive waste. At the same time, the agency encouraged the growth of a civilian nuclear industry that would produce great quantities of additional radioactive waste. Through the late 1950s, the AEC's confidence was perhaps justified. Outside technical experts essentially agreed that the AEC's waste practices did not pose an environmental hazard. A still, small voice during most of the 1960s, dissent to the agency's practices grew exponentially during the last half-dozen years of the AEC. In 1965, AEC officials could state that the agency's waste management operational experience had been "more satisfactory than essentially any other facet of the nuclear fuel cycle." A decade later, ERDA officials agreed that the biggest uncertainties, both technical and administrative, involved "the back end of the fuel cycle."[55]

For all of the increasing outcry over radioactive wastes, the silent, unspoken, and largely unrecognized heritage passed on to ERDA was that dealing with hazardous wastes. For two decades there was no recognition at the highest levels of the AEC that hazardous wastes might pose a problem. Here, however, unlike with radioactive wastes, the AEC was not alone. The agency was probably no worse in its handling of hazardous wastes than most other major American industrial concerns. The AEC was perhaps better than most in dealing with hazardous wastes when those wastes were a component of mixed wastes. Because of the radioactive component, the AEC's handling of mixed waste was comparatively more conscientious than private industry waste practices. Indeed, those who questioned the AEC's

radioactive waste practices never singled out problems with hazardous waste practices. Hazardous wastes, nonetheless, were a major part of the multibillion dollar waste and cleanup bill inherited by the AEC's successor agencies. □

Part III: Energy Research and Development Administration, 1975-1977

Waste Management Reexamined

The AEC, shorn of its regulatory component that became the Nuclear Regulatory Commission (NRC), formed the major part of the newly created Energy Research and Development Administration (ERDA) in January 1975. The nuclear weapons complex—in its scope, mission, and management—remained largely unchanged. ERDA waste management officials were for the most part the same as the AEC officials. The new agency, nonetheless, brought the potential for change and new direction. Under continual public attack, the AEC staff had tended to become sensitive to criticism and thus less than imaginative and creative in formulating plans. As ERDA staff, however, the same officials could now disavow the errors and commitments of the past and take a fresh and unbiased look at waste disposal practices and problems.[56]

Two weeks after the agency was activated, ERDA officials convened a special task force to review all aspects of the nuclear fuel cycle. A month later, the task force reported that the back end of the cycle was "at a standstill." With West Valley shut down, spent fuel reprocessing was nonexistent. In addition, the technology for neither retrievable surface storage nor permanent geologic disposal had been demonstrated. The task force also noted the critical need for an agreement on a plan for the ultimate disposal of defense wastes. For both the civilian and defense programs, the task force concluded, early demonstration of permanent disposal technology was essential.[57]

Waste Management Reorganized and Reoriented

The special task force recommended that fuel cycle responsibilities be consolidated under a single ERDA organization. Since the late 1950s, commissioners, advisory groups, the GAO, and others had advocated similar integration of civilian and defense waste management to no avail. In July 1975, however, ERDA finally consolidated headquarters waste management activities, both civilian and defense, in an expanded division of nuclear fuel cycle and production. ERDA also created a new division of environmental control technology to oversee environmental and safety aspects of all ERDA programs including radioactive waste management. Long overdue, the reorganization afforded the ERDA headquarters staff the opportunity to develop a coherent policy on waste management.[58]

The new nuclear fuel cycle division moved quickly to reorient and enlarge the waste disposal program. A new conception of the waste management program, subtle but significant, aimed to place "multiple barriers" between civilian high-level wastes and the environment. Liquid wastes would be solidified and sealed in high-integrity containers. These would be placed in "terminal" repository in a deep, stable geologic formation. Because of the containers, a terminal repository could be either retrievable or irretrievable. This granted ERDA new flexibility, most significantly by opening up the possibility of multiple sites for terminal storage facilities. In addition, spent fuel elements themselves could constitute high-level waste and be transported and placed in repositories.

ERDA's commitment to an expanded high-level waste program was apparent in the fiscal year 1977 budget. Research and development for civilian wastes increased more than five-fold to almost $60 million, with funding for terminal storage leaping from $5 million to about $34 million. Defense waste research and development funding grew as well, increasing by 63

percent to more than $30 million. A smaller increase in funding for interim storage indicated that ERDA was concentrating on ultimate disposal of defense wastes.[59]

ERDA and Defense Wastes

ERDA officials attempted to move forward aggressively in resolving the long-term uncertainties in managing defense wastes. In May 1976, ERDA announced that it was preparing technical studies delineating alternative methods for long-term management of high-level wastes at Hanford, Savannah River, and Idaho. Comments on the studies would be used in preparation of programmatic environmental impact statements to assess in detail "all reasonable options" for high-level waste management.

Completed in 1977, the studies described a wide variety of feasible alternatives. The Savannah River study, for example, listed four primary options: 1) conversion of the waste to a solid and shipment off-site to a federal repository, 2) conversion of the waste to a solid and storage in an engineered surface facility on-site, 3) reconstituting the waste as a slurry and disposal in a bedrock cavern underneath the site, and 4) continued storage in tanks with the waste as salt cake and sludge. Accounting for costs, risks, and uncertainties, the Savannah River study noted that the cavern and tanks options were less expensive by a factor of ten. Clearly, there was no shortage of technological solutions. The problem lay in determining not only the relevant economic and other "soft" criteria but also the relative weight to be given that criteria in selecting a disposal system.[60]

ERDA officials concluded that, whatever ultimate disposal method was chosen, the programs at the three sites would be conducted sequentially and not concurrently due to funding limitations. Officials selected Savannah River as the lead location based on the sites "less favorable" environmental characteristics.[61]

Waste Isolation Pilot Plant

In early 1976, ERDA officials decided to build a waste isolation pilot plant (WIPP) in a bedded salt deposit near Carlsbad, New Mexico. ERDA intended to use the facility for the ultimate disposal of transuranic wastes from the defense program and for the performance of research and development with other waste materials in salt. The building schedule called for construction to begin in 1979 and for WIPP to become operational by 1985. An extended schedule for emplacement of transuranic material meant that such materials would not be fully removed from above-ground storage at Idaho until 1995.

Legally, ERDA could place transuranic wastes in WIPP without seeking a license from the Nuclear Regulatory Commission. In June 1977, however, ERDA officials decided that it was worthwhile to establish the credibility of WIPP, through outside independent analyses and public participation, as an acceptable operation. Officials recommended expanding the scope of WIPP to allow its acceptance of high-level defense wastes. This would require NRC licensing and permit demonstration tests on unreprocessed commercial fuel. No decision on this issue was forthcoming under ERDA.[62]

Civilian High-level Waste

On October 28, 1976, President Gerald R. Ford issued a major statement on nuclear policy. Because of concerns about nuclear proliferation aspects of plutonium recycle, he directed

ERDA to change policies based on the assumption that fuel reprocessing would proceed. In addition, he directed ERDA to demonstrate a complete high-level waste repository by 1985.[63]

Earlier in the year, ERDA had begun a nationwide survey of potential repository sites. Following President Ford's statement, the agency announced the expansion of its survey program. ERDA planned geologic investigations for thirty-six states, with exploratory drilling in thirteen of those states. ERDA envisioned the construction of six repositories: two each in salt, shale, and granite by the year 2000. The first two repositories, in salt formations, would be operational by 1985. Difficulties with the survey program, however, soon arose. Exploratory drilling in Michigan aroused the ire of the governor, and ERDA conceded the states a role in developing "appropriate and workable" procedures for determining the acceptability of potential sites.[64]

On April 7, 1977, President Carter formally declared that the United States would defer "indefinitely" all processing of spent fuel from civilian power reactors. The President called on other nations to join in the deferral in order to reduce the risk of nuclear proliferation. The decision eliminated any immediate requirement for commercial reprocessing plants and suggested that additional surface facilities would be needed for storing spent fuel assemblies. The decision also raised the possibility that terminal repositories would be used for spent fuel assemblies rather than for solidified wastes.[65]

Demise of ERDA

The Department of Energy Organization Act of 1977 abolished ERDA. The act transferred the agency's waste management and remedial action functions to the Department of Energy (DOE).

During its brief existence of less than three years, the agency could boast of positive accomplishments in the field of waste management. ERDA had reorganized and streamlined administration so that at long last both civilian and defense waste management were under one roof. In the area of defense wastes, ERDA had decided to build WIPP for transuranic wastes and had structured the process whereby a decision on ultimate disposal of high-level wastes would be possible in the not-to-distant future. In the area of civilian wastes, ERDA had made the commitment to demonstrate a high-level waste repository by 1985.

Numerous waste management issues, nonetheless, were left for the new Department to resolve. The fuel reprocessing deferral decision of April 1977, for example, made necessary extensive reorganization of the high-level waste disposal program. Thus, in late September, ERDA Acting Administrator Robert W. Fri informed incoming Secretary of Energy James R. Schlesinger that "key decisions" would be required for both the defense and commercial waste management programs. Fri noted several major issues requiring "immediate" attention and resolution. These included whether WIPP should be expanded to include high-level defense wastes and what combination of interim storage and geologic facilities should be used for storing spent fuel assemblies.[66] □

Part IV: DOE and Radioactive Waste Management, 1977-1989

Department of Energy Organization

On October 1, 1977, the Department of Energy became the twelfth cabinet level department in the Federal Government. ERDA carried over in its entirety, formed the major part of the new department. The Federal Energy Administration, the Federal Power Commission, and assorted components of Interior, Commerce, and other agencies formed the remainder. The unified Department employed about 20,000 people and had a budget of $10.4 billion. DOE did not simply organize existing agencies and offices under new leadership but reshaped many programs and functions to fit the Carter administration's national energy policy. Energy technologies were not divided by fuel type, such as fossil, nuclear, or solar, but grouped under assistant secretaries according to their evolution from research and development through application and commercialization. The nuclear weapons complex, including materials production, fell largely under the authority of the office of defense programs.

In the legislation creating the Department, Congress was quite specific in delineating DOE's responsibilities regarding waste management. The organization act instructed the Department to "establish control" over "all existing nuclear waste" owned or held by the Federal Government and "all commercial nuclear waste presently stored on other than the site of a licensed nuclear power electric generating facility." The act also told the Department to establish programs and facilities for the treatment, management, storage, and disposal of nuclear wastes.[67]

Carter administration officials placed waste management functions, both civilian and defense, within the office of energy technology. Secretary of Energy Schlesinger expressed his intent to move waste management to the office of environment. "I think it's a program with high environmental components," he told the House Science and Technology Committee. "I think there will be a greater competence and perhaps a greater pursuance of that program if we make the change." Waste management, nonetheless, remained in energy technology during Schlesinger's tenure.[68]

Waste Management Reexamined Again

As ERDA had three years earlier, DOE formed a priority task force to assess current nuclear waste management programs, identify significant outstanding issues, and explore alternative courses of action. The task force's emphasis, a department official explained, was on commercial wastes because internally DOE did not have "institutional problems" with its own defense wastes. "As far as our own nuclear waste is concerned," the official noted, "we can manage that by setting internal policies and programs and asking Congress for money, then solving the problems ourselves. It's not so much a public issue as the commercial program is."[69]

The task force completed its report in February 1978. On the civilian side, the task force affirmed the ultimate disposal of high-level wastes in a geologic repository. Under the best of circumstances, a repository would not be operational for at least a decade. What was "vitally needed," the task force concluded, was further research and development in bedded salt and technical demonstration of the emplacement of spent fuel in a monitored facility. WIPP would meet these requirements, but current planning limited the site to defense wastes. The task

force thus recommended that WIPP be used for civilian waste research and development and demonstration as well. A moderate-scale demonstration of spent-fuel emplacement at WIPP would require licensing and regulation by the NRC. The task force also observed that legislation to permit land withdrawal would be needed to allow departmental use of WIPP.

As for placing high-level defense wastes in WIPP, the task force believed that this was not a viable near-term consideration. Although the general assumption was that permanent disposal in a geologic repository would ultimately be required, too many decisions and actions still needed to be accomplished. Besides the lengthy decision-making process required, facilities would have to be built at Savannah River and Hanford to prepare the waste for shipment off-site. The task force noted that there was an "aggressive overall program" for high-level defense wastes. This program, the task force concluded, should be continued at the same approach and pace.[70]

Interagency Review Group

The task force highlighted the need to develop a national nuclear waste management policy. The task force stated that for any nuclear waste management policy to be credible it must reflect the views of involved government agencies, Congress, the states, local governments, industry, the scientific and technical community, and other members of the public. In response to these findings, President Carter on March 13, 1978, established the Interagency Review Group to make recommendations on the long-term management of nuclear wastes. Chaired by the Secretary of Energy, the group was composed of representatives from fourteen interested federal agencies. The group provided for "appropriate participation" by the public.

In its report released the following March, the group questioned the need not only for an early demonstration of spent-fuel storage at WIPP but also for a transuranic waste repository itself. Because U.S. Geological Survey studies had found potentially significant minuses at each of the near-term sites that DOE had under consideration, the group argued that emphasis should be placed on a renewed search for alternate geologic sites.[71]

Administration Infighting, WIPP Under Attack

The Department of Energy was no longer in control of the waste management decision-making process. Radioactive waste was now a major national issue, and the White House and Congress had become lead players in determining policy. Disagreeing with the Interagency Review Group's arguments on both WIPP and the search for alternate sites, the Department exerted considerable effort to influence policy outcomes. Intense infighting delayed for nearly a year the administration's issuance of a waste management policy statement.[72]

During this period, WIPP came under considerable attack from both the administration and Congress. Bowing to considerable congressional pressure, DOE in May 1979 decided that WIPP—if it was ever built—would be an unlicensed facility for defense wastes. The Senate and House Armed Services committees, with jurisdiction over DOE's defense programs, opposed plans to store commercial fuel at WIPP and indicated that WIPP would not be funded if it had to be licensed. A DOE official noted that the Department still supported the concept of licensing all facilities but "Congress has made it very clear that it will not permit licensing."[73]

The administration, by contrast, was not enthusiastic with WIPP as an unlicensed defense facility. In December, the Office of Management and Budget slashed the Department's budget request for WIPP. The budget cut reflected the White House's decision to cancel plans to begin building the facility in 1981. Enough funds remained to continue some research and development on the site.[74]

Carter and the Nation's First Comprehensive Program

On February 12, 1980, President Carter announced the Nation's "first comprehensive radioactive waste management program." Noting that past governmental efforts to manage radioactive wastes had been "technically inadequate" and had failed to involve successfully the states, local governments and the public, Carter asserted his intention "to lay the foundation for both a technically superior program and a fully cooperative federal-state partnership to ensure public confidence in a waste management program." He stated that his program would establish comprehensive control for "all" types of radioactive waste.

Following the recommendations of the Interagency Review Group, Carter adopted an "interim planning strategy" on the disposal of high-level wastes. DOE would mount an "expanded and diversified" program of geologic investigations in a variety of rock types. Gone was the Department's emphasis on salt as a the storage medium. Only after a full environmental review, Carter noted, would a site be selected for the first full-scale repository. This decision would be made about 1985, and the repository would be operational by the mid-1990s.

Significantly, the President made no distinction between high-level civilian and defense wastes. For "reasons of economy," the first and subsequent repositories would accept both commercial and defense wastes. High-level defense wastes would therefore be solidified on-site and disposed of off-site. Carter stressed that DOE would "ensure close and meticulous control" over defense waste facilities vital to the national security. "I am committed," he said, "to maintaining safe interim storage of these wastes as long as necessary and to making adequate funding available for that purpose. We will also proceed with research and development at the various defense sites that will lead the processing, packaging, and ultimate transfer to a permanent repository of the high-level and transuranic wastes from defense programs."

Carter also confirmed the cancellation of WIPP. The project, he observed, was authorized for the unlicensed disposal of transuranic waste from the defense program and for research and development using high-level defense waste. This was inconsistent with his "policy that all repositories for highly radioactive waste be licensed, and that they accept both defense and commercial wastes." The President noted that the NRC had authority to license the disposal of high-level waste and low-level waste in commercial facilities. He called for the extension of this authority to include spent fuel storage and the disposal of transuranic waste and non-defense low-level waste in any new government facilities.

Carter emphasized the need for input from all concerned parties. He established the State Planning Council to advise the executive branch and work with Congress on planning and siting issues. He directed DOE to provide financial and technical assistance to states and other jurisdictions to assist in review and licensing proceedings. Finally, he ordered DOE to work jointly with states and others in developing national plans to establish regional disposal sites for commercial low-level waste.[75]

Congress: Defense Wastes, WIPP, and Commercial Low-level Wastes

In his radioactive waste policy statement, President Carter called for legislation implementing various components of his program, including federal away-from-reactor storage facilities for commercial spent fuel and assistance to states in managing commercial low-level waste. Efforts to produce a comprehensive bill during the 1980 session failed when senators could not agree on the role of the states in the disposal of high-level defense wastes. Henry M. Jackson (D-Washington), chairman of the Senate Energy Committee and second-ranking Democrat on the Armed Services Committee, demanded that states be prohibited from objecting to defense waste repositories built within their borders. John Glenn (D-Ohio), chairman of the Senate Governmental Affairs Subcommittee on Energy and Nuclear Proliferation, insisted that states should have the right to oppose any waste site, subject to congressional review.

Despite Carter's pronouncement on merging civilian and defense repositories, a separate defense facility was hardly a dead issue. Indeed, WIPP remained very much alive. Congress rejected the President's request to rescind funding for the facility. "The will of Congress has been clear," the House Armed Services Committee stated, that WIPP should go forward as planned. The Senate Armed Services Committee stressed that cancellation of WIPP would "significantly hamper defense weapons activities." WIPP, the committee added, should be built "solely for defense wastes."

Carter's only legislative success was with commercial low-level waste. With only three states having disposal sites, and these threatening to close, the problem with what to do with low-level commercial wastes was approaching the "crisis stage." The Low-Level Radioactive Waste Policy Act of 1980 made the disposal of commercial wastes a state responsibility. States could construct their own disposal sites or form compacts to establish regional burial sites. Wastes generated by DOE would not be the responsibility of the states, and the regional compacts could not make policies affecting federal waste. The act limited DOE involvement to evaluating existing burial and transportation problems. In 1985, however, amendments to the act required the Department to provide technical and financial assistance for certain categories (Greater-Than-Class C) of low-level waste.[76]

The Reagan Administration and WIPP

Ronald Reagan's election to the presidency had potentially significant impact on both the Department of Energy and the Department's waste management policy. During the 1980 campaign, Reagan had advocated the abolition of the Department. This proved not to be a major priority of the new administration, and congressional opposition helped forestall the effort. Radioactive waste management was a more important issue, certainly for Congress and the Nation, and Reagan could have attempted a radical redirection of the previous administration's policy. During the tenure of the Atomic Energy Commission, presidents had come and gone and waste policy was largely unaffected. By the 1980s, this was no longer the case. Radioactive waste, at least on the civilian side, had become a controversial political issue.

On October 8, 1981, Reagan announced his policy initiatives on nuclear energy. Waste management was an important component of this policy. The president instructed the secretary of energy to work closely with industry and the states and to "proceed swiftly toward deployment of means of storing and disposing of commercial, high-level radioactive

waste." This was in essence what Carter was trying to do. Where Reagan differed was in his advocacy of commercial fuel reprocessing, which had little ultimate impact because reprocessing remained a dead issue.[77]

More significantly, on the defense side, Reagan reversed Carter's decision on WIPP. Only a week into the new administration, the Department issued a record of decision document indicating that WIPP should be built as soon as possible as a defense facility for transuranic waste. DOE sought $80 million for fiscal year 1982 to move forward with WIPP. A month later, the budget-cutting administration slashed the request almost in half. Later in the year, the Office of Management and Budget, as it had similarly done two years earlier under Carter, cut $98 million from the $125 million requested by DOE for fiscal year 1983. Unlike with Carter, however, Secretary of Energy James B. Edwards successfully appealed the decision, and the full amount was restored.[78]

Waste Management Reorganization

Had Reagan been successful in abolishing the Department, civilian and defense waste management probably would have been separated and placed in different agencies. Although the Department endured, a unified waste management organization did not. Nonetheless, Congress, and not the administration, was primarily responsible for returning to an organizational arrangement similar to that existing under the AEC. Because civilian radioactive waste had become such a controversial political issue, the congressional Armed Services Committees were eager to distance defense from civilian waste management. The committees feared that potential licensing, legal, and other disputes might entangle defense as well as civilian wastes. In the fiscal year 1981 defense authorization bill, Congress mandated that the programs be separated.

The Department opposed the change. DOE informed Congress that the two programs would be more effective together. Separation would cause duplication of effort. Research and development on alternatives for long-term management of airborne, low-level, and high-level wastes was essentially the same, whether the wastes were civilian or defense. The committees, however, were eager to break the linkage. In September 1981, DOE transferred defense waste programs, comprising an annual budget of some $300 million, from the Office of Nuclear Energy to the Office of Defense Programs. Civilian wastes remained in nuclear energy.[79]

The Nuclear Waste Policy Act of 1982

Failing to pass a comprehensive nuclear waste bill in 1980, Congress was eager to try again. The new administration, as well, sought resolution of the uncertainties involving the civilian waste program. Once more, the question of including defense wastes in the legislation threatened to scuttle the entire effort. The Department urged that defense wastes be kept out. Putting defense wastes in a repository would complicate funding for the civilian high-level waste program that would be funded with utility fees. On the other hand, the Department did not want Congress precluding the possibility of putting solidified defense wastes in a repository.

After months of laborious deliberations and a few hectic hours of resolving outstanding issues at the end of a lame duck session, Congress on December 20, 1982, finally passed the Nuclear Waste Policy Act. The act exempted defense wastes from most provisions. If defense

wastes were placed in a civilian repository, the act stated, then the Federal Government would pay its pro rata share of the cost of developing, constructing, and operating the facility. The act required a decision by January 1985 as to whether the two types of waste should be disposed of together. The law favored joint disposal unless the President decided otherwise.

The act established a timetable to achieve a permanent high-level repository by the mid-1990s. The Department would study five potential sites, and the secretary of energy would recommend three of those sites to the president by January 1, 1985. For a second repository, five additional sites would be studied and three recommended by July 1, 1989. The president would recommend to Congress an initial site by March 31, 1987, and a second by March 31, 1990. States could veto the site selection, unless the veto was overruled by a vote of both houses of Congress within ninety days. The act also required the secretary of energy to report to Congress by June 1, 1985, on the need for and feasibility of a monitored, retrievable storage facility.[80]

On January 7, 1983, President Reagan signed the act at the White House. The Nuclear Waste Policy Act of 1982, he noted, provided the "long overdue assurance that we now have a safe and effective solution to the nuclear waste problem." The act cleared the "barrier" that stood in the way of developing nuclear power and allowed the Federal Government to "fulfill its responsibilities concerning nuclear waste in a timely and responsible manner."[81]

High-level Defense Wastes

The slow, deliberate process of resolving the issues surrounding the ultimate disposal of high-level defense wastes continued throughout the 1980s. In fall 1981, the Department of Energy issued a draft environmental impact statement (EIS) on disposal of Savannah River high-level wastes. DOE concluded that geologic disposal of solidified wastes was significantly preferable to other alternatives. The Department proposed building a Defense Waste Processing Facility (DWPF) on-site to process for disposal approximately 25 million gallons of high-level waste stored in tanks. Expected costs for the facility were more than $900 million to build and about $25 million per year to operate. DOE anticipated that the DWPF would be operational by the end of the decade and could process all existing wastes in about 15 years.[82]

The Department still had to decide where to dispose of the solidified high-level waste. In August 1984, DOE tentatively concluded that civilian and defense wastes should be disposed of at the same federal repository. Although the Department addressed national security, transportation, and health and safety issues, the deciding factor was the estimated savings to the government of nearly $2 billion. A combined repository would cost $6.2 to $7.9 billion. Separate civilian and defense repositories would cost $5.5 to $6.4 billion and $2.3 to $3.1 billion respectively, with a total cost of $7.8 to $9.5 billion. In spring 1985, President Reagan approved the Department's decision.[83]

High-level Waste Repository in Doubt

In spite of the general blueprint laid down by the Nuclear Waste Policy Act of 1982, actual siting and building of a high-level waste repository for civilian and defense wastes was becoming increasingly problematical. The difficulties were largely political and not technical. The 1982 act was flawed, but the Department itself, in the words of science writer Luther

Carter, was "insensitive to land-use and environmental conflicts that greatly alarm the public, intensify host-state resistance, and make geologic uncertainties all the more important."[84]

The 1982 act promised potential host states a rational, participatory siting process but required the Department to notify the states of "potentially acceptable sites" within ninety days of the act taking effect. The time constraints virtually assured that the Department would select sites currently under consideration, sites that the host states had no voice in selecting. The five candidate sites chosen were bedded salt deposits in Deaf Smith county, Texas, and near Canyonlands National Park, Utah; a salt dome near Richton, Mississippi; basalt on the Hanford reservation; and volcanic tuff at Yucca Mountain near the Nevada Test Site.

In May 1986, DOE announced the selection of the Hanford, Nevada, and Texas sites for further characterization. The three states involved immediately filed lawsuits challenging the decisions and how they were reached. Something other than technical suitability, it was claimed, had influenced the process. Hanford, for example, had ranked fifth as far as advantages and disadvantages, yet made the list. In addition, the states disputed the Department's methodology. Against the advice of the National Academy of Sciences' Board on Radioactive Waste Management, DOE never had its assumptions and conclusions reviewed by an independent panel of experts. Reliance on inhouse expertise alone, the board had cautioned, could introduce bias and "mask the degree of uncertainty" involved.

What particularly irritated the three Western states, however, was the simultaneous announcement by the Department that the site screening for a second repository, to be located in the upper Midwest or the East, had been suspended indefinitely. With twelve sites in seven different states still under consideration, the Department and the White House had been inundated by pleas to halt the process from citizens, governors, and members of Congress. The nuclear industry as well, fearing the effort was mobilizing massive opposition, backed away from a second site.[85]

Secretary of Energy John S. Herrington denied that politics had played a role in the Department's suspension of the search for a second site. Based on projected levels of nuclear waste, the Department estimated that there would be no need to develop a second site study until the mid-1990s. Herrington saw no point in spending money on a second study with nuclear power itself in the doldrums. "The important thing is to get the first one," he advocated. Subsequently, the Department could develop monitored retrievable storage and a second site, if necessary.[86]

Yucca Mountain

With fierce opposition from the three states and the process showing signs of starting to unravel, Congress simplified selection of a high-level waste site with the Nuclear Waste Policy Amendments Act of 1987. The act, shepherded through Congress under the adroit leadership of Senate Energy Committee Chairman J. Bennett Johnston (D-Louisiana), designated the Yucca Mountain site in Nevada as the only candidate site. Activities at the Texas and Washington sites were terminated. The act also authorized a monitored retrievable storage facility, but not until the licensing of the permanent repository, and canceled language in the 1982 law calling for a second repository. In essence, the 1987 act reversed the participatory measures of the 1982 law, which had declared that site selection would be based purely on science and safety and not politics. "We've done it in a purely political

process," commented Representative Al Swift (D-Washington). "We are going to give somebody some nasty stuff."

Nevadans were, indeed, irate. "No one from our state has been permitted to participate or argue for our interests," complained Representative Barbara F. Vucanovich (R-Nevada). This "will turn our state into a federal colony," she added, "Congress is behaving like a pack of wolves going in for the kill." Senator Harry Reid (D-Nevada) agreed. "When you rub all the fog off this window," noted Reid, "you look in and you see base power politics at its worst." Nevada, he added, had been "shut out completely." "They weren't shut out," Johnston responded. "They just weren't appointed to the conference."[87]

Aside from Nevadans, most everyone else welcomed the act. Officials from the Department and the nuclear utility industry stated that the act offered assurances that construction of a waste repository would proceed at an acceptable pace. Delays were still possible. Nevada could veto the project, but, as Johnston noted, "that veto would be, I am sure, overridden." Nevada could also bring suit. Nevada Governor Richard Bryan, terming the act a "legislative atrocity," promised the state would use every legal remedy to oppose the decision. A further complicating factor was that if the Yucca Mountain site proved unacceptable for environmental or other reasons there would be no available alternative site.[88]

WIPP

Following $700 million in expenditures and seven years in construction, WIPP was ready to begin receiving waste shipments by the end of 1988. The facility possessed a capacity for about 800,000 barrels of transuranic waste. DOE planned a five-year test period during which 25,000 and 125,000 barrels would be placed in WIPP. Only after the five-year test could WIPP be qualified as a permanent disposal site. Critics—scientists, environmentalists, members of Congress—contended that until all outstanding issues were resolved, presumably only at the end of the five years, minimal waste material should be stored at WIPP. In their view, the Department's plans did not constitute a minimal amount of waste material. DOE responded that a large amount of material was needed to demonstrate that the facility could be managed effectively.[89]

Environmental and political uncertainties threatened to delay even a minimal test phase. Experiments conducted during the mid-1980s indicated the potential for salt creep, where the floor and ceiling would gradually come together, and cracking. Scientists estimated that in a decade, with the presence of heat-producing wastes, the height of a room would diminish by eight feet. Although this was not necessarily detrimental for the permanent disposal of low-heat producing transuranic wastes, the phenomenon did complicate any planned retrievability during the test phase. Water seeping into the facility and creating a slurry of brine and radioactive particles was also a concern. Further complicating the Department's task was the presence in the transuranic wastes of solvents and other chemicals subject to Environmental Protection Agency rules governing hazardous wastes. Finally, the Department needed permanent land withdrawal legislation before it could begin loading wastes into WIPP.[90] □

Part V: DOE and Hazardous Waste Management, 1977-1989

Resource Conservation and Recovery Act

Prior to World War II, industry in the United States annually generated about 500,000 metric tons of hazardous waste. By the 1970s, annual generation of hazardous waste had risen to over 200 million metric tons. Similar growth in the ability to manage these wastes, unfortunately, had not taken place. As a result, Congress in 1976 remodeled the Solid Waste Disposal Act, which primarily addressed the disposal of nonhazardous waste, into a major new program on hazardous waste. In the new law, the Resource Conservation and Recovery Act (RCRA), Congress sought to encourage more than simple pollution control. The congressional intent was to discourage the production of hazardous wastes and encourage the development of advanced forms of material recycling and recovery.

Enforcement of RCRA was the responsibility of the Environmental Protection Agency (EPA). Congress charged the EPA with issuing regulations concerning generation, transport, treatment, storage, and disposal of hazardous waste. Essentially, EPA was to regulate the management of waste from "cradle to grave." Congress gave EPA authority to delegate hazardous waste management to states that established programs that were at least as stringent as the EPA program.

Delegating broad initial authority to the EPA, Congress, nonetheless, gave little guidance on how to develop a complete hazardous waste management program. RCRA left EPA to make its own decisions on the scope and requirements of the regulatory program. Eventually, EPA developed a complex regulatory program, featuring 1) detailed reporting procedures establishing continuous accountability in handling hazardous waste from generation to disposal, 2) strict technical standards for treating, storing, or disposing of hazardous waste, and 3) a permitting system requiring adherence to technical standards as a prerequisite to granting an operating license for a hazardous waste facility.[91]

DOE and RCRA

The initial implementation of RCRA by EPA, nonetheless, was disappointing. The agency missed deadlines for issuing regulations implementing the new law. EPA did not propose the first RCRA regulations until May 1980, and the new regulations were not effective until November.[92]

When EPA proposed the regulations, the Department of Energy concluded that RCRA did not apply to the hazardous wastes generated by the nuclear weapons complex. In defense of its position, the Department cited Section 1006(a) of RCRA. This section stated that RCRA did not apply to "any activity or substance" subject to the Atomic Energy Act of 1954 except where RCRA was "not inconsistent" with the Atomic Energy Act. In other words, the Atomic Energy Act took precedence over RCRA. Taking a broad view, the Department interpreted this to mean that RCRA itself did not apply to the Department's nuclear weapons complex. Although the Defense Department recognized RCRA as applicable to its facilities, EPA accepted DOE's interpretation of the law.[93]

In exempting itself from RCRA, the Department was not necessarily presuming license to do whatever it wanted with its hazardous wastes. The nuclear weapons complex operated under hazardous waste standards that, as one DOE attorney put it, were comparable to, but not as specific, as the RCRA standards. In addition, DOE did not completely seal off the

complex. EPA had access, albeit limited because of the sensitive nature of the defense facilities, and the Department cooperated with various state officials in minimizing waste problems. The Department refused, however, to recognize either EPA or state authority over hazardous wastes. "There seems to be a line drawn that a technician can't cross," noted one South Carolina official. "That line seems to stop short of getting state permits or paying penalties."[94]

Reagan's Antienvironmental Revolution

Efforts to implement RCRA throughout industry were impeded by what one scholarly observer has termed "the Reagan antienvironmental revolution." Previous Democratic and Republican administrations had, to varying degrees, responded favorably to environmental objectives. In January 1981, the Reagan administration, however, proceeded with a determined commitment to reverse the prevailing environmental tide. The environmental movement, in the administration's view, had been taken over by "radical extremists." As did most of the business community, the administration believed that two decades of environmental activism had stunted economic growth and unjustifiably inhibited business activity. From an ideological perspective, the administration thus sought to reduce governmental action, including regulatory activity, and enhance the private sector. The administration's central strategy was to change policy by changing policy makers.[95]

EPA was particularly hard hit by the reorienting of environmental policy. In May 1981, Senate Environment and Public Works Committee Chairman Robert T. Stafford (R-Vermont) questioned new EPA Administrator Anne Gorsuch about reports of low morale at the agency and a personnel attrition rate of one percent per month. The scene depicted, Stafford noted, was of "an agency in agony, with its senior officials under siege." The situation would get worse before it got better. In early February 1983, the agency became headline news when Gorsuch asked Rita Lavelle, assistant administrator for the EPA's hazardous waste programs, to resign and Lavelle refused. Gorsuch had been frustrated with Lavelle's management of the hazardous waste program, but the immediate issue was a draft memorandum to the White House in which Lavelle accused the EPA lawyers of "systematically alienating the primary constituents of this Administration, the business community." President Reagan himself was forced to fire Lavelle.[96]

Under these circumstances, EPA's development of a hazardous waste regulatory program suffered. Key RCRA provisions, such as permitting standards for land disposal facilities, remained unissued. The agency withdrew a regulation prohibiting disposal of liquid hazardous wastes in landfills. Public outcry, however, forced the president's advisers to overrule EPA. In addition, industry was not adopting environmentally preferred alternatives, such as waste treatment, reduction, and recycling. Despite RCRA, industry found it less expensive to dispose of hazardous waste by placing it in landfills, surface impoundments, or underground injection wells without treatment or recycling.[97]

NRDC and LEAF Sue DOE

With EPA prostrate, pressure for the Department of Energy to conform to RCRA came from another quarter. In early 1983, a federal employee charged that there were pollution problems at DOE's Oak Ridge complex. In May, the Department admitted that it had released two million pounds of mercury from the Y-12 Plant at Oak Ridge between 1950 and 1977.

The resulting uproar prompted the Natural Resources Defense Council (NRDC) and the Legal Environmental Assistance Foundation (LEAF) to bring suit against DOE in federal district court. The state of Tennessee also intervened as a plaintiff to protect its interest in hazardous waste regulation. The plaintiffs alleged that the Department was in violation of RCRA and asked for a declaration that RCRA did apply to the Y-12 facility.

The Department argued in court that application of RCRA to Y-12 was inconsistent with the Atomic Energy Act of 1954. RCRA subjected federal facilities to state regulation, the Department noted, but the Atomic Energy Act precluded state regulation of DOE activities. In addition, RCRA gave EPA, state, and local officials the authority to set standards for waste disposal, yet the Atomic Energy Act placed that authority with DOE. Finally, the Atomic Energy Act restricted dissemination of classified information pertaining to nuclear weapons and material, but RCRA would subject this information to public disclosure.[98]

EPA vs. DOE

As the suit against the Department proceeded, the moribund EPA began to show signs of life. By 1983, the Reagan administration realized that its environmental policies had become so controversial that changes were required. President Reagan replaced Gorsuch as head of EPA with William Ruckelshaus, who had served as the agency's first administrator during the Nixon administration. Ruckelshaus believed that EPA had become politicized and ineffective. Viewing his task as one of restoring the agency's professionalism and its credibility with the public, Ruckelshaus replaced EPA's top personnel.[99]

In fall 1983, a reinvigorated EPA asserted that RCRA did indeed confer upon EPA and the states authority to regulate DOE's hazardous waste. Following several months of negotiations, DOE and EPA struck a compromise. Under a memorandum of understanding signed by Secretary of Energy Donald Hodel and Ruckelshaus, DOE's facilities would not be subject to RCRA but would be held to certain RCRA standards. The agreement gave EPA the right to inspect DOE's defense plants but precluded state inspections.

A NRDC attorney called the compromise a "real disappointment" and "a retreat." The attorney criticized EPA for concurring with DOE in excluding state inspectors from the weapons plants. No more threat to national security existed from a state inspection, the attorney noted, than from an EPA inspection. An EPA official, however, defended his agency's willingness to compromise on the issue. The memorandum of understanding, the official observed, allowed EPA to pursue basic RCRA objectives "on an interim basis" until the law suit was resolved. A DOE official commended the EPA for turning "its attention from a legal dispute to solving a pollution-abatement problem."[100]

The day after the agreement was signed, federal attorneys sought dismissal of the NRDC suit. In a brief, government attorneys characterized the memorandum of understanding as "the optimal resolution" of complaints raised by the plaintiffs. "The court should note," the brief stated, "that EPA and DOE share the plaintiffs' concern for the environmental damage which could be caused by improperly handled hazardous waste." The attorneys justified their position by observing that the government could not ignore the national security implications posed by state regulatory control. The court, nonetheless, rejected the request for dismissal of the suit.[101]

LEAF vs. Hodel

On April 13, 1984, the court found that the Department of Energy was in violation of RCRA. Judge Robert Taylor ruled that the Department had failed to demonstrate that compliance with RCRA would result in the disclosure of classified information. "The Court can no more assume," Taylor stated, "that the RCRA would require defendants to disclose restricted nuclear material data than it could assume that the RCRA would require private business to disclose trade secrets." The judge thus ordered the Department to seek a RCRA permit "with all deliberate speed" for the treatment, storage, and disposal of hazardous waste at the Y-12 facility.[102]

Although the court imposed neither an injunction nor civil penalties on the Department, the plaintiffs were well-pleased. They believed that the ruling set a department-wide precedent. "This will send a message to every DOE facility in the nation," noted LEAR attorney Gary Davis. "It is precedent. We think DOE will have to come into compliance throughout the country." Technically, the court ruling was applicable only to the Y-12 plant, but Department officials did not necessarily disagree with the plaintiffs' assessment. The Department's response to the decision, one official noted "undoubtedly will have inevitable consequences for the entire defense complex."[103]

Full compliance, the Department realized, could be very expensive. A DOE report indicated that remedying past pollution problems and bringing all facilities into compliance with RCRA at Oak Ridge would cost an estimated $500 to $600 million between 1984 and 1988 and an additional $200 to $300 million afterwards.[104]

Mixed Waste

The Department decided not to appeal the LEAF vs. Hodel ruling. DOE officials continued to believe that they were correct in contending that defense hazardous wastes were not subject to RCRA, but they were doubtful of prevailing in an appeal. Further litigation might also disrupt operations. Instead, the Department took another tack. In an environmental impact statement for the Savannah River L-Reactor issued in May 1984, the Department stated that it did not consider mixed waste—waste containing both hazardous chemicals and solvents and radioactivity—as subject to RCRA. This was not a trivial distinction. Subsequent studies indicated that almost half the waste streams at Hanford and fully two-thirds at Savannah River contained mixed wastes.[105]

Lawyers for the NRDC and LEAF rejected this interpretation. They contended that the LEAF vs. Hodel ruling affirmed the position that RCRA applied to mixed waste as well as hazardous waste. "With respect to mixed waste," NRDC and LEAF attorneys wrote EPA Administrator Ruckelshaus on June 14, "we are concerned that, despite the court's ruling that all hazardous wastes managed by DOE are covered by RCRA, DOE may once again attempt to evade its RCRA responsibilities by claiming an exemption for hazardous waste streams that contain radioactive material." A DOE official countered that NRDC and LEAF were taking an "expansionist view" of the court order. Department officials, he stated, "don't view" the order as subjecting mixed waste to RCRA. A letter from EPA Assistant Administrator Lee Thomas to NRDC attorney Barbara Finamore on August 13 made it clear where EPA stood. Thomas wrote Finamore that "we, of course, share your view that under the LEAF v. Hodel decision, DOE facilities operating under the Atomic Energy Act are subject to the requirements of RCRA." While it was true that the decision applied only to the Y-12 plant, Thomas added, "we are proceeding to apply it nationwide."[106]

In August, Energy Secretary Hodel and Ruckelshaus agreed on a program to implement RCRA at DOE weapons facilities. With the agreement, the Department officially recognized RCRA as applicable to hazardous wastes except when national security might be an issue. The two agency heads set up a task force to identify instances where application of RCRA would be inconsistent with the Atomic Energy Act. A DOE attorney noted that DOE's compliance with RCRA "should not be held in a state of suspended animation" until possible conflicts were resolved. "In instances where it's clear-cut that chemical waste treatment or disposal requires a RCRA permit," he added, "we should be prepared."[107]

Hazardous and Solid Waste Amendments (HSWA)

At the same time the court was forcing RCRA on DOE, Congress grew increasingly impatient with EPA's lack of enforcement of the statute. By September 1984, for example, only five of the Nation's thousands of land disposal facilities had actually received RCRA permits. Congress thus decided to take "drastic action" and force the realization of its intent by enacting major modifications to RCRA in the Hazardous and Solid Waste Amendments (HSWA) of 1984. The amendments contained levels of detail unprecedented in environmental law. HSWA closed loopholes and removed EPA's decision making discretion by using "hammer provisions." These provisions were self-enacting. If EPA failed to issue regulations by strict deadlines, then stringent HSWA requirements would automatically go into effect.

At the heart of HSWA were the land disposal restrictions. Continued reliance on land disposal of untreated hazardous wastes would no longer be acceptable under HSWA. Providing for a phased prohibition on land disposal, the amendments divided RCRA regulated wastes into five groups and scheduled deadlines for EPA's evaluation of each group. Failure of EPA to act would result in an automatic land disposal ban. No further disposal of untreated wastes in a surface impoundment or a landfill would be allowed. In addition, HSWA directed EPA to promulgate regulations specifying levels or methods of treatment for each restricted waste. Treatment would have to diminish either waste toxicity or the likelihood that waste would migrate from a landfill.[108]

DOE's Byproduct Regulations

The Department of Energy was no more willing to abide by HSWA than it was by RCRA as originally enacted. Efforts by the Department to evade RCRA, and now HSWA, application to mixed wastes continued. On November 1, 1985, DOE issued regulations focusing on the provision in the Atomic Energy Act that exempted "byproduct materials" from consideration by RCRA. The Department expanded the definition of a byproduct material from a "radioactive material" to a "waste substance containing radioactivity." Most mixed waste effectively became byproduct materials and were, therefore, exempt from RCRA.

Environmental groups were livid. The definition, they objected, would keep entire waste streams under DOE authority. The NRDC, the Energy Research Foundation, and the Environmental Policy Institute jointly warned that "millions of gallons of mixed wastes at DOE facilities in Washington, South Carolina, Ohio, Idaho and other states have been disposed of in unlined ponds, trenches and lagoons, resulting in contamination of ground and surface waters." For decades, the environmental groups stated, "DOE and its predecessor agencies have managed mixed wastes without outside oversight."[109]

Nor was criticism of DOE limited to environmental groups. The Nuclear Regulatory Commission opposed the Department's byproduct ruling and urged DOE to withdraw the standards because they would have far-reaching impact beyond the application of RCRA. The Nation's governors, meeting in Washington, approved a resolution stating that both EPA and states should have a role in overseeing environmental matters at DOE facilities. In Congress, the House Government Operations subcommittee on environment, energy, and natural resources began a review of DOE's mixed waste disposal and compliance with RCRA. Subcommittee Chairman Mike Synar (D-Oklahoma) accused the Department of spending more time avoiding environmental compliance than treating and disposing of radioactive and hazardous wastes.[110]

Meanwhile, EPA was considering criminal action against DOE for refusing to comply at Hanford with RCRA's groundwater monitoring requirements. Never in the ten-year history of RCRA had criminal sanctions been sought against a federal agency. Hanford, according to EPA officials, persistently avoided compliance with environmental laws and may have knowingly submitted false documents in order to avoid RCRA requirements.[111]

DOE Reconsiders

Criticism from all quarters and threatened legal action put DOE on the defensive, but there were also fresh winds of change blowing through the Department. In January 1986, Secretary of Energy Herrington cited increasing environmental protection as a top departmental priority. "While there is confidence that environmental protection measures currently in effect are protecting the health and safety of the public," he stated, "I have taken actions to improve these programs."[112]

A month later, Mary Walker, his newly appointed assistant secretary for the Office of Environment, Safety, and Health, declared that DOE would allow some state regulation of mixed wastes. "We certainly feel that state regulation is appropriate under the programs that the Environmental Protection Agency will be approving," she noted. Exactly what was appropriate would be handled on a "case by case" basis, she observed, until all DOE and EPA regulations governing the handling of mixed wastes were issued. This did not mean, however, that the Department was accepting RCRA authority over mixed wastes. Walker asserted that there would be no "backing off" by DOE of "certain protections" mandated by Congress for national security. But, she added, "I think in terms of RCRA and hazardous waste, we fully expect [EPA] to regulate it and are working with them even now."[113]

In spite of her tough talk on the mixed wastes and RCRA issue, Walker's office began a policy review of the byproduct ruling that same month. The review, Walker explained, would examine the implications of proceeding with the byproduct rule in light of Herrington's announced policy to follow the "letter and spirit of environmental regulations." The study would include assessment of departmental options should the rule be withdrawn.[114]

By fall 1986, Congress was growing increasingly impatient. "There is an arrogant attitude within the Department and a feeling that the weapons programs are sacrosanct," one critic noted. "DOE is saying that we don't want the states involved." In October, a bipartisan group of seventy House and Senate members asked Herrington to withdraw the byproduct ruling. Herrington responded that the Department would not decide whether to withdraw the rule until the ongoing policy review was completed. Herrington assured the senators and representatives that all aspects of the rulemaking were being thoroughly assessed. The study

was expected by the end of the year, the secretary observed, at which time the Department would make its decision.[115]

DOE Capitulates

The Department clearly was moving toward an accommodation on the mixed waste issue. In late 1986, DOE opened discussions with EPA about withdrawing the byproduct ruling in exchange for an EPA "blanket exemption" from existing regulations for all high-level and transuranic wastes and for "certain other radioactive wastes." The EPA exemption would supersede state laws. Opponents of the Department's compromise effort argued that an EPA exemption could well be illegal. Aside from exempting high-level and transuranic waste, they further contended, DOE would be tempted to take a broad interpretation of what constituted "certain other radioactive wastes."[116]

DOE's final effort to evade full application of RCRA failed, and on May 1, 1987, the Department capitulated. In a rule change published in the *Federal Register*, DOE subjected all mixed wastes to EPA and state regulation under RCRA. The Department would regulate the radionuclides in a waste stream and EPA or the states the hazardous component. The Department was now committed to full compliance with the law, from the perspective of the court, EPA, states, and environmentalists. As Leo Duffy, first assistant secretary for the Office of Environmental Restoration and Waste Management, later observed, May 1, 1987, was the day the Department of Energy joined the rest of the world.[117] □

Part VI: DOE, Remedial Action, and the Nuclear Weapons Complex, 1977-1989

Remedial Action During the Carter Administration

Realization was slowly dawning among environmentalists, state officials, Congress, and others knowledgeable about the nuclear weapons complex that over three decades of frantic weapon building had bequeathed a legacy of significant environmental degradation throughout the complex. This degradation would require remedial action and restoration. As noted previously, the Atomic Energy Commission in the early 1970s had taken the initial steps in this direction with the Grand Junction Remedial Action Project and the Formerly Utilized Manhattan Engineer District/AEC Sites Remedial Action Project (FUSRAP). During the Carter administration, these projects continued and two more were begun: the Uranium Mill Tailings Remedial Action (UMTRA) Project and the Surplus Facilities Management Program.

UMTRA was an outgrowth of the Grand Junction Project. In 1974, the AEC began investigating inactive uranium milling sites throughout the West. Reports indicated that mill tailings were a potential environmental and health problem and that remedial action should be performed. In 1978, Congress passed the Uranium Mill Tailings Radiation Control Act authorizing the Department of Energy to designate sites requiring remedial action, establish priorities, and enter into cooperative agreements with states and Indian tribes. The act required that the UMTRA Project be completed by 1990. The Department's UMTRA contractors generally attempted to "stabilize" tailings on-site where they were deposited. In some cases, however, they relocated tailings to meet long-term EPA disposal requirements. DOE financed ninety percent of remedial action costs and the states the remainder. On tribal lands, the Department provided one hundred percent of the cost.

The Department established the Surplus Facilities Management Program in 1978 to assure the safe caretaking and disposition—the decommissioning—of facilities no longer needed but having residual radioactive contamination levels requiring controls. Facilities decommissioned included reactors, laboratories, tanks, pipelines, waste treatment systems, and storage areas with uranium and thorium residues. In some cases, cleaned up facilities were returned to government use, obviating new construction. The Mound Plant at Miamisburg, Ohio, had a particularly strong and active decommissioning effort.[118]

CERCLA or "Superfund"

In the late 1970s, revelations concerning Love Canal and other sites awakened public awareness to the problem of abandoned, leaking hazardous waste dumps posing a serious threat to both human health and the environment. As a result, Congress in December 1980 passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The act, also known as "Superfund," provided for 1) liability, compensation, cleanup, and emergency response to releases of hazardous substances into the environment and 2) the cleanup of inactive hazardous waste disposal sites. The intent of CERCLA was to cover problems not adequately dealt with by other environmental laws like RCRA. CERCLA was thus primarily a response and reporting act as opposed to an extensive regulatory act. CERCLA gave EPA lead agency responsibility. Unlike with RCRA, EPA under CERCLA could not authorize a state program, and hazardous wastes, as defined by CERCLA, included both chemical and radioactive materials. CERCLA required federal agencies to comply with its

provisions to the same extent as private entities. Funding for cleanup of federal sites was to be through the budget process.[119]

The Department was slow in implementing CERCLA. The act mandated that by June 1981 a list of inactive waste disposal sites be sent to EPA. In May 1981, DOE asked its field offices to provide the required information. Response was minimal. Not until January 1983, however, did headquarters again request a listing of inactive sites from the field. The field again largely demurred. Hanford, for example, submitted no sites because Hanford officials concluded that their sites were exempt from CERCLA reporting requirements. CERCLA dealt with RCRAhazardous waste, they reasoned, and DOE and Hanford were exempt from RCRA. Finally, in April 1985, DOE issued an order setting up a department-wide CERCLA program and providing guidance and instructions to field offices and contractors. Field offices began responding. In December 1985, Hanford provided headquarters with a list of 378 inactive sites.[120]

Remedial Action During the Early 1980s

Remedial action remained a fairly low priority in the Department during President Reagan's first term in office. As the identification of potential sites requiring cleanup under CERCLA slowly proceeded, the Department lacked any kind of overall plan for dealing with the growing environmental problems throughout the nuclear weapons complex. What national programs there were—FUSRAP, the Grand Junction Project, UMTRA, and the Surplus Facilities Program—dealt with specific, limited problems. At headquarters, the Office of Defense Programs, preoccupied with the Reagan arms buildup of the early 1980s, devoted little time and energy to environmental issues. Environment, safety, and health oversight responsibilities were scattered among various program offices, thus lacking a central powerbase that could put forth a unified agenda and program.

The first inklings of a concerted remedial action program were coming not from headquarters but from the field. Pressed by growing state activism and an increasingly knowledgeable environmental movement, field facilities by necessity began focusing attention on environmental problems. At Oak Ridge, for example, controversy with the State of Tennessee in late 1982 over whether East Fork Poplar Creek was an industrial ditch or a creek, and revelations concerning mercury discharges, prompted DOE's Oak Ridge Operations Office to enter into a Tri-Party Agreement with the state and EPA Region IV. The agreement, signed in May 1983, lacked the force of law. The stated purpose, however, was to create immediate results without regard to jurisdictional issues. With new DOE manager Joe LaGrone and new M&O contractor Martin Marietta working cooperatively with the community, Oak Ridge agreed to apply "substantive" RCRA requirements to all waste streams, and a task force was formed to evaluate effects of off-site residual contaminants. Oak Ridge also set up a program to identify and clean up sources of mercury contamination. These included building sumps, drain lines, and storm sewers.[121]

Fernald

Events at Oak Ridge helped awaken largely somnolent environmental, safety, and health activities and concerns throughout the Department. Revelations in late 1984 of uranium releases from the Fernald Feed Materials Production Center further assisted the process. On December 11, DOE's contractor, N.L.O., formerly National Lead of Ohio, announced that 275

pounds of radioactive uranium dust had been released during the previous month from the plant's exhaust stacks. N.L.O. temporarily stopped the processing of uranium at the plant. Over the next week, nonetheless, the company announced three more releases, at which point DOE halted operations.

DOE and N.L.O. officials stated that it was unlikely the uranium posed any health hazard. The amount of radiation involved, a DOE spokesperson noted, was "very, very little." Plant workers, residents around the facility, and state officials were not so sanguine. A union official accused DOE and N.L.O. of maintaining a "veil of secrecy" at Fernald. "They monitored the loss on at least four or five occasions, so they knew they were losing [the uranium dust]," observed the official. "What really upset the labor community was they didn't inform the workers and their unions." After area residents voiced concerns at two public meetings, the Department brought in a mobile radiation monitoring lab and made it available to residents. On December 21, 1984, the State of Ohio filed suit against the federal government charging violations of federal and state hazardous waste laws not only at Fernald but also at the Mound Plant.[122]

Adverse publicity from the incident prompted DOE to announce that it would seek competitive bids when N.L.O.'s contract to operate Fernald expired the following September. N.L.O., which had run the facility for three decades, responded that it would not seek to renew the contract.[123]

Perhaps the most significant result of the Fernald releases, however, was that they focused the attention of Senator John Glenn (D-Ohio) on the environment, safety, and health problems within the nuclear weapons complex. Glenn was instrumental in raising the issue to national prominence and pressing DOE to make environment, safety, and health a Department priority. He asked the General Accounting Office to prepare a study on Fernald, Mound, and the Portsmouth, Ohio, gaseous diffusion plant. In April 1985, he chaired a hearing on Fernald that documented additional releases and waste management deficiencies. The GAO report, released in November 1985, found numerous safety and environmental problems.[124]

Herrington Takes Stock

When John S. Herrington became Secretary of Energy at the start of President Reagan's second term in early February 1985, environment, safety, and health issues had suddenly risen to prominence. Soon after his confirmation, Herrington expressed concern over the aging condition of the nuclear weapons complex and acknowledged increased public awareness of health and safety hazards. Believing that DOE needed to allay public concerns, he viewed the Department's credibility problem as similar to that of a utility trying to convince the public of a nuclear power plant's safety. He also asked James Kane, a former DOE environmental official, to report on the Department's environment, safety, and health programs.

In May, Herrington created an environment, safety, and health division. He chose William Vaughan, who was then assistant secretary for the Office of Fossil Energy, to organize the new division. Vaughan was assisted by Mary Walker, deputy solicitor at the Department of the Interior on special detail to DOE. "Secretary Herrington is very committed to [DOE] being a good environmental neighbor," Walker noted. "He really wants to give [the new division] some force and significance in the Department."[125]

Not everyone shared this perspective. The Environmental Policy Institute's Robert Alvarez, author of a study charging DOE with suppressing reports of cancer and other health risks within the weapons complex, discounted the Department's plans to set up a new division. He stated that the reorganization amounted to "damage control" directed toward minimizing DOE's liability for radiation claims and avoiding costly improvements to aging facilities. Alvarez observed that "a very little-known but very real crisis" was confronting a nuclear weapons complex whose newest reactor was over two-decades old. Many of the facilities, he added, were of "stone-age technology."[126]

The Kane Report

The Department's critics were not only external. James Kane's internal review of the environment, safety, and health program was blunt and highly critical. Kane termed these departmental activities a "disgrace." Environment, safety, and health, he informed Herrington, are "widely perceived as having 'no clout,' and of being ignored by senior management unless a crisis develops. Morale is low, and as successive reports recommending action are followed by no action, it sinks further." Kane noted that there was no indication that DOE's operations were unsafe or endangering public health. Rather, the danger was that the Department might not know it if there was a safety or health problem. For Kane, the bottom line was that the health of the oversight function itself was not sound.

Kane stated that this was a difficult problem to solve given the diverse nature of the Department. The organization of DOE in 1977 complicated the oversight function because of the additional responsibility of energy regulation, natural-gas pricing, and other issues that DOE's predecessor agencies did not have to contend with. There was also the "fundamental, inevitable tension" between production and environment, safety and health.

Kane offered Herrington eight recommendations. Two of these, according to Kane, were "by far" the most important: 1) revitalizing the environment, safety, and health office, and 2) establishing organizational responsibility and budget strategy for site cleanups. The other six recommendations were administrative in nature. Kane concluded that the "best measure of an organization's dedication to safety is not the number of safety inspectors, but the number of hours per week the chief executive officer devotes to safety issues." He added that the same was "true for environment. It is easy to ignore, until a crisis occurs."[127]

Herrington Takes Action

Secretary Herrington moved quickly on the Kane report recommendations. On September 18, 1985, he announced a new initiative to strengthen the environment, safety, and health functions within the Department. Herrington asserted that it was "essential" that these responsibilities be met and that production operations be conducted in a safe and environmentally sound manner. He observed that the "environmental problems we are now finding at DOE facilities are for the most part legacies from the past, from activities conducted in a different atmosphere and under different standards than today's. What was acceptable in 1945 is not acceptable in 1985." Herrington added that he did not intend to "let today's activities create problems for tomorrow."

Herrington's initiative contained three major elements. First, Herrington established a new position of assistant secretary for the Office of Environment, Safety and Health, consolidating current functions and upgrading responsibilities. He promised that the new office would be

"integrally involved" in all Department operations at all levels. Second, Herrington directed the new office to conduct a "baseline survey" of all DOE facilities to identify and prioritize areas of existing environmental problems. The survey would look at all media, including air, water, and soil. Third, Herrington authorized the new office to conduct safety appraisals at DOE's nuclear facilities. These would be on-site technical appraisals of all aspects of safety.[128]

ES&H Revitalized

Simultaneously with his new initiative, Secretary Herrington announced that Mary Walker would be his assistant secretary for environment, safety and health. He also stated that he intended to increase from $40 million to $100 million the amount spent annually on environment, safety, and health.[129]

A dispute between Herrington and the Senate Energy Committee delayed Walker's confirmation, however, and William Vaughan served as interim assistant secretary. In mapping the direction that the new environment, safety, and health office would take, Vaughan said that he did not anticipate substantial changes in DOE's environmental standards and regulations. "I think the main effort will be in tightening and clarifying existing Department orders and standards," he observed. "They are not broken. They just need reinforcement and in some cases clarification." Obtaining appropriate and accurate information, he indicated, would be critical for the new office. Because of the decentralized system within the Department, much of the required information remained scattered in the field. The baseline survey would help DOE determine the impact of its facilities on the environment and the corrective steps needed. Vaughan stressed that public awareness of DOE's commitment to maintaining safe facilities was a necessity. He nonetheless expressed concern that critics might deliberately distort information to interrupt weapons production. "We have to talk and deal with some subjects," he noted, "that in the hands of irresponsible but articulate people can cause that sort of problem."[130]

Walker assumed her new position in late December 1985. Two months later, she announced that the baseline surveys would begin in June 1986. Some forty sites would be surveyed, including 600 inactive waste areas, 300 hazardous-waste management areas, 1,800 air-emission stacks, and 400 wastewater discharge pipes. Fernald would be the initial site, to be followed closely by Mound, Portsmouth, Rocky Flats, and Hanford. Five teams comprised of DOE and NUS Corporation specialists would conduct the surveys. Anticipated completion was late 1988.[131]

Walker stated that the intent of the survey was to "take all [the] information, pull it together and make it consistent" on a national basis. "Where sampling hasn't been done as extensively at one site as another, we are going to do that," she observed. "The survey might recommend some projects for higher priority as it will feed in additional projects." Walker indicated that certain states were "more aggressive" in pressing for cleanup actions. Ohio, for example, was "pretty aggressive in terms of the Fernald facility." She added that in "some states there's a very good relationship, an ongoing dialogue. The good relationships work a lot better. That's why there's so much going on [in Oak Ridge and Savannah River]." Walker was also optimistic about cleanup funding. She noted that once recommendations were in Herrington was prepared to lobby Congress for cleanup dollars. The secretary recognized, she said, that over the long term hundreds of millions of dollars would need to be spent on cleanup.[132]

Congress Not Satisfied

Congress, meanwhile, took a somewhat jaundiced view of the Department's new initiatives, partly due to DOE's continued recalcitrance in accepting RCRA regulation of mixed waste. Departmental reluctance on RCRA, interested members of Congress believed, indicated a lack of enthusiasm on DOE's part for waste cleanup as required by RCRA. In a hearing held on the issue by the Senate Environment Committee, Senator Pete Domenici (R-New Mexico) warned that on RCRA-mandated mixed waste cleanup, DOE was on "a very slippery slope." The Department, he added, "better get on with it . . . or somebody else is going to do it for you."[133]

Senator Glenn, as well, continued his critical focus on the nuclear weapons complex. In written testimony to the Senate Environment Committee, he asserted that environmental problems at DOE defense facilities had reached the dimension of a "national scandal." Glenn characterized as "too little, too late" the initiatives taken by Herrington to improve DOE oversight. He charged that DOE and its predecessor agencies had produced nuclear weapons "with an attitude of neglect bordering on contempt for environmental protection." The result, he noted, was that the Nation was "going to be forced to spend hundreds of millions—perhaps even billions of dollars—to clean up its mess." The senator attempted, unsuccessfully, to pass legislation requiring the Department to give environmental protection equal priority with weapons production.[134]

Walker, however, remained undeterred. In late 1986, after one year as assistant secretary, she pledged to continue carrying out Herrington's environmental initiatives. Looking toward 1987, she said DOE would proceed with revising departmental hazardous waste guidelines in line with RCRA and CERCLA requirements. DOE would work with EPA to develop federal facility compliance agreements that would provide a site-wide program for environment and safety. Walker singled out Savannah River in this area. She also stated that DOE would continue working with the Nuclear Safety Council and the Environmental Council. Including members from Walker's office and representatives from the field, these groups were designed to identify environment, safety, and health problems and make recommendations to remedy them.[135]

Fallout From Chernobyl

The Chernobyl accident in the Soviet Union on April 26, 1986, focused additional attention on the Department's nuclear weapons complex. In the aftermath, Secretary Herrington intensified safety reviews of DOE's large production and research reactors. He established a special safety panel to review the N-Reactor at Hanford, the only American graphite production reactor even remotely similar to the Chernobyl reactor. In addition to the Department's internal safety review, Herrington requested the National Academy of Sciences and the National Academy of Engineering to make an independent assessment of DOE's production reactors at Hanford and Savannah River. In response, a National Research Council committee was formed to conduct an eighteen-month study.[136]

Superfund Amendment and Reauthorization Act (SARA)

By late summer 1986, Superfund had spent all of the funds allotted by Congress six years earlier. In October 1986, Congress, therefore, reauthorized CERCLA but also amended the original act. The result was the Superfund Amendment and Reauthorization Act (SARA).

Broadly expanding the authority of CERCLA, the amendments required EPA to identify sites, including sites owned or operated by the Federal Government, to be included on the National Priorities List (NPL) not later than thirty months after enactment. Agencies would have to begin remedial investigation and feasibility studies (RI/FS) within six months of a site being placed on the NPL. Six months following completion of the RI/FS, agencies would have to enter into an interagency agreement with EPA for the remedial actions required. Remedial actions would then have to begin within nine months and be completed "as expeditiously as practicable." The CERCLA amendments also gave states a greater role. States could join EPA in identifying NPL sites and selecting appropriate cleanup remedies.[137]

Congress Keeps the Pressure On

The Department's cleanup obligations under CERCLA and RCRA were now clear. The SARA amendments to CERCLA laid out exact procedures to follow on a strict time schedule. DOE's acceptance on May 1, 1987, of RCRA regulation of mixed wastes committed the Department to adhering to the act's cleanup provisions for all applicable wastes.

Congress remained skeptical, however, of DOE's ability and/or willingness to follow through on required compliance and cleanup measures. Senator Glenn sponsored a bill to establish an independent oversight board to monitor environmental and safety conditions at DOE facilities. At hearings on the bill before the Senate Governmental Affairs Committee in June 1987, DOE Under Secretary Joseph Salgado endorsed the concept of independent oversight. He stated that he believed "we have reached a point of consensus, within and outside of DOE, that the Department and the public stand to benefit from a systematic, institutional approach to outside oversight." He added that the "secretary's position represents a landmark development in the administration's efforts to strengthen the Department's capabilities and credibility in the safe operation of our nuclear facilities."[138]

Salgado also pledged that the Department would provide Congress with a detailed study of environmental conditions at DOE's facilities by July 1988. "We made mistakes in the past," Salgado admitted. "We are committed to bringing our complexes into compliance, [but] we have an enormous legacy of misuse of the environment in the past." Glenn responded that DOE had repeatedly frustrated his efforts to obtain detailed information. He noted that he was continually being told that "studies are underway." When pressed by Glenn for an estimate of cleanup costs, Salgado stated that a total program could cost anywhere from $2 billion to $12 billion. Glenn suggested that the Department not wait for implementation of an overall program but take what immediate cleanup steps it could. He accused DOE of being "very laggard" in the environment, safety, and health arena. "It does very little good to build nuclear weapons to protect our country from the Soviet Union," Glenn noted, "if we poison our people in the process."[139]

In August 1988, DOE repudiated Salgado's apparent endorsement of Glenn's legislation to create an independent oversight board. The Department's concern was that the bill effectively bypassed the secretary of energy and deviated from what agency officials described as "normal executive channels." Under Glenn's legislation, DOE would be compelled to fulfill any actions recommended by the board. The Department preferred to have the board report its findings to the secretary who would then decide whether to take action. Glenn rejected DOE's position because it foreclosed the board's ability to act independently.[140]

Assessment of Safety Issues at the Production Reactors

On October 29, 1987, the National Research Council's special committee, commissioned by Secretary Herrington in the aftermath of Chernobyl, released its long-awaited assessment of safety issues at DOE's production reactors. The committee conceded that the Department's contractors had emphasized the prevention of accidents. In addition, the production reactors had been operated for more than a quarter century without a major accident. Nevertheless, the committee cited the Department for not having "clearly articulated" safety objectives. DOE, the committee noted, "has failed to specify its safety requirements clearly, has failed to apply them uniformly at the two production reactor sites, and has failed to implement them in a timely manner." Part of the problem, according to the committee, was that the Department lacked an adequate technical understanding and capability. Equally serious, however, were DOE's managerial shortfalls. "Weakness of management," the committee stated, had "led to a loose-knit system of largely self-regulated contractors." Finally, the committee cited the "acute aging" of the production reactors as an issue that had not been adequately addressed by the Department.

The committee concluded that DOE could "accomplish the reactor safety functions assigned to it by Congress if the Department dedicated itself to the task." The committee recommended that DOE clarify its safety objectives, increase the involvement of the Office of Environment, Safety, and Health, and establish an independent external safety oversight committee advisory to the secretary. The committee also recommended that the Department accelerate planning for new production reactors or other alternatives.[141]

Herrington stated that he "welcomed" the committee's findings. He stressed that the Department had long been aware of safety concerns and "action was long overdue." Salgado observed that the report was really about "a department in transition. It's about how we are making changes and how we are meeting our responsibilities and obligations. This report is a continuation of what we began more than two years ago." In response to the committee's recommendations, Herrington directed that an independent oversight panel be established and action plans be prepared by the assistant secretaries for environment, safety, and health and for defense programs.[142]

ES&H Initiatives

In response to Secretary Herrington's directive on creating an independent oversight panel, the Department in early 1988 established the Advisory Committee on Nuclear Facility Safety. Herrington appointed former Nuclear Regulatory Commission Chairman John Ahearne as chair of the new panel. Critics contended that no board established by DOE could act independently, and Congress continued to consider legislation to establish an independent safety board. Ernest Baynard, III, who replaced Walker as assistant secretary for environment, safety, and health in March 1988, disagreed. "I don't think Congress needs to establish another oversight body," Baynard said. "I think that whenever you have well recognized professionals involved in an important decision-making process, a highly visible process, the thing you rely upon is their professional integrity, their professional reputations and I think that the biggest insurance package we have . . . is that we all have our professional reputations at stake."[143]

Baynard indicated that the Department was eager to enter into enforceable compliance agreements with EPA and states for those facilities not in compliance with CERCLA and other

environmental laws. If any DOE facility then failed to comply, he noted, states or private citizens could take the Department to court to force compliance. "We already have some agreements of this type," Baynard observed, "but I think its important that we have more."[144]

At the same time, the Department was preparing two separate priority reports. The first, known as the "Glenn Plan," which Salgado had promised to deliver to Glenn by July, would detail conditions and provide costs to achieve full environmental compliance and safety upgrades at DOE's production facilities. The second, known as the "Salgado Plan," would provide a similar, department-wide assessment by the end of the year. Meanwhile, Baynard was unsure how long a cleanup would take and what the total cost would be. "Right now the timetables are established under CERCLA and we are in compliance with those timetables," he noted. "I don't know exactly how long it will take us; it's a function of how much money Congress is willing to spend each year to do this."[145]

Baynard's control over even DOE's funding request was minimal. The Office of Environment, Safety, and Health's role was oversight and not cleanup itself. Program offices, such as Defense Programs, did the actual cleanup and sought their own funding for cleanup. Baynard had input, but the real decisions were made in the program offices. Critics argued that the arrangement was unworkable because environmental concerns for Defense Programs would always be a lower priority than production. Environmental spending within program offices, nonetheless, was on the rise. Defense Programs increased its spending on environment from $383 million in fiscal year 1987 to $472 million in 1988. For fiscal year 1989, Defense Programs sought $574 million.[146]

An Idea Whose Time Has Come

The effort to make remedial activities a budget line item began in May 1985 with a Defense Programs study that identified options but did not lead to an action. A January 1986 Tiger Team studying environmental issues recommended a new budget category for hazardous waste activities, but again no organizational action resulted. A November 1986 survey of field offices found support for CERCLA and RCRA dedicated funding, with field office responses generally agreeing that the line item was an idea "whose time had come." In her December 10, 1986, memorandum to field office managers reporting on survey results, Jill Lytle, Director of the Office of Defense Waste and Transportation Management, attached a talking paper on the new budget category that noted "increased pressure to restrict DOE's self-regulation authorities" and that "Representative Dingel [sic] is expected to place increased oversight on environmental remediation activities in the next Congress."[147]

On February 24, 1987, the effort received a congressional push when Congressman Samuel S. Stratton (D-New York), Chairman of the Subcommittee on Procurement and Military Nuclear Systems of the House Armed Services Committee, expressed his concern that DOE's budget request lacked focus. Stratton's primary concern was that public and congressional support for the nuclear weapons program would decline if DOE did not demonstrate that it was "adequately addressing environmental problems," which "are clearly driving the overall DOE budget." Stratton and other House Armed Services Committee members pressured DOE to design a remedial action program for environmental restoration along the lines of the Defense Department's Defense Environmental Restoration Account and then identify appropriate funding levels.

In March 1987, DOE chartered a remedial actions budget strategy task force composed of Defenst Programs personnel from headquarters and the field and managed by Jill Lytle to

define options for establishing a CERCLA/RCRA budget category. In a crash effort, the task force wrote a draft in a month and, at the HASC's request, provided remedial action funding needs for fiscal years 1987-1989 informally to the committee. Based on DOE estimates, which reached $93 million in fiscal year 1989, the HASC recommended $20 million in additional funding for fiscal year 1988. When the HASC recommended $98 million for fiscal year 1989, DOE reviewed its hastily-compiled initial estimates and came up with a $158 million figure in July 1987.[148]

The remedial actions budget strategy task force evaluated six management options for locating DOE's remediation programs. The three "prime options" placed environmental activities in the existing Defense Programs organization, which, the task force recognized, ran "the risk of creating the perception of 'business as usual' with respect to Congress and the public" but would be relatively easy to implement. The task force rejected the option of placing program direction in the Office of Environment, Safety and Health, noting that this "does not appear to be consistent with the independent overview function established for the ASEH." Full decentralization to the field was also considered and rejected, primarily because the group believed there would be uneven program execution and no headquarters advocate "to support the remedial action program needs and to coordinate budget formulation and funding allocation." The sixth option was "the creation of a new program office reporting to the Secretary" to perform cleanup activities, which the task force also opposed. The group argued that placing active waste management sites in one organization and inactive ones in another would make it difficult to coordinate RCRA compliance schedules and threaten operations at Defense Programs facilities. The task force opposed the ES&H and new program office options because they "would remove the accountability for remedial environmental management from the program offices that created the problems to begin with and which are presently responsible for management of the installations where they are located" and produce uncertainties since they would place "the remedial actions management under different authorization committees from those presently handling them."[149]

In June 1987, Acting Assistant Secretary for Defense Programs Troy Wade, in accordance with the task force's recommendation, assigned management of the Remedial Action Budget Category to DP-12, Jilly Lytle's office. Thomas Hindman was Acting Director in October 1987 when headquarters sent a memorandum to operations office managers asking that they take a harder look at earlier Environmental Restoration (ER) cost estimates. This led to a downward revision from $158 million to $122 million. Hindman's memorandum argued that it was important to "maintain the integrity of the ER program and the segregation of ER funds from other Defense Programs funds. If we do not," Hindman claimed, "we will eventually lose credibility and subsequent support of the Office of Management and Budget and Congress."[150]

The position of the Office of Defense Waste and Transportation Management was that the segregation, or "fencing off," of ER funds from other Defense Programs funds was critical. A distinction between active and inactive sites and facilities in the Defense Programs budget meant that the regulation of each could be separated, thus preventing production operations from being shutdown because of cleanup or compliance problems at inactive sites. The prevalent view in Defense Programs was that production operations had little impact on management and cleanup of hazardous wastes and substances at DOE sites. There was concern, however, that states and environmental groups would take advantage of CERCLA and RCRA technicalities on compliance at inactive sites as a springboard for litigation aimed at

shutting down the defense production complex. The Remedial Action Budget Category was designed with this concern in mind.[151]

The "Glenn Plan"

On July 1, 1988, Salgado forwarded the promised study detailing environmental conditions at DOE's nuclear facilities to the Senate Governmental Affairs Committee. Salgado told the committee that the environmental issue represented a "major challenge for the Department, the Congress, and the Nation . . . . [requiring] a significant investment over a long period of time." The Department's study focused on seventeen sites and examined efforts both to clean up environmental contamination and to assure and maintain compliance with environmental, safety, and health standards. The study estimated "expected" cleanup and compliance costs of $66 billion through fiscal year 2025. Under a "high" cleanup and compliance scenario, estimated costs rose to $110 billion through fiscal year 2045. Senator Glenn observed that the "high" estimate was more likely to be a "floor . . . than a ceiling." The Department, he added, could not "assume that it will continue to be treated as a royal exception to the laws, standards and regulations that all other hazardous industrial enterprises in the United States are subject to." A July 1988 GAO report supported Glenn's view on the pricetag for cleanup of the weapons complex, estimating that DOE would have to spend between $100 and $130 billion and recommending that the Department request between $5 and $8 billion for fiscal year 1990 to begin the job.[152]

The Weapons Complex Under Siege

Secretary Herrington's "sweeping" environmental and safety reforms were called into question during the last half of 1988 as problems in the nuclear weapons complex became headline news. In August, unexpected power surges occurred during attempts to restart the P production reactor at Savannah River. Departmental safety officials, who had been belatedly and inadequately briefed on the incident, recommended that the reactor be shut down. Subsequent studies indicated that no significant safety risk or threat to public safety resulted from the incident, but departmental safety officials were highly critical of operational and managerial procedures at the Savannah River site. John Ahearne, chairman of the newly created oversight panel, indicted officials from both the Department and its Savannah River contractor, E.I. du Pont de Nemours and Company, for "years of ingrained complacency and self-satisfaction. . . . One conclusion is that operating practices at Savannah River have built up over so many years and the operators had believed they have done so very well, they did not keep abreast of what was going on in the commercial world." Deputy Assistant Secretary for Safety, Health and Quality Assurance Richard Starostecki, in a tough internal memorandum sent to Bayard on September 16 and later made public, stated that some senior departmental managers have "an attitude towards production reactor safety which on the face seems to be similar to that which existed in the space program prior to the *Challenger* accident. . . . Such a mindset presumes reactors are safe unless demonstrated otherwise."[153]

What began as an internal debate quickly spilled over into the public arena. Congressional hearings investigated the incident and the subsequent safety debate. The media pursued the issue with alacrity. In October, the shutdown of the plutonium fabrication plant at Rocky Flats for safety code violation and further revelations of radiation leaks at the uranium processing plant at Fernald heightened public scrutiny and expanded it to include the entire

weapons complex. Environmental groups filed a lawsuit to prevent DOE from restarting the Savannah River K reactor prior to completing an environmental impact statement. Articles appeared almost daily in the *New York Times* and the *Washington Post*. The weekly newsmagazine *Time* did a cover story headlined, "'They Lied to Us': Unsafe, Aging U.S. Weapons Plants are Stirring Fear and Disillusion."[154]

An embattled Secretary Herrington handled the growing controversy with equanimity. He noted that the Department over the past three years had been its own harshest critic, and he announced a series of phased safety and management initiatives leading to the restart of the production reactors at Savannah River. "President Reagan, and myself as Secretary of Energy, will not operate unsafe reactors," Herrington declared. "We will meet the defense needs of this country in a safe and environmentally sensitive manner."[155]

On December 28, 1988, Acting Assistant Secretary for Defense Programs Troy Wade, sent a letter to six members of Congress whose committees were critical to DOE—Senators John Glenn (Governmental Affairs), James Exon (D-Nebraska, Strategic Forces and Nuclear Deterrence Subcommittee of Senate Armed Services Committee), and J. Bennett Johnston (Energy and Natural Resources), and House members John Dingell (Energy and Commerce and Oversight and Investigations Subcommittee), Tom Bevill (D-Alabama, Energy and Water Development Subcommittee of House Appropriations Committee), and the retiring Samuel Stratton (Procurement and Military Nuclear Systems of House Armed Services Committee). Wade referred to the publicity surrounding cleanup of defense facilities, most of which had been critical, and argued that "little recognition has been given to the environmental accomplishments of the past decade." Hoping that the working relationship with the incoming Bush administration would "begin on a postive note" and declaring that he was proud of Defense Programs' environmental accomplishments, Wade attached a two-page compilation of environmental activities and asked the Congressmen for their continued support of "necessary environmental clean-up at the Defense Programs sites."[156]

Independent Oversight Established by Congress

In the midst of all the excitement surrounding the nuclear weapons complex, Congress in late September approved an independent oversight panel as part of the fiscal year 1989 Defense Authorization bill. The measure called for the administration to appoint a five-member independent Defense Nuclear Facilities Safety Board to review safety and environmental conditions at DOE's production facilities. Resistance from the Armed Services committees resulted in the exclusion of the Pantex weapons assembly plant outside Amarillo, Texas, from board review. Uranium enrichment plants and nuclear research facilities were also excluded. Senator Glenn welcomed the new board but was unhappy that Congress eliminated provisions that would have given the board power to compel DOE to take action. The Reagan administration left it to its successor to appoint the board members.[157]

The Baseline Survey

In early December 1988, the Department released a "preliminary summary report" on the baseline survey ordered by Secretary Herrington in September 1988. The report provided risk-based assessment of 160 sites at sixteen of DOE's defense facilities, ranking them according to their potential threat to the public. Of all sites surveyed, Rocky Flats ranked the highest because of volatile organic compounds (VOCs) in the groundwater and the large

population near the plant. The site was given a nine on a ranking scale of zero to ten. The second-highest ranking was an unlined waste pit at Pantex, earning a ranking of eight. Solvents from the pit were viewed as posing a threat to the Ogalalla aquifer.

Congressional and industry sources contended that the study was significant because of DOE's admission that contamination posed such potential hazards. Nonetheless, the value of these rankings and, indeed, of the entire baseline survey was disputed. In July 1989, John C. Layton, the Department's inspector general, told a House subcommittee that the three-year, $60 million environmental survey program was so deeply flawed as to be useless.[158]

Billions Needed For Modernization and Cleanup

Herrington pushed to complete two studies projecting the expenditure of billions of dollars—one study on modernization and the other on cleanup—before the end of the Reagan administration. In December, the Department forwarded to the White House a draft report intended for Congress on the retirement and modernization of the facilities in the weapons production complex. The study, known as the "2010 Report," estimated that operation and maintenance of the weapons complex would cost $244 billion over the next twenty years. These costs included new production plants, waste facilities, and environmental and safety corrective actions and compliance. The 2010 Report recommended ending all materials production at Hanford and closing down the Rocky Flats and Fernald facilities as well as the Mound Plant. The report underlined the Department's commitment to constructing two new production reactors and a $500 million special isotope separation plant in Idaho that would convert fuel-grade to weapons-grade plutonium.[159]

In early January, Herrington released a report, known internally as the "Salgado Plan," estimating expenditures needed to achieve department-wide compliance with all applicable environmental, safety, and health requirements. Updating and expanding the applicability of the figures given Senator Glenn the previous July, the new study estimated "expected" costs of $53 billion, of which $35 billion would be for environmental remedial action. Costs for the "high" scenario were $92 billion, of which $64 billion would be for remedial action. These figures did not include an additional $1.8 billion per year through fiscal year 2010 that would be needed for routine day-to-day environmental, safety, and health and waste management operations.[160]

Herrington's Last Hurrah

Asserting that one of his major accomplishments had been "putting in place a strong environment, health and safety plan," Secretary Herrington was still not satisfied with the state of the nuclear weapons complex. In one of his last addresses as Secretary, he noted that no Department reactor was producing tritium for nuclear weapons. Under current planning, Herrington stated, "we are not going to be in a serious problem." The Department's biggest challenge, nonetheless, was to make certain equipment modifications and improvements in training so that the production reactors could be restarted. "Nuclear deterrence remains at the heart of our national security policy," Herrington observed. "This means that a healthy, viable nuclear weapons complex is not an option for this country, it is a necessity." In addition, he warned that DOE's contractors must share in the commitment to safety: "Any private contractor that does business with the Department of Energy had better realize that with us as a customer comes the obligation of fair and responsible dealing."[161]

The departing Secretary also took aim at environmental groups. Herrington accused the groups of having an "unwritten agenda" that used problems within the nuclear weapons complex as a means to halt the production of nuclear weapons. Many of the groups raising environmental and safety concerns over problems at the complex, he noted, were the same groups protesting nuclear weapons testing. "They are using the environment as an issue to further their goals," he asserted. "And, I don't think that's right." In response, Dan Reicher, an attorney with NRDC, said Herrington's statements were "naive" and did not recognize the complex approach NRDC had taken toward the environment and weapons production issues. "We are trying to rein in a dangerous industry," Reicher stated. "We are not trying to close it down. We are trying to bring some rationality to the debate about the need for nuclear weapons material."[162] □

Part VII: Establishment of EM, 1989

President-Elect Bush Appoints Admiral Watkins

On November 8, 1988, George Bush was elected President of the United States. Somewhat surprisingly, the growing controversy surrounding the Department's nuclear weapons complex never became an election issue. During the campaign, one White House official noted that "the Department of Energy is managing the situation very well." Another administration source confided to the *New York Times*: "If the news is going to be really bad, don't you want to make it an Energy Department disaster rather than a White House disaster?"[163]

Not surprisingly, one of President-elect Bush's most sensitive appointments was secretary of energy. As attention continued to focus on the Department's besieged weapons complex, reports emerged of the ongoing "fierce fight" within the Department over balancing national security with health and safety needs. Transition team officials indicated that "competent management" was the most important component in choosing the new secretary. Bush stated that he was looking for someone with experience in nuclear energy. By Christmas, secretary of energy was the only cabinet position left unfilled. Serious consideration briefly was given to James R. Schlesinger, DOE's first secretary, but Schlesinger's unpopularity with the oil and gas industry and doubts about his secretarial performance during the Carter years derailed his candidacy.[164]

Not until January 12, 1989, the same day the White House released the 2010 Report, did Bush announce his intention to nominate retired Admiral James D. Watkins as secretary of energy. A nuclear engineer and a veteran of Hyman Rickover's nuclear navy, Watkins had served as chief of naval operations from 1982 to 1986, the first submariner to hold the post. Most recently, he had received considerable credit for his work as chairman of the presidential AIDS commission. Watkins was chosen for secretary of energy because the president-elect became convinced that widespread safety and environmental problems in DOE's nuclear weapons complex required immediate attention. Current nuclear weapons facilities needed to be upgraded, new facilities needed to be designed and built, and numerous sites needed to be cleaned up because of past processing and waste practices. Watkins thus prevailed over other potential nominees primarily because the incoming administration decided that the job of fixing the bomb factory required strong credentials in nuclear technology and operations.[165]

In announcing the appointment, Bush stated that both he and Watkins believed that "protecting the environment . . . is not at all inconsistent with advancing both energy security and national security needs." Concerning the troubled weapons complex, the president-elect said that he was not committed to the 2010 Report but was committed to having Watkins formulate a policy that included safety and cleanup aspects. Watkins underscored Bush's comments by stressing his own commitment to safety and the environment. "I am confident," he told the press, "I can help find that desired and balanced formula wherein safety is never subverted, the environment is adequately protected, and national security and other energy objectives are achieved in harmony." Restarting the production reactors, Watkins assured his audience would "not be done at the expense of safety."[166]

Reaction to Watkins's nomination was generally favorable. The *New York Times* described Watkins as an "unusual leader" with "forceful opinions and [a] record of independence." The

Washington Post cited his "political skill" and "competence." Environmental and activist groups were wary, however, given Watkins's military background and pronuclear views. A spokesperson for the Natural Resources Defense Council declared that the appointment "signals that cleaning up the bomb plants and developing a sound national energy policy will continue to be sacrificed in the name of nuclear weapons production."[167]

Setting Priorities: The Complex, Cleanup, and Culture

At his confirmation hearing on February 22, 1989, Admiral Watkins left no doubt that his initial priority would be cleaning up the contaminated weapons complex and putting defense operations "back on track." The primary problem, according to Watkins, was in the management area. Partly this was organizational. "I'm seeing a management system that is antique, it's out of date, it's back in fifties technology," Watkins lamented. "If you look at our organization chart, you'll be aghast at the lack of attention to implementing policy. We are great on policy documents, but very poor on following up to see if they are implemented properly." The situation, Watkins added, "is a mess." Watkins, a staunch believer in the conduct of operations philosophy that characterized the nuclear navy, later recalled that he "couldn't believe how unaccountable the organizational structure was. Every time I asked who was responsible for something," he remembered, "each person pointed to the one at his left."[168]

But part of the managerial problem was attributable to what Watkins described as the DOE and, more specifically, the Defense Programs "culture"—the set of values permeating the work atmosphere within which operations take place. "There is an urgent need to effect a significant change in its deeply imbedded thirty-five year culture," he asserted, which has "evolved from such heavy emphasis on achieving production goals, made within an atmosphere of collegial secrecy, that problems relating to safety, health, and the environment have not only been backlogged to intolerable levels but, in effect, hidden from public view until recently. So, we are now paying the price for this long-term cultural misdirection." Watkins pointed out that the civilian nuclear power industry had tightened management and safety procedures in the wake of the Three Mile Island accident in 1979. The Department of Energy, however, had "not brought itself into line with nearly all other public and private nuclear ventures."[169]

Watkins noted that the management of radioactive waste presented "nearly the same challenges" as those encountered in the overall weapons production complex. The principle was the same: safety, health, and environmental standards needed to be "religiously" met. Watkins declared that the president's 1990 budget proposal included "strong, clear, and much needed initiatives" to both implement these standards at waste facilities and upgrade the facilities themselves. But, he added, "only a strong, common culture" would assure that "waste will be handled, processed, and finally stored in compliance with those safety standards to which Federal, state and responsible local authorities are full partners."[170]

Congress Helps Watkins Focus

Congress was sympathetic with Watkins's predicament but not at all patient. At the confirmation hearing, Senate Energy Committee Chairman Johnston told Watkins that his was "the most daunting management task I think we have ever given anybody I've seen in government since I've been around here." Less than a month later Senate Budget Committee

Chairman James Sasser (D-Tennessee) informed Watkins that the Department would have the opportunity to "review its history in the nuclear weapons cleanup area and come up with new solutions." The senator warned Watkins, however, that if "DOE cannot make a clear and convincing case that it has the expertise to handle this program and does not develop a credible environmental plan within the year—I believe that serious consideration should be given to removing the cleanup responsibilities from [DOE] and placing them in a separate entity."[171]

Congress also threatened to enhance independent oversight of the weapons complex. Senator Glenn proposed expanding the number of DOE facilities subject to Defense Nuclear Facilities Safety Board oversight. Congressman John Spratt (D-South Carolina), chairman of a special House Armed Services panel examining the weapons complex, suggested giving the board power to "shut down a facility summarily." Watkins resisted these efforts. He believed that he had sufficient information regarding conditions in the weapons complex from his own sources and that additional oversight would be of little value. As he remarked to reporters, "all they are going to tell me is how to suck eggs and I already know how to suck eggs."[172]

Watkins was not opposed, however, to independent oversight as such. With the advent of the Defense Nuclear Facilities Safety Board, for example, he directed the Department's Advisory Committee on Nuclear Facility Safety, commonly referred to as the Ahearne Committee, to provide oversight for those facilities not covered by the five-person safety board established by Congress. Unfortunately for Watkins, his comments on oversight could easily be mininterpreted because of DOE's low credibility with both Congress and the public. Given the widespread belief that DOE had a poor record in managing the Nation's nuclear weapons complex, Watkins's remarks could be read—and were by some critics—as signalling an unwillingness to open the Department to outside scrutiny. Watkins tried to make it clear that his objection to more oversight was that it was costly and redundant and that it was time to get on with the job, not that he opposed oversight *per se* or intended to continue "business as usual." While most observers initially gave Watkins high marks for candor and good intentions, skepticism of his ability to improve the Department's performance without continuous scrutiny from Congress, the public and state and federal authorities remained.[173]

Carrying Out the Mandate

In the weeks following his confirmation on March 1 and swearing in on March 9, Watkins moved quickly to address the problems in DOE's nuclear weapons complex that he and the president agreed needed urgent attention. On March 6, he informed DOE employees of his immediate priorities, the first of which was "[r]eforming the FY 1991 budget process to include specific five-year objectives for waste clean-up" at DOE sites. On March 23, Watkins sent a letter to Congress announcing immediate implementation of an action plan placing a "higher priority" on DOE's environmental and waste management programs.[174]

On March 20, 1989, Watkins responded to a hard-hitting letter that John Dingell addressed to John Herrington on November 10, 1988. Taking exception to Herrington's characterization of DOE's health and safety record as satisfactory, Dingell listed numerous dangerous practices and procedural violations that suggested to him "a systemic breakdown in the programs to insure adequate health and safety" resulting from "serious mismanagement" in the nuclear weapons complex. Watkins took advantage of Herrington's decision not to answer Dingell to

write the influential Congressman a letter stressing his commitment to operating DOE's nuclear weapons facilities in a safe and responsible manner.

Watkins told Dingell that DOE would work diligently and "as quickly as possible" to make needed improvements "throughout the complex." Safety inspections would be performed, management systems would be improved, and efforts would be made "to change attitudes of workers to instill a greater sense of responsibility and accountability." Watkins also stated that enhanced safety would result from oversight provided by the National Academy of Sciences, the Ahearne Committee, the congressionally mandated Defense Nuclear Facilities Safety Board, EPA, and the states. "We view these problems as serious," the Admiral promised, [and] I assure you that the Department will pursue aggressively programs to ensure the environmentally sound and safe operation of our facilities. Watkins added a handwritten postscript that read, "I was brought into this job by the President who asked me to remedy the problems you have properly identified. I intend to do exactly as he asked."

The memorandum Special Assistant Garry Gibbs sent Watkins explaining the wording of the letter to Dingell conveyed the burden of the mixed legacy of DOE's historic mission of producing nuclear weapons for national defense. "DOE must be careful," Gibbs wrote, "to recognize that, in an overall sense, there has not been an adequate level of importance attached to the operation of the complex in a safe and environmentally responsible manner. Accordingly, whenever credit is taken for good performance in certain specific activities" Gibbs recommended, "the Department should complete its statement with the acknowledgement that we are committed to improve our performance to ensure an overall safe responsible operation. This is advisable to avoid any misinterpretation."[175]

Duffy and the Five-Year Plan

In one of his most significant early moves, Admiral Watkins appointed Leo Duffy as his special assistant for coordination of DOE defense waste management on March 15, 1989. Duffy was among a group of nuclear industry specialists, including many with nuclear navy experience, who were advising Watkins on the status of DOE's weapons complex. Duffy had served on Rickover's staff at Idaho and prior to joining DOE had been an officer with Roy Weston's environmental and engineering consulting firm. Duffy had also worked with Westinghouse's commercial nuclear program and with the contractor EG&G Inc. Duffy was widely known and respected in the nuclear industry and throughout the Department's nuclear complex.

Duffy's primary responsibility was to develop a five-year plan by the end of July, something Watkins promised Congress in his March 23 letter. As envisioned by Watkins, the plan would include waste management, inactive waste site cleanup, and corrective actions needed at DOE's operating facilities to "bring air, water, and solid waste discharges within acceptable limits." The plan would take a consolidated look at DOE waste and cleanup activities and provide the basis for fiscal year 1991 budget requests. Watkins set forth several priorities. Bringing DOE's waste management and environmental activities into compliance with federal and state regulations was the "first priority." Of "equal importance" was environmental restoration of DOE facilities to confine and contain any contamination. "Highest priorities" were to be placed "on facilities where there are known releases with the potential to affect the public and the environment."[176]

Watkins also instructed Duffy to "assess current technology development activities and provide a basis for future research, development, and demonstration of new and innovative

technologies." As Duffy testified before the House Science, Space, and Technology Committee in early April, current technology was primarily "hog and haul" where contaminated soil was dug up and transported to another area. This was, according to Duffy, the "most inefficient, ineffective long-term solution." The Department looked to innovative technologies, such as *in situ* vitrification, not only to more effectively perform remedial action but also to save money. In a widely reported comment, Watkins stated that technology developments would mean that DOE could clean up the complex "for a lot less."[177]

Watkins provided Duffy with an executive assistant, a secretary, and other administrative services from the Office of Defense Programs, and he announced that an advisory committee would be appointed to "provide guidance in policy, funding, prioritization, and report structure." Watkins stated that after he personally reviewed Duffy's plan, he would work with other federal agencies and affected states and Indian tribes "to assure that we have addressed their concerns." The five-year plan, according to Watkins, would establish "agreed-upon milestones" with Congress and the states.[178]

Watkins Establishes Line Management Accountability

In late April, Watkins, in one of his first visits to a field installation, toured the troubled Savannah River site, where Westinghouse had recently replaced DuPont as operating contractor. As Watkins informed Secretary of Defense Dick Cheney on April 24, while the tritium production reactors could not be restarted in 1989, they would be restarted early enough in 1990 "to maintain a viable weapons stockpile." Watkins declared that production would not resume until a culture was established that made "safety the coequal of production." Westinghouse officials told Watkins that they were fully committed to his philosophy, confirming "the unequivocal corporate commitment to DOE to operate facilities in a safe and environmentally sound manner" that Executive Vice President Theodore Stern gave Watkins in an April 7 letter.[179]

In mid-May, Watkins announced a reorganization whereby the manager of the Savannah River Operations Office, who had previously reported directly to the secretary, would now report to the assistant secretary for defense programs. As part of a "new management concept" modeled on navy command chains and emphasizing "line management accountability," Watkins removed responsibility for environmental and safety issues at Savannah River from the Department's Office of Environment, Safety and Health and placed it under the jurisdiction of Defense Programs. Defense Programs would thus be "fully responsible" for its own activities."[180]

This move brought criticism from the Natural Resources Defense Council and some in Congress who feared that it would weaken environment, safety, and health responsibilities that had been strengthened during Secretary Herrington's tenure. On May 23, 1989, for example, Congressional critics wrote Watkins to express their "very strong concern . . ." that he was "scrap[ping] the proven and effective safety oversight role being performed by [ES&H)." The House members agreed with Watkins that Defense Programs should "bear the first responsibility for the safety and environmental soundness of their production operations," but they argued that "it is premature and wishful to think this [improved accountability] can be accomplished without the tough internal scrutiny provided in recent years by ES&H."[181]

Watkins used the occasion to send a letter to every member of Congress on May 26 explaining his approach to safe restart of the Savannah River reactors and reactor operations

in general. He reminded Congress that DOE had done little in the 1980s to correct operational deficiencies that had been identified in the 1981 Crawford Report prepared in the aftermath of Three Mile Island, a view supported by the 1987 NAS review of reactor operations that concluded that DOE continued to have technical and managerial problems with its aging reactors. Incidents at Savannah River in 1988 and 1989, Watkins maintained, provided further evidence of the need to take a fresh look at reactor safety throughout the complex.

This history of management inadequacy, combined with advice from reactor consultants who studied the Savannah River situation at his request, Watkins stated, convinced him that he needed to put in place a reactor safety system "which has proven its worth in the U.S. Navy for over 35 years and in the commercial nuclear reactor industry since Three Mile Island. This sytem," Watkins continued, "is based on the principle that unless accountability and responsibility for safe operations of reactor plants are firmly imbedded in the line, no amount of oversight can assure management or the public that we are serious about safety 'round-the-clock.'" Watkins closed with the assertion that his goal was to improve safety of operations and that "my number one objective is safety *over* production." He also assured Congress that DOE would continue to be subject to both internal and external oversight."[182]

Striking a Proper Balance

During spring 1989, environmental groups continued to criticize Watkins and DOE for devoting more resources to nuclear weapons production initiatives than to cleanup of the complex. The NRDC's Dan Reicher and Jim Werner took this position at a Senate Armed Services Committee hearing on April 7, arguing that "the current proposed DOE budget fails to direct adequate funding for this long overdue cleanup." Reicher and Werner pointed out that the 2010 Report provided full funding for weapons production but less than half that needed for environmental restoration. On May 9, Werner and James Beard presented testimony on the need to accelerate cleanup to the House Armed Services Committee that proposed that "Congress should set DOE on a path toward cleanup of the weapons complex that is at least as swift as modernization." Werner and Beard, appearing on behalf of sixteen advocacy organizations, argued that DOE's half-hearted commitment would allow contamination to spread and increase cleanup costs. "DOE's priorities must be changed," the two charged, and they claimed that "the Department's skewed priorities are well illustrated by its recent request to reprogram millions of dollars from environmental activities to weapons production." The Department, Werner and Beard suggested, should spend more on EPA and state oversight to prevent paperwork backlogs that in the end produced higher environmental restoration costs.[183]

Ten Governors' Letter

Ten western governors, eager to provide external oversight to DOE nuclear facilities within or bordering their states, wrote Watkins a strongly worded letter in mid-April.[184] The governors, all members of the twenty member Western Governors' Association founded in 1984 to represent the region's perspective on key issues, were acting on an initiative that Washington Governor Booth Gardner called "Governors' Alliance for Defense Waste Cleanup" when he and Oregon Governor Neil Goldschmidt met in November 1988 to urge other governors to join them in developing recommendations for the incoming Bush administration on cleanup of the weapons complex. The governors criticized DOE for

deferring too long the disposal and cleanup of defense wastes. Noting the "grave risks" these wastes posed to public health and the environment, the governors called for "decisive federal action to establish a comprehensive national program for the cleanup of all DOE defense and research facilities." In addition, the governors asserted the need for "stable long-term funding" to support the program. Finally, the governors committed themselves to working with the administration and Congress to secure both the program and the funding.[185]

The governors, clearly bidding to shape the five-year cleanup planning process, appended a position paper on defense waste cleanup containing specific recommendations. Not unexpectedly, they focused considerable attention on participatory and regulatory activities involving the states. To restore public confidence, the governors asserted, the Department needed to open the decision-making and review processes to the public. The affected states, as well as Native American tribes, would play a key role in public involvement. The governors thus concluded that the cleanup progam had to provide for and fund state and tribal activities, including technical review of cleanup plans and methods, transportation and emergency response, environmental monitoring of waste sites and cleanup activities, and public information and participation programs.

Regarding regulatory activities, the governors were highly critical of DOE's history of challenging EPA and state regulatory powers. The Department's program, the governors declared in their position paper, therefore had to set up a "clear regulatory framework" that would provide "the independent authority" to ensure full evaluation and cleanup of existing waste problems. To accomplish this, the EPA and affected states had to be given the "clear authority and direction to issue orders and ensure compliance with approved cleanup plans and schedules;" the role of state regulators needed to be strengthened; and the implementation of CERCLA, primarily a function of the EPA, could not override or replace the implementation of RCRA, primarily a state function in those states with EPA authorized programs.[186]

Public Participation/Hanford Tri-Party Agreement

Watkins and departmental officials preparing the five-year plan concurred in the western governors' assessment of the need for greater public participation. In June, the Department invited interested state and tribal representatives to hear presentations by DOE officials responsible for assembling the five-year plan and to read and discuss the first draft. Their "independent responses" provided useful guidance in the plan's first revision. The group, formalized as the State and Tribal Government Working Group (STGWG), met again in early July to review the second draft. The Department's intent was to utilize input from the group throughout the implementation of the five-year plan.[187]

In the area of regulatory activities, Watkins inherited ongoing negotiations concerning environmental compliance agreements and consent decrees along the lines the western governors advocated. On March 17, 1989, Watkins informed secretarial officers and managers of operations offices that he would be "personally involved" in negotiating agreements "which could have the effect of committing the Department's resources beyond funds that are currently available." In addition, Watkins requested information on current negotiations.[188]

Most significant and pressing of the current negotiations were those on Hanford. Since 1983, when it began to implement federal hazardous waste statutes, the State of Washington had been pressing DOE on safety issues regarding single-shell underground storage tanks

containing high-level liquid waste and extensive soil and groundwater contamination at the 560-square-mile Hanford Nuclear Reservation, considered the most contaminated DOE site. Between 1985 and 1987, Washington's authority to regulate hazardous and radioactive waste was recognized and EPA began acting on Section 120 of SARA that required EPA to work with other federal agencies to develop federal compliance agreements. Overlapping state (RCRA) and federal (CERCLA) authority thus complicated prospective cleanup. To reach a consensus on addressing Hanford's waste management and contamination problems, DOE, EPA, and Washington entered into negotiations on a comprehensive compliance and cleanup agreement in late 1987. Fourteen months of difficult negotiations resulted in the execution of a notice of intent by the three parties on February 27, 1989, to sign the agreement on May 15, pending public comment. Negotiations had been conducted largely by DOE's Hanford Operations Office personnel. DOE headquarters had been aware of the negotiations but had provided little input. Watkins and his newly appointed Special Assistant Leo Duffy thus faced something of a *fait accompli* on what would be a ground-breaking, precedent-setting agreement. Duffy was initially wary, especially considering the multi-billion dollar commitments that the Department would be making, but Hanford officials persuaded him that there was no alternative but to proceed with the agreement.[189]

On May 11, 1989, Duffy sent a memorandum to Watkins recommending that the secretary authorize Richland Operations Office Manager Mike Lawrence to sign the agreement on May 15. Duffy noted that Hanford was "not in full compliance with existing hazardous substance laws and regulations" and that without the agreement "the state and EPA could, and probably will, take enforcement action . . . for hazardous waste violations." A signed agreement would allow Hanford to continue operations while "moving toward full compliance with environmental laws." Duffy also explained that a united Northwest Congressional delegation "expects and endorses the scheduled . . . signing of the agreement." Acting General Counsel Eric Fygi's May 10, 1989, memorandum to Watkins supported Duffy's recommendation, noting that DOE officials "may be more vulnerable to civil and/or criminal personal legal liability should Hanford continue operations without the benefit of a compliance schedule approved by EPA and State of Washington Department of Ecology." Fygi also believed that "DOE's efforts to enter into agreements at other sites with negotiated schedules and deadlines will be facilitated by DOE's execution of the Agreement."

Watkins authorized Lawrence to sign the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) in a memorandum dated May 11, 1989. The Secretary stressed that DOE must operate "in complete compliance with environmental laws and that needed cleanup activities be carried out both promptly and prudently." The agreement, according to Watkins, provided a framework with concrete milestones acceptable to all parties and would help other DOE facilities review their compliance and cleanup requirements as they participated in Duffy's five-year planning effort. Watkins also pointed out that the agreement provided for cooperation between the signatories in developing DOE's budget requests "while preserving the Secretary's necessary authority and duty to weigh such requests in the larger context of all of the Department's operations."[190]

The Tri-Party Agreement was a landmark cleanup blueprint that influenced subsequent negotiations in other states. The TPA called for spending $50 billion over thirty years to achieve full regulatory compliance. The TPA defined and ranked RCRA and CERCLA cleanup commitments, established responsibilities and integrated complex and overlapping regulations, provided a basis for obtaining funding for cleanup, and included enforceable

milestones to achieve full regulatory compliance and cleanup. DOE cited the TPA as a "near-term mechanism for improving consistency in application of environmental regulations." Washington Governor Booth Gardner welcomed the agreement as the beginning of cleanup. Others, however, were more skeptical. Jim Thomas of the Hanford Education Action League commented that the agreement would "not [be] worth the paper it's written on" if Congress proved unwilling to appropriate sufficient funds.[191]

Rocky Flats Raid

Unhappily for DOE, a similar agreement was not in place at the Rocky Flats plant. Negotiations between DOE, EPA, and Colorado were preliminary when, on June 6, the Department of Justice announced that it was conducting a broad criminal investigation into possible violations of Federal environmental laws at Rock Flats. At the same time, FBI agents and DOE and EPA investigators seized records at both Rocky Flats and the Albuquerque Operations Office and obtained air, water, and soil samples at the site. Rockwell International, operating contractor at Rocky Flats since 1975, eventually pleaded guilty to ten charges of violating federal environmental laws. These included permit violations for the storing of pondcrete (solidified pond sludge) and violations of the Clean Water Act. Rockwell defended its management of the site by asserting that it could not comply with the various environmental laws and still maintain the level of production ordered by DOE. On January 1, 1990, EG&G Rocky Flats, Inc., took over as operating contractor of Rocky Flats. On March 26, 1992, Rockwell agreed to pay a fine of $18.5 million.[192]

Following the raid, the Department moved quickly to implement damage control. On June 15, DOE and Colorado reached an Agreement-in-Principle (AIP), in which the Department agreed to spend $1.8 million a year on environmental monitoring and undertake a study of health effects of plant operations on area residents. The AIP, officially signed on June 28, also provided for independent validation of data, cleanup schedules, and funds for state oversight. Two months later, Deputy Secretary Henson Moore wrote governors of eleven states with DOE nuclear facilities and invited them to contact Duffy if they were interested in negotiating similar agreements that would provide direct state access and enhance state environmental monitoring. Duffy's August 10, 1989, memorandum to Moore recommending that the invitation letters be sent cited the Rocky Flats agreement as "a model agreement" and pointed out that "the first of ten Secretarial environment, safety and health (ES&H) initiatives involves the negotiation of a more substantive State role in overseeing DOE's environmental compliance activities."[193]

Deputy Secretary Moore used the occasion of the June 15 agreement to state that "environmental safety" at DOE's weapons plants was "top priority, even ahead of production." Moore also announced that the Department would grant EPA and Occupational Safety and Health Administration (OSHA) inspectors Q clearances so they could enter previously restricted areas, an announcement that created a stir at DOE. Watkins reasoned that, while EPA currently did not have legal authority to regulate defense facilities, Congress would soon grant such authority, and it made sense to be on better terms with the agency. "At Rocky Flats we nearly shut down the nation's nuclear deterrent because we refused to make even the slightest concession to environmental protection," Watkins stated. "We straight-armed the EPA every time."[194]

On September 18, DOE, EPA, and Colorado signed a Federal Facilities Compliance Agreement outlining steps to achieve compliance with land disposal restrictions on solid and

hazardous waste at Rocky Flats. In addition, the Department committed to developing a national report assessing actions needed to address compliance with land disposal requirements at all other DOE facilities. Watkins termed the agreement the first of a "series of steps to refocus our priorities on environmental compliance."[195]

Ten-Point Plan

On June 27, 1989, as the Rocky Flats investigation continued, Watkins announced a ten-point plan to strengthen environment, safety, and health activities at the Department's production, research, and testing facilities. In his remarks, Watkins declared that he was "not proud nor pleased" with what he had seen during his first months in office. He reiterated his strong disagreement with the "operating philosophy and culture of DOE that adequate production of defense nuclear materials and a healthy, safe environment [are] not compatible objectives." In reference to the ongoing problems within the nuclear weapons complex, Watkins observed that the "chickens have finally come home to roost and years of inattention to changing standards and demands regarding the environment, safety, and health are vividly exposed to public examination, almost daily."

The plan addressed the major issues raised by the ten western governors and provided the framework for environment, safety, and health initiatives during the Watkins administration. The Secretary promised that DOE would give more weight to environment, safety, and health than production and reward contractors accordingly. He stated that award fees for contractors would be modified so that "not less than 51 percent" would be "based on compliance with environmental, safety and health requirements." These would include not only DOE requirements but also those set by EPA, the states, and compliance agreements. Citing Rocky Flats, Watkins noted that the current norm was closer to twenty percent. Watkins also directed that the contractor's entire award fee could be at risk for poor performance in the environment, safety, and health area.

Watkins also announced the formation of the environmental "tiger teams" so highly identified with his tenure. Observing that they would be similar to the twenty-five-person investigative team he had sent to Rocky Flats following the raid, Watkins said the teams would review "operations, documentation, agreements, planning, and facility's performance in meeting environmentally-regulated schedules." Watkins promised that teams would perform compliance assessments at DOE's thirty-five major facilities by mid-1991. Watkins added that he was establishing a special hotline at DOE headquarters to "allow citizens to report specific facility concerns" and thereby "assist these teams in their work."

Watkins also announced a significant budget increase for remediation and waste activities. Noting that this was the "first action taken as a result of the Environmental Restoration and Waste Management Five-Year Plan," Watkins stated that the administration, working with Congress, had provided an additional $300 million in the fiscal year 1990 budget to "accelerate" the cleanup. The Reagan administration's initial fiscal year 1990 budget request had been $1.8 billion. Upon taking office, President Bush, Watkins observed, had increased this to $2.1 billion. Now the figure would be $2.4 billion. Looking five years ahead, Watkins estimated that the budget would be $4.0 billion in fiscal year 1993 and $4.1 billion in both fiscal year 1994 and fiscal year 1995.

Other ten-point plan initiatives included signing additional environmental compliance agreements similar to the Rocky Flats AIP, strengthening environment, safety, and health expertise among line managers, and making health data available to the public. The

Department would also revise its "haphazard" NEPA procedures, and Watkins announced that a new "safety conscious" management team would be put in place in defense programs.[196]

Environmentalists were encouraged but skeptical about the ten-point plan, noting that Herrington gave similar assurances when he took office in 1985. Dan Reicher of the Natural Resources Defense Council argued that "[t]he real test . . . will come when he [Watkins] is facing a competition between funding for cleanup and funding of production initiatives." Criticizing Watkins for providing too little public access, Reicher explained that the NRDC and twenty other groups had filed suit against DOE to gain public review of the Department's cleanup and waste management plans through NEPA's environmental impact statement process.[197]

Tiger Teams

The first Tiger Team accompanied by FBI agents and EPA observers arrived at the West Valley Demonstration Project south of Buffalo, New York, on July 7. Following three weeks of intensive assessment of all aspects of environment, health, and safety, the Tiger Team reported 122 findings, with some fifty of these focusing on waste management. The team's most significant waste management concerns involved the treatment and storage of mixed and hazardous wastes, but the team noted that these did not present any undue risk to public or worker health. In October, West Valley formally responded to the findings with an "action plan response." The action plan described corrective actions to be taken, set due dates, and identified costs and parties responsible for implementation. Concurrent with the Tiger Team assessment, the FBI conducted a criminal investigation arising from local citizens' complaints concerning disposal practices. In September 1990, the FBI closed its review without filing criminal charges, concluding that the only violations involved twenty barrels of nonnuclear solvents stored longer than hazardous waste guidelines allowed.[198]

The second Tiger Team, accompanied by State of Ohio and EPA personnel, assessed the Fernald uranium processing plant northwest of Cincinnati from July 17 to August 4, 1989. Fernald faced considerably greater environment, safety, and health problems than West Valley. Prior to the announcement that Fernald would be the recipient of one of the initial Tiger Team visits, Westinghouse Materials Company of Ohio, the operating contractor, had suspended production operations in an effort to improve safety and concentrate on site cleanup. In addition, on June 30 DOE agreed to pay 24,000 local residents $73 million in an out-of-court settlement to a class action lawsuit alleging that uranium from the facility contaminated the air and local water supplies. Rather than claiming that years of inadequate controls caused health problems, the plaintiffs argued that plant operations reduced property values and subjected residents to emotional distress.[199]

Not surprisingly, the Tiger Team determined that Fernald did not meet all requirements of existing statutes and regulations. Violations included incomplete hazardous waste characterization and storage, inadequate treatment of wastewater streams, and lack of timely implementation of remedial investigation work. The Tiger Team found that Fernald's compliance problems stemmed primarily from inadequate staffing and planning and a passive attitude toward environmental requirements. As at West Valley, the Tiger Team concluded that there existed no imminent threat to public health or welfare. EPA, however, disagreed, citing current removal actions that were undertaken as a result of public endangerment. These included remediation of contaminated groundwater, control of runoff

from waste pits, cleanup of contaminated soil, and work on the K-65 silos. In June 1990, Fernald responded to the Tiger Team assessment with a two-volume "corrective actions plan." Fernald stated that key Tiger Team findings had been identified by outside regulatory agencies and corrective actions had been underway before the arrival of the Tiger Team.[200]

Over the next two years, Tiger Teams visited thirty-five of the largest DOE sites. The assessments followed the pattern set at West Valley and Fernald, with the Tiger Team appraisal followed by the site's corrective action plan. In May 1991, the Department produced an interim analysis of findings from the first sixteen Tiger Team assessments that identified problems and deficiencies common to DOE facilities. Management problems included ill-defined authority and responsibility, reactive rather than proactive management, inadequate self-assessment programs, and insufficient DOE field office oversight of day-to-day contractor activities. In addition, environment, safety, and health programs were hampered by a lack of formality and discipline, and the Department had not succeeded in communicating policy to all levels of DOE and contractor staff. Finally, major difficulties existed in obtaining sufficient staff with appropriate qualifications to carry out program activities.[201]

The Weapons Complex Under Stress

Admiral Watkins's initiatives heightened pressure on and within the nuclear weapons complex. The Secretary's activist approach, coupled with unflagging congressional interest and incidents like the Rocky Flats raid, kept the complex under intense public scrutiny, though the daily bad publicity bombardment suffered through in late 1988 relented somewhat. In addition, the attack by Watkins on the culture of his own agency and his efforts to reorient longstanding organizational structures and practices not only augered rapid change but also threatened to disaffect and demoralize significant elements within the complex.[202]

Discomfort within the weapons complex was also attributable to the complex's seeming inability to fulfill its mission and resume the full-scale manufacturing of nuclear weapons. Indeed, the date of resumption kept receding further and further into the future. With no production reactors operating, Watkins was especially eager to restart Savannah River production and in April 1989 had projected resumption some time in 1990. By November, engineers working on the three Savannah River production reactors estimated that tritium production could not begin before mid-1991, with full production unlikely until mid-1992. The same month, Watkins "temporarily" suspended plutonium manufacturing at the troubled Rocky Flats facility and dispatched a 100-person review team to the site. Operations at Rocky Flats would never resume. The same was true at Fernald.[203]

If DOE despaired over ever fulfilling its nuclear weapons mission, the mission itself was growing increasingly tenuous. The 2010 Report on modernization of the complex, submitted to Congress in January 1989, assumed, among other things, a relatively constant nuclear weapons program. The approaching end of the Cold War and the rapidly changing international situation soon called this assumption into question. In response, Watkins in September established a Modernization Review Committee to review the assumptions and recommendations of the 2010 Report. The committee's difficult assignment was to design a nuclear weapons complex that would match the strategic needs of the new international situation when that situation kept changing rapidly and in unanticipated ways throughout the course of their deliberations.[204]

Organizational uncertainties continued to plague the complex as well. For two years, the Office of Defense Programs had operated with acting directors. As part of his ten-point plan, Watkins announced a new "safety conscious" management team for defense programs, with Victor Stello, Jr., executive director of operations at the Nuclear Regulatory Commission (NRC), as assistant secretary for defense programs. The Stello announcement provoked immediate criticism from the Natural Resources Defense Council and some in Congress who charged that Stello had abused his powers when at the NRC by giving favorable treatment to utilities and thwarting investigations. Congressman John Dingell (D-Michigan) wrote Senator Sam Nunn (D-Georgia), chairman of the Senate Armed Services Committee, that Stello was "unqualified" and that "the only benefit of moving Mr. Stello to the Department of Energy is ridding the NRC of Mr. Stello." Watkins defended Stello, sponsored by the White House, as someone who could do the job, though he conceded that many regarded Stello as a "B student" with "chinks in his armor." In a highly unusual move, Watkins appeared with Stello on November 16 before the Senate Armed Services Committee, where he called Stello "an incredible public servant" with flawless personal integrity. After several more months of deadlock and recriminations, the Stello nomination died in April 1990. Not until October was a permanent assistant secretary, Richard A. Claytor, confirmed.[205]

Certainly the Tiger Teams were deeply resented throughout the nuclear weapons complex. The laboratories, in particular, disliked being compelled to forego research so that groups of "lesser status" could "pick over" their operations. Resentment also flared because of some of the Tiger Teams' tactics. Moreover, many Tiger Team findings failed to distinguish between relative risks.[206]

Nor did Watkins's oversight initiatives end with the Tiger Teams. In September 1989, Watkins established the independent Office of Nuclear Safety reporting directly to him, a move consistent with a recommendation from the Ahearne Committee made in July and aimed at implementing 1988 Congressional amendments to the Atomic Energy Act giving the secretary authority to levy fines and penalties against DOE contractors for safety violations. Watkins tasked the new office with determining whether line management was adequately assuring nuclear safety. The office possessed oversight responsibility for some 2,700 DOE nuclear facilities, including production reactors, separation canyons, high-level waste facilities, vitrification facilities, and numerous shut down or abandoned contaminated facilities. Watkins noted that he created the office to apply "tough love" to the DOE nuclear establishment.[207]

Finally, the most dynamic and growing sectors of the nuclear weapons complex involved waste management and environmental restoration. These were, for the most part, subsumed under Defense Programs, but Watkins and Duffy, early in the five-year planning process, made no secret that restructuring was in the offing, with the possible intent of carving out a separate, independent organization. How this restructuring was carried out would affect a significant segment of the nuclear weapons complex.[208]

The First Five-Year Plan

On August 1, 1989, Admiral Watkins unveiled the first five-year plan at the National Press Club. Billed as the cornerstone of DOE's long-term strategy in achieving the "minimization, cleanup, and management" of DOE's waste materials, the five-year plan stated that the Department's "fundamental goal" was to "ensure that risks to human health and safety and to the environment" were "either eliminated or reduced to prescribed, safe levels." Watkins

committed the Department to the cleanup of all sites within thirty years. "That will seem like too long to some people, and unattainable to others," the Secretary observed, "but we believe that it is as close to accurate as we can get, considering the various research and cost estimate goals which we believe are achievable."[209]

The Department, in its press release, estimated costs for fiscal year 1990 through fiscal year 1995 as $16.5 billion for completing the "highest priority activities," with complete implementation estimated at $19.5 billion. The plan delineated these costs on a site-by-site basis over five years. Nowhere in the plan itself, however, were overall cost figures presented or discussed. The authors of the five-year plan were careful to point out that the costs did "not necessarily represent a projection of Departmental budgets." Rather, the costs were "driven by requirements, that is, they are the amounts estimated to be required to carry out all the activities in the Plan."[210]

Given possible budget constraints, Duffy and his staff were well aware of the need for prioritizing the plan's activities. Lacking a "formal, agreed-upon method for setting priorities," the plan's authors noted that in September DOE would convene "a multi-agency workshop to set prioritization criteria." Indian tribes, local and state agencies, other federal agencies, and national interest groups would be included. The prioritizing methodology would be based on "risk concepts" and would be designed to "promote the greatest reduction in overall health and safety risk" as well as the "greatest degree of regulatory compliance." In the interim, the five-year plan used a "less sophisticated" approach with four priority levels. The first two, composing the "highest priority activities" and most of the estimated costs, were activities that 1) limited immediate or short-term health risk and contamination and 2) complied with in-place or pending agreements. The lower-priority level activities were defined as those 1) reducing outyear risk, promoting outyear compliance, addressing public concern, and protecting departmental misssions and 2) accelerating overall compliance.[211]

Duffy and his staff contended that to meet the five-year plan's goals "centralized planning, Department-wide priorities, and consolidated budgeting [were] essential." The plan included activities in eleven DOE programs that reported to three assistant secretary-level officials. While a single appropriation act—the Energy and Water Development Act—funded the plan's activities, four House and two Senate committees provided authorization. Neither DOE nor Congress was organized to provide an integrated approach to managing the program described in the five-year plan. To overcome the problem of conflicting goals and responsibilities in DOE, the plan's authors advocated "an integrated organizational structure" to provide, among other things, consistent support for compliance activities. They noted that Watkins was evaluating options and would announce changes later in the year. Duffy and his staff also proposed a "new funding approach by the Administration and Congress" consisting of a single appropriation account combined with a near-term response fund to provide maximum program flexibility.[212]

A "living document" that would be updated on an annual basis, the five-year plan served as a mechanism both for collecting and prioritizing data from the field and for providing direction and guidance to field organizations and activities. Duffy and his staff developed Activity Data Sheets (ADSs) as the "basic unit of description" to be used by operations offices in identifying all projects. The ADSs contained appropriate information on priority and funding levels and budget reporting codes, as well as a short narrative description. Submitted from the field, the ADSs formed the basis for the five-year plan.

Watkins, in turn, directed that DOE's eight operations offices use the five-year plan to develop site-specific work plans. Duffy and his staff made clear that throughout this process "affected regional parties" would participate in both plan development and review. Indeed, the five-year plan underscored that through such participation DOE hoped to "establish public confidence in its ability to operate its facilities without posing a threat to public and worker health and the environment." Implementation, in short, was contingent on "broad national consensus."[213]

Technology Development and Waste Minimization

Two basic principles lay at the heart of the five-year plan's approach to solving the Department's environmental restoration and waste management problems: technology development and waste minimization. In his brief cover letter to the five-year plan, Admiral Watkins stated that current technology was "not sufficiently mature or cost effective" to meet the Department's goals. An "aggressive applied research and development program" therefore was necessary "to enable more rapid assessment of environmental problems and more efficient and effective development of environmental restoration, treatment, and disposal technologies."[214]

In accordance with Watkins's enthusiasm, technology development comprised one of five major sections of the five-year plan. The plan's authors contended that DOE's ability to meet its thirty-year cleanup goal would be adversly affected unless research and development provided solutions to "key technical issues." As examples, the five-year plan cited the need for determining the appropriate disposal method for high-level wastes at Hanford and selecting the appropriate waste form for disposal of calcined high-level wastes stored at Idaho. "Spiraling costs," as well, provided impetus toward technology development. Duffy and his staff thus called for a centralized technology development program "managed through DOE Headquarters" and "applied at DOE sites across the Nation." Investment in applied research and development would be "significantly increased from its present level of about 6 percent of the total program budget to about 10 percent, which is accepted as a broad industry standard." In addition, the Department was preparing a draft research, development, demonstration, testing, and evaluation (RDDT&E) plan, basically a five-year plan for technology development, which was due in November.[215]

Duffy reiterated the criticality of technology development in an early October speech discussing opportunities for private sector participation in cleanup and waste management activities. Duffy stressed that the overall program had to be "keyed to developing innovative environmental technologies to yield permanent disposal solutions." The Department, he noted, was not interested in transferring problems "from one hole in the ground to another hole in the ground." Rather, DOE's "highest waste technology priority" was how to treat contamination *in situ* and without moving it. Duffy added that since the public's perception was that DOE waste practices were causing adverse health effects due to migration of wastes into surface and groundwater supplies, research and development needed to focus on negating the sources from which materials were coming and on restoring waters under and surrounding DOE facilities. The challenge was to develop technologies to process high volumes of dilute, low concentration materials.[216]

Technology development was also closely related to waste minimization. In his five-year plan cover letter, Watkins asserted that technology development had to be devoted to "minimizing" the generation of current and future wastes. In the five-year plan, Duffy and

his staff declared that waste minimization would be the means by which DOE would "take control" of its waste problem. Waste minimization was essential, they argued, because "ungenerated wastes need no management and cause no environmental damage." Whereas DOE, like almost everyone else, had been "beset by a throw-away mentality," the Department, according to the five-year plan, was now implementing "cradle-to-grave radioactive, hazardous, and mixed waste characterization and tracking systems." Formal programs were either being developed or were in place at "all" DOE sites. Applied research and development to minimize waste generation was becoming a "major area of emphasis." Three lines of pursuit received particular attention: 1) process changes and chemical substitutions that would eliminate or significantly reduce hazardous wastes generated, 2) material recycling and reuse, and 3) segregation and concentration of wastes that required sophisticated waste disposal methods.[217]

Qualified Enthusiasm for the Five-Year Plan

Although the five-year plan was generally well received by other federal agencies, affected states, and environmental groups, there was criticism. J. Dexter Peach, assistant comptroller general of the General Accounting Office, termed the plan "an important first step" that would begin to provide Congress with information needed "to ask the questions and to exercise effective oversight." Peach expressed concern, however, that the full scope of environmental problems within the nuclear weapons complex was not yet known. This meant that cost estimates were "very uncertain" and likely to rise as problems were more fully characterized. Peach added that the envisioned three-decade cleanup required "strong bipartisan and long-term commitment," especially as costs rose. Agreement between states, local governments, and other federal agencies, as well, was required.[218]

The Environmental Protection Agency expressed similar qualified praise for the five-year plan. Deputy Assistant Administrator Christian Holmes commended DOE for its efforts and described the plan as "a good foundation." Nonetheless, senior officials at EPA objected to DOE's prioritization scheme because it implied that there would be "trade-offs among compliance-related activities" and that not everything would be cleaned up.[219]

Officials from affected states were also of mixed minds. Colorado Attorney General Duane Woodard called the five-year plan "a breath of fresh air." Maury Walsh, deputy director of the Ohio Environmental Protection Agency, referred to the plan as a "welcome change." Roger Stanley of the Washington State Department of Ecology found the efforts to be "encouraging" and "to be applauded." Woodard, however, also contended that "legislative direction" was necessary to keep momentum moving forward, stated that thirty-year cleanup was an "outside limit" and most facilities should be cleaned up in "substantially less" time, and asserted that Activity Data Sheets could not be prepared without input from state and EPA regulators. Walsh complained that the plan was silent both on how DOE was going to change its culture and on contingency plans if WIPP and other facilities failed to open. And Stanley expressed concern that the national prioritization system uphold "commitments within legally binding agreements," namely the Hanford Tri-Party Agreement.[220]

Environmentalists charged that the five-year plan went only "halfway" and was at best "a step in the right direction," and then only if the money went entirely for environmental remediation and not for waste management activities and environmental compliance paperwork. Dan Reicher of the Natural Resources Defense Council stated that the plan "generally represents some progress" but "the fundamental problems in the Department have

really yet to be corrected." The NRDC's Jim Werner again criticized DOE's prioritization system. He noted that sites with state cleanup agreements, like Hanford and Fernald, were getting "the lion's share" of funding. Sites without agreements were getting a smaller proportion. Reicher and Werner also pointed out that numerous DOE sites were not included and argued that the Department should expand public access to the five-year planning process. In a November hearing on the five-year plan held by John Glenn, Reicher and Werner also pointed to broader concerns with the Watkins-Duffy approach to cleaning up the complex: Tiger Teams appeared to be duplicating the work of Herrington's Environmental Surveys, action plans prepared subsequent to Tiger Team visits were not being carried out, and the establishment of EM was a step backwards because it reversed progress made under Herrington to strengthen ES&H oversight.[221]

Establishment of EM

Through a memorandum of agreement signed on September 19, 1989, between the Offices of Environmental Management (soon to be Environmental Restoration and Waste Management); Defense Programs; Energy Research; Nuclear Energy; Environment, Safety, and Health; Fossil Energy; and New Production Reactors, EM took over cleanup, compliance, and waste management responsibilities previously assigned to the Offices of Defense Programs, Nuclear Energy, and Energy Research. Consolidation of these responsibilities gave EM a budget of approximately $2.5 billion for fiscal year 1990. Watkins instructed DOE operations offices to propose realignments in their organizations necessary to implement the five-year plan and to identify facilities that should be transferred to EM.[222]

Establishing new program offices produces significant organizational stress, not least in offices giving up the lion's share of resources—in this case Defense Programs. Evidence of Defense Programs' discomfort was abundant. To cite but one example, in an October 3, 1989, memorandum to Under Secretary John Tuck, Acting Assistant Secretary for Defense Programs John Meinhardt forwarded comments on DP's concerns related to transferring functions to EM and stated that "I am unable to provide my concurrence in the proposal." Meinhardt argued that some organizational and functional transfer actions implicitly rejected the secretary's belief in "line management accountability for environment, safety and health matters" and were inconsistent with explicit statements in the September 19 MOU giving production operations responsibility for environmental management. Meinhardt insisted that favorable resolution of DP's concerns would be consistent with "the Secretary's direction and goals."[223]

On October 4, Watkins approved the establishment of the Office of Environmental Restoration and Waste Management (EM) and set November 1 as the implementation date. Watkins named Duffy office director and announced his intention to submit legislation making EM an assistant secretary-level organization. Watkins stated that the EM office was needed "to implement the Five-Year Plan" and to establish a headquarters organization dedicated to environmental cleanup, compliance, waste management, and applied research and technology development activities. This would eliminate "fragmentation of responsibilities" and "provide a single line organization . . . accountable for the progress of these important environmental initiatives" and responsible for cost control, schedule, and project priorities. Watkins noted that the groups that had provided input to the five-year plan agreed that such an organization was needed.[224]

Duffy was pleased. For the first time, he observed, environmental restoration and waste management activities would be "treated as a single, focused, and unified program" managed under his direction. To be successful in the long term, Duffy argued, the program had to be "the 'first priority' of a single Headquarters organization, not a 'second priority' of an organization responsible for achieving production goals or for performing energy-related research."[225] □

Part VIII: EM Takes Shape, November 1989-June 1991

Confronting the "Monumental Task"

Leo Duffy became director of the new Office of Environmental Restoration and Waste Management on November 1, 1989. He faced, in the words of Ohio EPA's Maury Walsh, a "monumental task." The responsibility for creating and shaping a new organization was in itself daunting enough. As rapidly and smoothly as possible, Duffy had to merge disparate parts of "multiple DOE organizations" (primarily Office of Defense Programs, but also major activities from the Offices of Nuclear Energy and Energy Research), create a fully functioning headquarters staff, and establish lines of communication and authority with diverse field operations and activities spread throughout the DOE complex. And he had to do this with a budget of $2.5 billion that was increasing almost exponentially and an ongoing program for which there were great outside expectations and numerous legally driven, rapidly approaching "hammer" dates.

Budgetary and personnel matters were central to Duffy's organizational task. Duffy estimated EM's budget needs for fiscal year 1991 as between $2.8 billion and $3.3 billion, with the lower figure applying if the administration decided to delay or "extend out the length of time on" some lower-priority EM activities. Only two weeks into his new job, at a November 14, 1989, hearing before the Senate Committee on Governmental Affairs chaired by Senator John Glenn, Duffy indicated that $3.3 billion was about the largest amount that could be "used effectively" by EM. The problem was the lack of trained and knowledgeable people in the area of environmental remediation. Cleanup demands, not only within DOE but in the Nation as a whole, given the expanse of Superfund, required "a tremendous amount of talent" that simply was not there. "To put that money out into the industry at this time," Duffy observed, "would be ineffective and inefficient." Duffy cited his own difficulty in setting up a headquarters staff. "We have authority for 136 people," he stated, "and we need 67 additional people to fill that billet." Duffy noted that the five-year plan had identified "human resource" as "the major problem that the Department of Energy has at the current time." As a result, DOE was working with universities to create new technical curricula emphasizing physical sciences applicable to waste management problems.[226]

With Duffy in essence turning down additional money, funding did not appear to be an immediate problem. Nonetheless, given DOE's legal obligations and the long-term nature of the cleanup, providing adequate funding over three decades was worrisome. As Senator Glenn rhetorically asked, "what will happen several years from now when several very expensive cleanup projects will be requiring funding authorization and there may not be the same political climate that exists today to support them, how will DOE deal with the many compliance agreements that contain requirements for long-term and expensive cleanup efforts, when support for this funding may diminish[?]" Congress must provide, he concluded, for "a long-term funding commitment to cover the 30-year period projected by DOE to complete this difficult task."[227]

"Are We Going to Actually Start Digging Dirt?"

Duffy's more immediate concern was not with funding but with producing results. Requirements for corrective actions and waste management were fairly straightforward. While the problems in these areas might be complex and lacking procedural and/or technical

solutions, the question of what problems needed to be solved, especially following the Tiger Team visits, was not a major point of controversy. Together, corrective actions and waste management accounted for $690 million and $11.6 billion respectively in what was now a five-year budget of $19.1 billion through fiscal year 1995. Many problems would not be resolved for years and possibly decades, but corrective actions were under way and waste management was an ongoing process. And both were providing tangible results, even if not as rapidly as hoped for or expected.

Producing results in environmental remediation, which accounted for $6.8 billion in the five-year budget, was somewhat more elusive. More than three-fourths of the Department's environmental problems at inactive sites were in the earliest phases of assessment and investigation. Visible, physical cleanup awaited characterization and decisionmaking. But Congress, the states, environmentalists, and local citizenry were impatient. As Glenn asked Duffy during the November 14 hearing, "are we going to actually start digging dirt and moving things around and actually curing the problem that we have talked about?" Duffy admitted that this was a good point, but he also asserted that DOE was "doing cleanup." He specifically cited Oak Ridge, where the Department had spent $832 million in the last four years in actual cleanup operations.[228]

Land Use

"Digging dirt" depended upon characterization of the contamination problem and selection of a cleanup remedy. But the assumptions and principles underlying environmental restoration also needed to be clarified so that the cleanup would not only satisfy all interested and affected parties to the greatest degree possible but also provide the most effective and efficient use of limited taxpayers' dollars. Most significant, perhaps, was the question of land use. Was a given site to be used for continued industrial activity, turned into public parkland or farmland, fenced off in perpetuity, or utilized for some other purpose?

Ultimate land use guided how sites would be cleaned up and to what degree, as Senator Glenn observed at the November 14 hearing. Noting Duffy's predilection for not transferring problems from "one hole in the ground to another hole in the ground" and his emphasis on *in situ* solutions, Glenn asked if this was going to be a "pattern now." Would waste be kept on site with the Department "basically memorializing these places, putting a fence around it and a guard at the gate and that is it?" Duffy replied that *in situ* "solutions" did not necessarily imply "leaving the waste in place." Bioremediation, for example, involved "*in situ* microorganisms" that could "break down the hazardous component." Problems thus could be solved "by changing the composition of the waste so it is less hazardous and less toxic."[229]

Not all waste, of course, was responsive to *in situ* solutions. No known process, other than natural decay, could make the radioactive component disappear. Glenn therefore asked Duffy if he envisioned "major transfers" of contaminated soil and materials cross-country to different sites. Duffy responded that this was not the Department's objective. Pointing specifically to the problems of transuranic waste and the opening of WIPP, Duffy noted that many governors would "not take waste from this State, that State, other States." The Department, he added, was "going to have to resolve that on a consensus basis with the various State governments and Congress."[230]

The states were most certainly interested, and Duffy's explanation brought Colorado Attorney General Duane Woodard up in arms. He declared that it was the first time he had

heard DOE state that there might be "emplacement" of waste materials at Rocky Flats. This "simply would not work at Rocky Flats" because of the "approximately 2 million people that border the facility." Woodard added that the "glaring deficiency" of the five-year plan was the lack of alternative if WIPP never opened. Maury Walsh of the Ohio Environmental Protection Agency approached the issue with greater equanimity. The "reality," he argued, was that, at all sites with serious contamination, there was "a point of diminishing returns on what you can clean up. There may be some instances where some materials have to remain on-site. We will push to have as much taken off as possible, but we are also realistic enough to realize that there is a point where it does not make sense to dig up half the county and haul it to Nevada or New Mexico."[231]

Cleanup Standards

Closely related to land use was the issue of cleanup standards. What were the standards or limits to which a site or facility would be cleaned up? How much residual radioactivity, for example, could remain in the soil? The Environmental Protection Agency took the lead in attempting to establish minimum standards. In the mid-1970s, EPA issued interim guidance applicable only to transuranic contamination. The Department of Defense used these standards in the cleanup of Johnston Atoll, but, EPA Deputy Assistant Administrator Christian Holmes complained to Glenn's committee, DOE would "like us to make those standards somewhat less stringent." In the early 1980s, EPA started a second project, the residual radioactivity project, addressing cleanup standards for all radiological contamination. EPA estimated that a comprehensive set of standards for radiological contamination would be issued in late 1992.[232]

Duffy defended DOE's role in standards setting. He noted that in the original draft of the five-year plan, DOE called for the establishment of national cleanup standards. This, he observed, was "totally rejected by the State members" who reviewed the draft. The states declared that it was "the States' right to set standards." As a result, Duffy stated, DOE eliminated the setting of standards as a goal in the five-year plan. The Department did notify EPA, however, that DOE was interested in achieving a "consensus on how clean is clean."[233]

Ohio's Walsh confirmed Duffy's interpretation of the states' position. He noted that the five-year plan originally had a "repeating theme" of trying to set "uniform national standards for cleanup and compliance which would usurp States' rights to set more stringent standards." Walsh added that DOE's "call for uniform national standards has been toned down significantly, though it still seems to be hinted at occasionally."[234]

Two PEISs Announced

On January 12, 1991, Admiral Watkins announced that the Department would prepare two programmatic environmental impact statements (PEISs). The National Environmental Policy Act requires the preparation of environmental impact statements for major projects or legislative proposals significantly affecting the environment. An EIS describes the positive and negative environmental effects of an undertaking and lists alternative actions, including taking no action. The EIS informs both decisionmakers and the public of reasonable alternatives that would minimize adverse impacts and environmental quality. A PEIS examines a program, as opposed to discrete activities, in its entirety.[235]

The first PEIS announced by Watkins addressed the environmental restoration and waste management program. The PEIS would "evaluate alternative approaches" to resolving DOE's remediation and waste problems. The PEIS would examine various treatment, storage, and disposal options. Duffy strongly supported the EM PEIS because it would give direction to the EM program. The second PEIS would evaluate environmental issues concerning the Department's long-term plans to renovate the aging nuclear weapons complex. The manner in which the modernization of the complex proceeded would have a significant impact on restoration and waste issues.[236]

Watkins stated that preparing the PEISs would be difficult and controversial. Nonetheless, they would serve as useful planning tools, provide for full public participation in the process, and be consistent with the ten-point initiative promising that the Department would fully comply with NEPA requirements. DOE's decision also averted lengthy litigation with the environmental coalition that had filed suit on June 27, 1989, to force the Department to conduct PEISs. Congress, as well, was pleased. Representative Les AuCoin (D-Oregon), who, with other members of Congress, had advocated such studies in a December 1988 letter to DOE, stated that the Department's decision "provides compelling evidence that this agency, our government's purest creation of the Cold War, may be coming in from the cold."[237]

The Weapons Complex Coming in from the Cold

Recognition that the Cold War itself might be ending was a major influence on the Department and its nuclear weapons complex. While the Department continued to work on resuming plutonium manufacturing at Rocky Flats and restarting production reactors at Savannah River, developments within the Soviet Union influenced national security decisionmaking at the highest levels. Uncertainty regarding weapon stockpile needs complicated modernization planning at DOE. In 1989, Watkins had inherited a situation that required him to balance "fix-up" of the weapon complex with "cleanup" of the weapon complex—DOE's production facilities had to be safe and running to produce material for nuclear weapons needed for national security.

Reduced Cold War tensions tilted the balance away from weapon production and toward cleanup, leading DOE to direct significantly more resources to cleanup and compliance activities and to rethink national defense assumptions made only a year earlier. In late January 1990, for example, DOE decided to cancel the Idaho isotope separation plant considered critical in the 2010 report as a backup for Savannah River. In July, the Department concluded that the Hanford PUREX facility, a separations facility that operated on and off beginning in 1956, was no longer needed for plutonium production. DOE announced that an EIS would be prepared in case PUREX were ever used to treat fuel stored at Hanford's N-reactor.[238]

Lessening of Cold War tensions and the gradual "greening" of the weapons complex, nonetheless, gave rise to uncertainty and confusion regarding the complex's weapons production mission. With Rocky Flats and Savannah River out of production, DOE was incapable of meeting the Department of Defense's stockpile targets. This exacerbated tension between the two departments, especially after safety questions arose regarding DOE-produced nuclear weapons for DOD's bomber fleet. On the other hand, the national security priority of weapons production was no longer a given. In April 1990, Watkins argued that plutonium pits from Rocky Flats were needed to prevent a delay in deploying Trident II missiles on nuclear submarines. This position was weakened considerably a month later, however, when

the Navy testified in closed hearings that, in light of developments in the Soviet Union, such a delay would not compromise national security.[239]

Fiscal Year 1991 Budget Request

What was clear was the growing significance of the environmental restoration and waste management program. This was reflected in the Department's fiscal year 1991 budget for EM, released in late January 1990, of $2.8 billion. As Duffy testified before the House Appropriations Committee on March 6, the request funded priorities one, two, and most of three of the five-year plan. In other words, the request covered activities necessary to prevent near-term adverse health and environmental impacts and ensured that existing compliance or cleanup agreements were maintained. The request also provided "some funds" for other projects to reduce risks, promote compliance, reduce costs, and prevent disruption of the DOE mission.[240]

The request thus did not fund all four priority levels delineated in the five-year plan. Even with less than full funding, Duffy admitted that there would be "program slippages," given the "large number of individual projects (over 1500) and the probable delays in attracting and acquiring the required technical and administrative staff at DOE and in the States to administer this large, complex program." Simply put, DOE, contractors, and states were all competing for "a very limited talent base." Therefore, because DOE would not be able to spend all funds requested, the adjusted budget was $142 million less at $2.8 billion. This was still $573 million, or 26 percent, more than fiscal year 1990 and continued, in Duffy's words, the "rapid acceleration of the cleanup."[241]

Waste management activities comprised the largest portion of EM's estimated budget at $1.7 billion. This was 56 percent of the total fiscal year 1991 EM budget and reflected the costs of constructing and operating waste management facilities. Corrective actions to bring operational facilities into compliance with existing standards totaled $169 million. Environmental restoration, funded at $882 million, more than doubled the fiscal year 1989 amount. Duffy attributed this to "the gradual transition from the investigation and feasibility studies under CERCLA and RCRA to actual remediation projects." Duffy warned, however, that because the ultimate scope and complexity had not been determined, environmental restoration had the "greatest degree of cost uncertainty." Budgets for these three activities—waste management, corrective actions, and environmental restoration—increased 32, 35, and 34 percent respectively from fiscal year 1990 to fiscal year 1991.[242]

Far behind this rapid growth rate was technology development's fiscal year 1991 budget request, which increased only 12 percent over the previous year. After a threefold leap in fiscal year 1990, going from $52 million in fiscal year 1989 to $184 million in fiscal year 1990, technology development funding rose to only $206 million in the fiscal year 1991 budget request. This represented about 7 percent of the total EM budget request, well below the 10 percent standard that the Department had declared was necessary in the five-year plan. Duffy reiterated DOE's commitment to allocate 10 percent of EM resources for technolo gy development in the "outyears." In the short term, however, Duffy contended that "some time is needed to build the needed infrastructure to conduct the R&D initiatives."[243]

Second Five-Year Plan (1992-1996): June 1990

The Office of Environmental Restoration and Waste Management's budget, which, as the fiscal year 1991 request indicated, was increasing rapidly but still within capabilities, soon threatened to spiral out of control. In late June 1990, DOE released the second five-year plan for fiscal years 1992–1996. At 622 pages and considerably longer than its predecessor, the second five-year plan differed most markedly from the first in its emphasis on skyrocketing cost estimates versus limited resources and infrastructure. Cost growth was expected, but EM planners were stunned with incoming field estimates that "exceed[ed] what is considered a manageable rate of growth." The second five-year plan estimated that DOE would need nearly $29 billion from fiscal year 1991 to fiscal year 1995 to make adequate progress on cleaning up the weapons facilities by 2019. This was a 50 percent increase over the figure cited in fall 1989. For fiscal year 1992 alone, cost estimates had soared from $3.7 billion to almost $6 billion.[244]

Several factors accounted for the "increase and uncertainty" in EM's cost estimates. Identified problems throughout the complex grew sharply. "Revised estimates" for previously planned activities increased fiscal year 1992 costs by nearly $500 million. Growth in regulatory and compliance agreements, like the Hanford Tri-Party Agreement, added costs of over half-a-billion dollars in fiscal year 1992. Other factors in escalating costs included enforcing new DOE Orders, implementing Tiger Team findings, building new facilities and operating existing ones, and funding EM landlord costs at Hanford, the Idaho National Engineering Laboratory, and the Oak Ridge Gaseous Diffusion Plant (K-25). In addition, EM had the lead on the PEIS and other NEPA compliance responsibilities.[245]

Perhaps the "most significant and troubling factor" in driving estimates up, the second five-year plan's authors asserted, was concern over DOE's proposed rulemaking to limit indemnification of contractors for violating environmental laws. Fearful that they could be held liable for criminal or civil penalties if EPA or a host state determined that a facility was not in compliance with RCRA, contractors tried to minimize personal and corporate exposure by interpreting regulations narrowly and requesting more-than-sufficient funds to demonstrate their intent to meet regulatory requirements. In some cases, EM planners noted, needs had been included "regardless of immediacy or technical basis." This created a "disparity" between "field-generated needs and Headquarters' view of these needs."[246]

Escalating cost estimates magnified significant structural problems in Duffy's organization and explained why he frequently stated, as he did to reporters on the occasion of the second five-year plan's release, that the "worst we can do is throw money at the problem." Though it was growing "as rapidly as practical," Duffy's headquarters staff could not manage more program increases for at least two years. DOE's operations offices and their contractors faced a similar shortage of management and technical staff, as did state and federal regulatory agencies that had to review work plans and process permit applications. Citing EPA's October 1989 statement that there were not enough engineers in the country to attack all Superfund sites simultaneously, Watkins in his cover letter to the second five-year plan noted that DOE's new EM program compounded an already difficult national problem. As Duffy told reporters, "the infrastructure does not exist. There is no place to store and dispose of the wastes, there is no contractor with the capability and DOE does not have the in-house expertise." He concluded philosophically, "it's going to be an interesting next few years."[247]

Expectations, Realism, and Responsibility

"It is clear," the authors of the second five-year plan noted, that DOE "has raised expectations without satisfying them. It is also clear that the funding requests submitted by the field for the fiscal year 1992-1996 five-year plan represent more than the Department can spend effectively and responsibly." Clearly, as well, the Department, as viewed by EM planners, had to make the effort to reconcile expectations with resources. The Department could not "forsake a responsible approach" by undertaking activities beyond its capability. An "unrestrainedly aggressive effort" lacking the supporting infrastructure was "irresponsible" and might actually result in reduced protection of health, safety, and the environment. "Growth," EM planners concluded, "must be responsibly managed."[248]

How was this to be accomplished? The authors of the second five-year plan noted that progress had been slow in developing a risk-based system for prioritizing compliance and cleanup activities. Lack of a system, however, did not relieve DOE of "responsibility to proceed as intelligently as possible." With or without a formal methodology, the Department had to "distinguish what is smart to do from what is not smart." This would require "an enormous amount of realism, honest, plain speaking, and cooperation among DOE, affected States, Indian Nations, the Administration, other Federal agencies, the Congress, and the public." In a plaintive plea, EM planners noted that DOE was "placing all of its cards face up on the table. DOE's expectation is that others will do the same."[249]

What is Smart/Not Smart?

The authors of the second five-year plan expressed their views on what was smart and what was not smart in balancing expectations with resources. What was needed, first of all, was a "bias for action." This meant focusing on the elimination or reduction of known potential risks to health, safety and the environment. What was not needed was "excessive characterization." Decision makers tended to move ahead with remediation only when uncertainty and risk were minimal. The Department contended that remedial actions could generally be initiated with much less characterization and little, if any, additional risk. EM planners pointed specifically to the emphasis on installing groundwater characterization wells, which often lacked a "clear rationale" for numbers and locations. Placing wells "simply on the basis of rigor inferred from regulations," they argued, "detracts from efforts to design efficient characterization plans, leads to a data explosion yielding diminishingly useful returns, and most importantly provides potential new pathways for contaminants to migrate throughout the very groundwater the Department seeks to protect."[250]

Other positive approaches cited in the second five-year plan included adding much-needed analytical laboratory capacity; supporting the education of new scientists, engineers, managers and workers; retraining complex employees whose jobs were threatened by production shutdowns and cutbacks; verifying cost estimates internally and externally; and improving the ability to explain risks to the general public. As did the first five-year plan, the second emphasized the importance of investing in technology development and waste minimization. To successfully achieve the thirty-year cleanup goal, EM planners noted, DOE had to "rapidly field new technologies concordant with all applicable regulations." Absence of a technology development program would mean continuation of "the old practices of 'suck, muck, and truck'" with resultant "exorbitant costs, probable delays, and unnecessary exposure of workers and the public to chemical and radiological hazards." In addition, waste

minimization and waste avoidance technologies were "the only hope for preventing passing on to future generations the legacy DOE has inherited from its past."[251]

Public Participation

Public comment following release of the second five-year plan was somewhat muted, partly because so many interested and affected parties had provided comments during the planning process itself. Appendix C to the plan excerpted over 200 comments, without identifying the commentator, and provided the Department's response. Additional comments, by and large critical, were received following the plan's release. General comments focused on lack of adequate funding for planned compliance and cleanup and the need for better characterization. Many comments were parochial, stressing the need for more funding at a particular site or advocating a changed policy approach at that site. Nearly one-fourth of the comments stressed that public involvement in all aspects of the decision-making process should be increased.[252]

The Department, from its perspective, had worked hard to include "stakeholders" in the planning process. Six additional states and another Indian tribe joined the State and Tribal Government Working Group (STGWG), which had been formed the previous year to review the draft of the first five-year plan. The group met three times with DOE officials, in March, May, and June 1990, to review and comment on drafts of the second five-year plan. In April 1990, the Department convened a Stakeholder Forum "to broaden the range of public involvement." The forum included over forty participants from the EPA, the Office of Management and Budget, the Office of Technology Assessment, states, Indian nations, industry, labor, academia, and environmental and public interest organizations. The participants attended ostensibly as individuals and not as official representatives of specific organizations.[253]

The Department convened another working body, the External Review Group (ERG), to assist in developing a risk-based prioritization methodology for environmental restoration activities. Composed of representatives from STGWG, states, EPA, the Natural Resources Defense Council, and the Environmental Defense Fund, the group held its first meeting in October 1989. As previously mentioned, progress was slow in developing the risk-based system.[254]

In the second five-year plan, the Department signaled its intent to extend public participation, already formalized at the national level, to local communities near DOE facilities and sites. The Department's major installations would prepare public participation plans to involve the public and local communities. The plans would be part of site-specific plans prepared by DOE's operations offices. The Department's public participation plans would supplement the community relations plans and programs required by environmental laws such as CERCLA.[255]

As a result of DOE's initiative and CERCLA requirements, field offices and production facilitites throughout the complex expanded efforts to increase public participation. Contractors as well as DOE personnel became heavily involved. At Rocky Flats, for example, Rockwell, operating contractor through 1989, seldom communicated with the public. When EG&G became operating contractor in January 1990, however, DOE and EG&G, working closely together, significantly upgraded Rocky Flat's public relations program. Sixty-seven activists and others within the community were interviewed as part of the public participation plan. Department public affairs personnel, supported by EG&G, held numerous local public

meetings. Monthly meetings were held with local mayors. Speeches were given. Schools were visited. Whereas Rockwell issued only five press releases in 1989, EG&G released over 150 in 1992. By that same year, DOE had four individuals working on public affairs; EG&G had thirty.[256]

Community Relations

The Department also used agreements—and associated benefits—to improve relations with states and local communities. At Rocky Flats, for example, in October 1990 DOE committed to a $140 million project that would provide protection from drinking water contamination for communities downstream. The program consisted of on-site water management and off-site reservoir isolation. The Department agreed to build structures to prevent runoff into a local reservoir and replace a second reservoir with a new supply. Water being discharged from Rocky Flats, according to DOE, either met or exceeded drinking water standards. "Clearly the problem is not an imminent threat," noted DOE Plant Manager Roger Nelson. "However, the people who live in the areas that surround Rocky Flats have a right to peace of mind. Our proximity to their drinking water supplies has been a source of real concern for community leaders."[257]

Similarly, in February 1991 the Department and the state of Colorado agreed that DOE would fund the Colorado Center for Environmental Management with a $1 million grant. The center, a "multidisciplinary consortium," would coordinate research and development capabilities at Colorado universities in order to accelerate transfer of new technologies to industries working in hazardous waste management.[258]

Contractor Liability

Getting management and operating (M&O) contractors involved in community relations was only one of many ways the Department sought to reorient its contracting practices toward the new culture and greater environmental consciousness. Another was to force contractors to take legal responsibility for their actions. As noted earlier, DOE attempted to limit indemnification of contractors for violating environmental laws. On January 26, 1990, DOE published a Notice of Proposed Rule Making to this effect in the *Federal Register*. Contractors were not pleased. During spring and summer 1990, several major DOE contractors threatened to walk away from their sites should the liability rulemaking take effect.

Contractors argued that the proposed rulemaking was more a response to public criticism than "a realistic approach to shifting risk and responsibilities at DOE sites." Westinghouse Electric, operator of seven DOE facilities including Savannah River and Hanford, observed that a management and operating contractor lacked the same control at a DOE facility that it would have in its other businesses. DOE, Westinghouse argued, "owns the facilities, provides and controls the funding, sets the overall policies, determines priorities and is involved in the day-to-day management. In the commercial world, the contractor or supplier controls the funding and has total responsibility for management, including the evaluation of corporate risks." Other contractors agreed. EG&G, operating contractor at Rocky Flats, Idaho, and other sites, contended that the rulemaking would alienate qualified contractors and "break down the trust and spirit that was the hallmark of DOE contractors." Martin-Marietta Energy Systems Inc., contractor at Oak Ridge and the uranium enrichment facilities, stated that it

was "inconsistent to retain control, yet seek to transfer risk to the M&O contractors in the absence of affording the contractor any meaningful ability to manage risks."[259]

In August, the Department issued a modified version of the proposed rulemaking. Noting that DOE had "carefully considered" public comments, Watkins asserted that contractor accountability continued to be the primary objective. The revised proposal clarified circumstances under which fines and penalties would not be allowable costs, allowed recovery of litigation costs approved by DOE, limited contractor liability to fees actually earned during any six-month period, provided an accountability phase-in period of up to one year for existing employees, established an explicit negligence standard, and revised award fee schedules to adjust for inflation and allow for increased assumed risk. Contractors, however, viewed the changes as minimal. In November, General Electric informed the Department that it was terminating its contract to operate the Pinellas plant in Florida as of May 31, 1992. Citing new exposure to liability, the company found contract changes required by DOE to be "unacceptable." General Electric had operated the plant since 1957.[260]

The liability issue continued to fester. In March 1991, Duffy testified before the House Appropriations Energy and Water Subcommittee that individuals subject to criminal liability had produced "a gigantic seismic activity" throughout the Department. The Department of Justice, he noted, could take either side. If justice took the other side, individuals had to provide separate counsel at their own expense. "You are," observed Duffy, "guilty until proven innocent." This, Duffy added, continued to produce "a considerable amount of financial padding" of cost estimates because contractors feared criminal liability for not asking for enough.[261]

Environmental Contracting

The Department began a concerted effort to revise contracts to make contractors more environmentally responsible. DOE and Martin Marietta, for example, signed two contracts on March 5, 1991, containing provisions consistent with the Secretary's ten-point initiative. Martin Marietta agreed to operate Paducah (Kentucky), Portsmouth (Ohio), and three Oak Ridge facilities (Oak Ridge National Laboratory, Y-12, and K-25) for five years under "revised rules." The virtually identical contracts included increased accountability for the management and operating contractor and a restructured award fee directly related to environment, safety, and health performance.[262]

The Department also began a new contracting process in an attempt to bring in contractors with expertise directly relevant to environmental work. An October 31, 1990, *Federal Register* notice announced that proposed changes in contracting for EM's environmental work would be discussed at a November 15 meeting. On March 4, 1991, DOE announced plans to issue a request for proposals for work at Fernald and noted that details would be published in the *Commerce Business Daily*. On June 27, DOE announced that there would also be a competition for cleanup work at Hanford. These announcements began a process to bring an Environmental Restoration Management Contractor (ERMC) to the two sites. The ERMC concept was "management only" rather than management and operating and sought to speed restoration of DOE facilities through contracting with companies having expertise in federal contracting and procurement, project management, quality assurance and quality control, and understanding of waste management and environmental regulations. The ERMC concept was based on the belief that hiring companies to perform EM functions without operating the sites would effect cost savings.[263]

Regulators and Agreements

As the Department sought to bring its contractors under control, the Department itself was becoming increasingly subject to regulatory control. Negotiated, legally binding agreements had become the driving force of the environmental restoration and waste management program. Negotiations with both EPA and the states were ongoing. In mid-1990, DOE was involved in negotiations with eleven states for environmental monitoring agreements in principle similar to that concluded with Colorado in June 1989. On January 23, 1991, DOE, EPA, and the Colorado Department of Health signed yet another agreement concerning Rocky Flats. The interagency agreement to clean up 178 contaminated sites—the first under the 1986 Superfund Act (SARA)—outlined each signatory's responsibilities during remediation, set forth compliance schedules, and included conflict resolution mechanisms. As an EPA official noted, suits could be brought against DOE if the Department failed to perform the stipulated work.[264]

Duffy estimated that by the end of 1991 some eighty-two consent orders, cleanup agreements, federal facility compliance agreements, and agreements in principle would be in place. The scope and influence of these agreements were reflected in the fiscal year 1992 budget request. Negotiated agreements drove 100 percent of the budget for corrective activities, 95 percent for waste management, and 97 percent for environmental restoration.[265]

Regulatory oversight, authority for which derived from the agreements and legal requirements, made the Department, in the view of Watkins and Duffy, a "regulated operation." In fact, oversight, in their opinion, threatened to overwhelm the Department. Watkins observed that DOE had "a lot of people telling us about things that are on the floor, but we don't have enough people picking them up." Duffy contended that oversight personnel outnumbered EM field management by about two to one. "If I get any more oversight," Duffy complained, "I won't be able to do my job."[266]

Congressional Oversight

Congress also kept a close watch on Duffy's program. This was inevitable given the size and rate of increase of EM's budget, the program's high visibility, and the seeming intractability of the weapon complex's problems. As Representative Tom Bevill (D-Alabama) told Duffy in semi-jest, "you've got the most difficult and the most important job in the world."[267]

In early 1991, the Office of Technology Assessment (OTA) concluded in a report done for Senator Sam Nunn (D-Georgia), who in 1989 had called for another agency to clean up the complex, that DOE did not have the ability to clean up the weapons complex. The Department, OTA observed, lacked both enough qualified personnel and public credibility. Because DOE had not "successfully engaged citizens of affected communities in a meaningful way," OTA recommended establishment of an independent public advisory group at each site. Composed of residents and experts from communities near the sites, the groups would advise Congress, DOE, EPA, and other federal and state agencies on major cleanup issues. In addition, OTA criticized the Department for its inattention to possible health effects of contamination. The Department's claim that "no immediate health threats" existed, OTA noted, was "largely unsubstantiated by scientific evidence."[268]

Duffy and Watkins regarded the OTA report as largely consistent with DOE's own analysis of the problem, which focused on the lack of available technology and of a trained workforce. "They identified everything we identified," Duffy observed. As for DOE's inattention to

health, Duffy stated this was an "inaccurate portrayal" of Watkins's ten-point initiative. Citing ongoing dose reconstruction and health studies throughout the complex, Duffy said that this was an area that OTA "did not quite understand what was going on."[269]

Congress also asked the General Accounting Office (GAO) to prepare a comprehensive review of the EM program. The GAO focused on contractors and costs. The "overall problem" in cleaning up the complex, GAO noted, was what had been DOE's problem for a long time: contract oversight and over reliance on contractors. The Department lacked the "quantities and expertise" in federal employees "to know what the contractor is doing, to monitor them closely, and to make sure they comply to what DOE wants them to do." As for costs, GAO contended that the various interagency and federal/state agreements were driving the process. The Department, according to GAO, was using the agreements as a "prioritization system," which might "not necessarily be the way we want to cleanup the complex on a national basis." The GAO recommended a risk-based national priority system that could establish how best to spend money on a national basis.[270]

Environmentalist and Activist Oversight

Nor were environmentalist and activist groups reticent in expressing their opinions regarding the environmental restoration and waste management program. Members of the Military Production Network, an umbrella group representing various regional organizations, met with Watkins in early 1990 to discuss compliance and cleanup issues. A year later, however, Watkins refused to meet with the group. Irritated, the group issued a scathing "report card" on DOE's cleanup performance, criticizing the agency for failing to meet cleanup deadlines, restricting public access, punishing whistle blowers, and blocking independent health studies. In addition, the NRDC expressed concern that DOE was diverting environmental funds to defense facilities like Hanford's PUREX plant, which chemically extracted plutonium and uranium for nuclear weapons and which DOE was trying to keep on standby.[271]

In April 1991, the NRDC's Dan Reicher and James Werner testified before the House Armed Services Committee on the state of the EM program. Reicher commended the Department for its "very encouraging" statements on creating a new culture and placing environment and safety concerns above production quotas. Noting that there "clearly have been some positive changes," the two NRDC spokespersons nonetheless cited several serious problems with the EM program. Werner argued that both the program and program oversight were underfunded. The fiscal year 1992 budget request contained at least a $200 million shortfall from requirements reported by field offices. Werner also stated that too much of EM funding went to projects that were "not actually legitimate or justifiable environmental projects." As important as cleanup funding, therefore, were intelligent decision making and "effective independent oversight to ensure that those funds are spent wisely." Werner contended that increased resources for oversight would "actually help break the log jam and help speed the cleanup process." The Department, he observed, was in many cases waiting for long periods to have cleanup documents reviewed by state agencies and EPA because those agencies did not have adequate review resources.

Reicher, in addition, criticized the Department in its preparation of the programmatic environmental impact statement for EM. Noting that the PEIS offered the opportunity to address many issues in a comprehensive and open way, Reicher stated that the process, unfortunately, had been "somewhat flawed." The Department had separated the two "rather

related" cleanup and complex modernization PEISs that needed to be linked, failed to include other agencies like EPA in the process, provided inadequate resources for the study, and had not declassified large amounts of information necessary for the analysis.

Finally, Reicher and Werner tackled the prioritization issue. Werner observed that for the past year and a half he had served on DOE's External Review Group analyzing the priority system. During that period, the Department had not come "any closer to a conscious system for establishing environmental priorities." States were generally hostile, Werner noted. The ERG was composed primarily of state officials whose attitude was "we better get back and get our agreements in place in order to get ours while its available because DOE seems to be trying to set its own path." This might seem like a "parochial interest," Werner admitted, but states remained unconvinced that DOE was acting in good faith. The Department only responded, they believed, when forced to respond. Reicher added that many of the interagency agreements were not as rigid as assumed. The Hanford Tri-Party Agreement, for example, contained specific provisions for altering the agreement. The agreements, Reicher concluded, simply filled the "unfortunate void" left by the absence of real prioritization.[272]

Filling the Void

A process for filling the "unfortunate void" began early in the Bush administration. A February 1989 House Armed Services subcommittee hearing focused on DOE's process of setting priorities for environmental restoration activities at nuclear weapons facilities. The April 1989 Ten Governors' letter calling upon DOE to develop a comprehensive cleanup program cited the need for a national priority system. The priority-setting process took on added momentum when EPA Administrator William Reilly sent OMB a letter proposing that EPA convene a conference with federal and state representatives to begin a dialogue on environmental and funding priorities for cleanup of federal facilities. Further support came in July 1989, when forty-nine attorneys general sent a letter to the U.S. House of Representatives arguing that a formalized dialogue on federal facilities cleanup would strengthen federal-state relations.

By the time EPA formally requested the non-profit Keystone Center to convene a national policy dialogue on priority-setting for cleanup activities in late 1990, Congress was debating the proposed Federal Facility Compliance Act, which would eliminate sovereign immunity for federal agencies and empower states to levy fines and penalties for RCRA violations. Federal agencies, foreseeing situations in which insufficient funding would lead to failures in meeting scheduled compliance deadlines, agreed at an informal meeting in January 1991 that discussions on environmental restoration decisionmaking and priority-setting would be worthwhile and began making plans for the first official meeting.[273]

EM Organization and the Greening of the Weapons Complex

For all the external criticisms and constructive suggestions for moving the program ahead, Duffy and his staff still had to deal with the hard realities of building an EM infrastructure basically from scratch at a time when the Department and its internal organizations were undergoing rapid, sometimes wrenching, change. Without a sufficient and educated bureaucracy present at both headquarters and in the field EM could never hope to provide the direction and oversight demanded by its critics. At a March 1991 hearing before the House Appropriations Subcommittee on Energy and Water Development, Duffy noted that

his office had begun in 1989 with thirty-nine people. At its inception, EM had no employees in the field. By early 1991, EM had 259 headquarters and 600 field personnel. Some 600 more people, Duffy hoped, would be added in the immediate future. Duffy contended that an EM infrastructure was "now in place," but he also noted that GAO had identified the environmental restoration and waste management program as one of the major areas in the government for potential fraud and abuse. "Unless we get significant personnel with trained experience," Duffy observed, "we have an opportunity to achieve that unsatisfactory projection."[274]

One way of dealing with EM's lack of adequate staffing was to bring in assistance from other federal agencies. In 1990, the House-passed energy and water development appropriations bill contained language that directed the Army Corps of Engineers to assume full management responsibility for the cleanup at Hanford. The Corps had accumulated significant experience in the cleanup field, assisting EPA with the Superfund program and managing the Department of Defense's environmental restoration program. The Corps also had a district office in the district of House Speaker Thomas Foley (D-Washington) who was chiefly responsible for the language in the bill. The Department, however, strenuously opposed turning over the Hanford cleanup to the Corps. In a compromise, DOE in July 1990 signed a memorandum of understanding (MOU) with the Corps, whereby the Corps would provide management services to DOE headquarters, technical assistance at DOE facilities, and program execution as assigned. The Department retained responsibility for management and implementation of the Hanford program.[275]

Further complicating Duffy's managerial efforts were the end of the Cold War and the inevitable if painful transition or "greening" of the nuclear weapons complex. Rapidly declining requirements for nuclear weapons hastened the planned shrinkage of the complex and greatly expanded EM responsibilities. Under a memorandum of understanding with the Office of Defense Programs, any defense facility that shut down automatically transferred to the Office of Environmental Restoration and Waste Management. Duffy's organization then became responsible for maintenance and decommissioning. But as defense missions ended, EM, also began to pick up entire sites. In July 1990, Hanford began reporting directly to EM, consistent with Watkins's goal of making Hanford the flagship site for DOE's environmental restoration and waste management program. Fernald joined the EM family on October 1, following several months of negotiations between Defense Programs and EM. Exchanging lead program offices brought no major changes in employment levels or contractors at the sites, and the predominance of the EM mission at both sites was already well established. Nonetheless, landlord status brought additional, non-environmental responsibilities to EM like maintenance, sanitation, and security. EM dollars, as well, were required for these functions.[276]

At other sites whose fates remained to be determined, EM shared an uneasy coexistence with the Office of Defense Programs. Rocky Flats proved to be particularly troublesome. The two organizations often found themselves in direct competition for scarce shared resources, with defense often taking priority. Inflated costs were also, as Duffy informed the Energy and Water Development Subcommittee, "a real problem." Costs for defense processing operations were exceptionally high compared to commercial cleanup costs. Overhead, particularly for security, thus greatly increased EM expenses with no commensurate cleanup return. At Rocky Flats, Duffy noted, the costs for a laborer, with overhead figured in, were $100 per hour. As a result, Duffy observed, EM was not getting "the biggest bang for the buck."[277]

Complex 21

Given the complex interrelationship existing between defense and cleanup, EM was keenly interested in the eventual makeup of the nuclear weapons complex. In mid-August, Watkins hinted that the weapons complex might be much smaller and gave the modernization committee revised guidance. In January 1991, DOE released the report of the Modernization Review Committee, since renamed the Complex Reconfiguration Committee. The committee presented two options for a reconfigured weapon complex, to be in place early in the twenty-first century, called Complex 21. The first approach, "downsize and modernize in place," called for consolidation at current sites, with the only major exception being the relocation of Rocky Flats's manufacturing operations. The second approach, "maximum consolidation," proposed consolidating most complex production and manufacturing operations at a single site. Complex 21 based its recommendations on projected weapon stockpile levels 30–85% lower than the fiscal year 1990 stockpile.

The Complex 21 report anticipated a phased implementation process, with initial efforts directed toward preparation of the NEPA-mandated Programmatic Environmental Impact Statement analyzing the environmental consequences of alternative long-term configuration strategies to be completed by late in fiscal year 1993. A Record of Decision selecting a specific configuration for Complex 21 would be forthcoming early in fiscal year 1994.[276]

EM and High-Level Waste Disposal

The Office of Environmental Restoration and Waste Management also had a vested interest in the development and construction of a high-level waste repository. The Nuclear Waste Policy Amendments Act of 1987 had designated Yucca Mountain in Nevada as the sole candidate site. The Office of Civilian Radioactive Waste Management (OCRWM), not EM, was the departmental office responsible for the Yucca Mountain project. Nonetheless, in 1985 President Reagan determined that solidified high-level defense wastes would be disposed with civilian wastes in the same repository. Solidified high-level wastes from Hanford, Savannah River, and West Valley—all EM projects—were designated for ultimate disposal at Yucca Mountain.

What remained at issue was who within the Department was going to pay for the defense side's funding contribution to the repository, how much they would pay, and when they would pay it. Under provisions of the Nuclear Waste Policy Act of 1982, the Federal Government was required to share costs of developing a high-level waste repository containing both civilian and defense wastes. Nuclear utilities, generators and owners of the civilian waste paid into the Nuclear Waste Fund at the rate of one mill per kilowatt hour of power produced. By the end of 1990, utilities had paid some $4 billion into the fund. The Department's "crude estimate" of the government's share was $4 billion to $6 billion based on a total repository cost of $25 billion to $30 billion. The Federal Government, however, had yet to pay anything into the fund.

The Senate, in a report accompanying its version of the fiscal year 1991 energy and water development appropriations bill, recommended that DOE essentially reprogram $5 million from EM's funding to make a first-time payment into the Nuclear Waste Fund. John Bartlett, director of OCRWM, strongly endorsed the payment as a showing of good faith to nuclear utilities who had been paying into the fund since 1983. "It's a token payment," observed Bartlett, "but it is an illustration of a commitment or an intent to fulfill a commitment."

Officials in EM acknowledged the payment liability but admitted that the payment was not a top EM priority. "We feel that we should be doing our fair share," an EM spokesperson noted, "but we did not make it part of our [fiscal year 1991] budget request. There are higher priorities and if you are asking will we make the payment in lieu of other priorities, the answer is probably no." In budget projections compiled in the second five-year plan, however, EM did show a first-time payment into the fund of $197 million in fiscal year 1992, with $203 million in fiscal year 1993 and slightly less for successive outyears. Officials in EM cautioned that the figures were not of "budget quality" but were for planning purposes only. In September, the Department's Office of Inspector General, in a proposal that greatly irritated nuclear utilities, argued that DOE should receive credits for contributions to the Nuclear Waste Fund because some defense activities had benefited the civilian waste program.

Congress finally resolved the issue in the fiscal year 1993 Energy and Water Development Appropriation by establishing a separate appropriation for Defense Nuclear Waste Disposal in lieu of a payment from the Federal Government into the Nuclear Waste Fund. In fiscal year 1994, the Department requested $120 million to be used to support site characterization at Yucca Mountain.[279]

Yucca Mountain

Even as the Department wrangled over who was going to pay for Yucca Mountain, the status of the facility remained problematic. The state of Nevada continued to oppose the high-level waste repository, using every tool at its disposal to delay or attempt to derail the project. Watkins initially extended the olive branch, assuring Nevadans in May 1989 that Yucca Mountain was "not a done deal," but Nevada officials countered with a formal veto of the repository site, citing provisions in the Nuclear Waste Policy Act of 1982. In November 1989, DOE abandoned efforts to appease Nevada, and in December Nevada filed suit against DOE to halt all work at Yucca Mountain.[280]

Relations between DOE and Nevada went from bad to worse in early 1990, with the Department countering the state's December 1989 suit with one of its own in late January. In a bitter confrontation between federal and state power, DOE held that the 1987 amendment to the 1982 act excluding all but the Nevada site for a waste repository provided the right to preempt Nevada's authority. In a June 13, 1990, hearing, Watkins and Senator Harry Reid of Nevada squared off. Watkins complained that he had been "vilified" in Nevada simply for trying to do his job, while Reid accused DOE of "brutalizing" Nevada and claimed that Watkins, known for remaining calm, had lost his cool because "he has a guilty conscience."[281]

The struggle between DOE and Nevada escalated even further in May 1991 when Governor Bob Miller accused DOE of lying about reasons for project delays, which he attributed to DOE's incompetence and "Keystone Cop scientists and equally inept spend-happy bureaucrats." Yucca Mountain Project Manager Carl Gertz defended DOE and called Miller's remarks "irresponsible and politically motivated demagoguery." On the legal front, a March 1991 Supreme Court decision upheld an appeals court ruling, and Nevada was ordered to process permits for site characterization.[282]

EM and High-Level Waste Vitrification

Yucca Mountain was not a top priority for the Office of Environmental Restoration and Waste Management, partly because EM's attention was focused on its own high-level waste problems, particularly the design and construction of high-level waste vitrification facilities at West Valley, Savannah River, and Hanford. Vitrification was the process whereby waste was immobilized in a glass-like solid more or less permanently capturing the radioactive materials. If the Department's high-level waste were not properly solidified, it would never be placed in the high-level waste repository, whether at Yucca Mountain or some other location. More significantly, storage of the waste in a glass-like form encapsulated in stainless steel canisters was "more secure and environmentally acceptable" than tank storage. The processes proposed for the three vitrification facilities were based on the same technology, but the three sites were unique and at different design and construction stages.[283]

The West Valley Demonstration Project was viewed as "one of DOE's success stories." Promoted by the Department as an "integrated production scale development and demonstration program," the vitrification plant would solidify 600,000 gallons of high-level waste contained in an underground storage tank. Approximately 300 canisters of vitrified high-level waste would be produced during an eighteen-to-thirty-six-month "waste vitrification campaign." In 1987, West Valley began working with a scale model of the vitrification system. Higher costs and decreased funding, however, forced schedule delays. Despite additional funding cuts experienced in fiscal year 1991, EM anticipated completion of construction in 1994 and start of hot operations in 1996.[284]

Much larger in scope was Savannah River's Defense Waste Processing Facility (DWPF). With some 34 million gallons of high-level waste stored in underground tanks at Savannah River, EM estimated that once the facility was fully operational processing of accumulated wastes would be accomplished in twelve to sixteen years. Savannah River planned for interim storage of 2,300 vitrified waste-filled canisters, which accounted for five years of DWPF production. Groundbreaking at DWPF occurred in 1983, with construction completion scheduled for June 1989. Delays caused schedule slippage, but by March 1990 DWPF was 97 percent complete. Original cost projections for DWPF had been $287.9 million. By 1990, total estimated cost for construction was $930.2 million. A 1991 assessment of the project by DOE faulted facilities managers for inattention to technical, institutional, and management issues. The result was failure to minimize schedule delays and resource requirements. The General Accounting Office also found that significant delay and cost growth resulted from ineffective facility management. In April 1991, Duffy informed the House Armed Services Committee that DWPF was 2½ years behind schedule. Vitrification operations using radioactive waste were expected to begin by 1993.[285]

The vitrification facility planned for Hanford was almost identical to DWPF. Although Hanford with approximately twenty million gallons of liquid waste had lesser amounts to deal with than Savannah River, the type and constituency of the wastes at the South Carolina site were, in the words of Duffy, "much simpler." Preliminary design of the Hanford Waste Vitrification Plant (HWVP) continued into 1990. In the Hanford Tri-Party Agreement, the Department had pledged to begin construction of HWVP in July 1991. In July 1990, however, DOE informed Congress that because of "technical difficulties" EM's fiscal year 1991 budget did not provide for construction of HWVP. The Department had proposed using the 45-year-old B Plant at Hanford for preparing wastes to be sent to the vitrification facility. Preliminary surveys indicated that the B Plant, despite planned modifications, would not meet

environmental and safety standards. If a new pretreatment facility were needed, DOE argued, the schedule for the vitrification plant would need adjustment. The Department intended to delay construction of HWVP until 1993.[286]

Officials from the state of Washington were not pleased. In February 1991, Governor Booth Gardner accused DOE of violating the Tri-Party Agreement. Gardner stated that the Department had unilaterally announced the delay without first consulting the state or EPA. Admiral Watkins rejected the accusation, noting that the state had been kept informed over the past six months about problems with the plants schedule. Duffy admitted, nonetheless, that there had been a "communication problem" associated with the Tri-Party Agreement. The Department, he noted, had not covered the issue in enough detail with the state and EPA. In addition, the Department sought to make amends. Agreeing to try and improve communications, Watkins met with Gardner and pledged that DOE would begin negotiations with the state over the proposed changes. In May, the Department reached agreement with the state of Washington and EPA on revised Tri-Party Agreement milestones for the vitrification plant. The Department agreed to complete HWVP construction and initiate hot testing operations in December 1999.[287]

Hanford Tanks

If vitrification and disposal in Yucca Mountain were the Department's ultimate high-level waste goals, DOE's immediate focus was on the environmental and safety problems associated with Hanford's underground high-level waste tanks. At the end of July 1990, after a flurry of mid-month stories related to health effects of radiation releases from Hanford during the 1940s and 1950s, attention turned to releases from Hanford's waste tanks. Based on an Ahearne Committee report, the press accused DOE of underestimating the danger of potential explosions and DOE contractors of covering up knowledge of potential explosions since the 1970s. In October, GAO joined in accusing DOE of underestimating the threat, and in November, another "burp" from hydrogen buildup in Hanford's 101-SY tank heightened criticism. Every 80 to 109 days, concentrated hydrogen gas cracked the crust in the million-gallon tank, threating to release radiation from the dangerous chemical sludge. Watkins called the danger of explosions "remote," but in October he directed the preparation of a supplemental EIS for Hanford because the 1987 EIS did not consider possible tank explosions.[288]

EM's Modest Milestones

During 1990 and 1991, EM spent considerable effort on organizational matters both at headquarters and in the field, on identifying the scope of waste management and environmental cleanup problems through Tiger Team and other audits, on completing reports and filing for state and EPA permits, on defending the EM program in Congress, and on negotiating with community groups, local and state officials. These and other time-consuming activities of a young and rapidly growing program led to frustration as public and congressional criticism of DOE's cleanup of the weapons complex focused on why so much money was being spent when so little cleanup was being completed.

There were, however, some modest "milestones" to report. In December 1990, for example, EM reported that Savannah River's Mixed Waste Management Facility, a 119-acre land disposal site, had been closed, and in August 1991, Duffy announced that DOE had received

approval from the South Carolina Department of Health and Environmental Control for final regulatory closure of the facility. This was the largest mixed waste closure in the Nation to date. At the same time, South Carolina also approved final regulatory closure of the M- and F-area seepage basins, where mixed and low-level radioactive waste had been stored since the 1950s. Duffy pointed to the closures as "fruition" of a ten-point initiative and stated that they reaffirmed DOE's "commitment to environmental responsibility in the operation of our facilities."[289]

In April 1991, EM reported that the TSCA K-25 incincerator at Oak Ridge, the only incinerator of its kind that was EPA-licensed, had burned one million pounds of liquid waste since beginning operations. And in May, EM reported that soil and concrete contaminated with polychlorinated biphenyl (PCB) had been removed from the Mound site after EG&G, the Mound management and operating contractor, detected PCBs from an earlier operating incident. PCB-contaminated soil would be sent to Oak Ridge for incineration, while contaminated concrete would be sent to the Nevada Test Site for burial.[290]

Fiscal Year 1992 Budget Request

Duffy's initial projected fiscal year 1992 budget request, reflecting the spiraling cost estimates of the second five-year plan, was over $5 billion. As a result of interagency budget debates during December 1990, however, the Office of Management and Budget (OMB) slashed EM's request by $900 million. Duffy appealed the cutback, noting that the proposed spending level "places the Secretary in the position of favoring production over environment." Duffy also warned that the OMB cut would require a cessation of weapons production due to RCRA-driven waste storage restrictions. Duffy's appeal was denied. When the Department's fiscal year 1992 request was released in February 1991, EM's portion totalled $4.2 billion.[291]

In a mid-April Senate Armed Forces Committee hearing, Senator Glenn criticized the OMB cuts, noting that DOE's weapons production budget had been trimmed by only $300 million in the same budget review process. The cuts, Glenn added, would require the renegotiation of numerous cleanup milestones set by DOE's various interagency agreements. Admiral Watkins disagreed. Duffy "got just about all the dollars he can manage," Watkins testified. "In no way do I think that production is taking a lead seat to environment." A "validated" EM budget, he further observed, demonstrated that "we didn't know how to spend $5 billion." Duffy generally concurred with the Secretary of Energy. At a departmental briefing announcing the fiscal year 1992 budget request, Duffy had stated that EM had "reached a point where we're ahead of our headlights." His budget angst was salved somewhat with the enactment of a supplemental appropriations bill containing $340 million earmarked for EM. "The question is academic," Duffy stated, "now that the supplemental has been approved."[292]

With the supplemental included, the fiscal year 1992 requested budget increased some $1.3 billion over the the fiscal year 1991 appropriation. Environmental restoration, corrective activities, and waste management were allotted $1.5 billion, $140 million, and $2.5 billion respectively.[293]

WIPP

The supplemental appropriation eased Duffy's immediate budget problems but did not alleviate his concerns regarding the direction of the EM program. When Representative Tom

Bevill (D-Alabama), chairman of the House Appropriations Subcommittee on Energy and Water Development, noted that the Department's cleanup program was "losing ground" rather than gaining, Duffy agreed that this "pretty accurately sums up the situation." Duffy immediately stated, however, that there was "light at the end of the tunnel: the opening of WIPP." Duffy added that he hoped that the light was "not an oncoming train."[294]

The opening of WIPP, nevertheless, remained clouded in uncertainty. The Department had spent $700 million and seven years constructing the WIPP facility about twenty-five miles east of Carlsbad, New Mexico. Designed as a permanent disposal facility for 800,000 barrels of transuranic defense wastes, WIPP was scheduled to begin receiving waste shipments in fall 1988. Safety and environmental concerns, however, delayed its opening. In October 1989, Watkins unveiled a restructured program that anticipated placing experimental amounts of waste in WIPP by mid-1990, with full startup delayed until 1994 or 1995.[295]

The delay in opening WIPP led to political friction, with Governor Roy Romer of Colorado, for instance, negotiating an agreement with DOE to limit the amount of hazardous and radioactive waste at Rocky Flats to 1,601 cubic yards as specified in a state permit. "I've got to stand tough. If you take the pressure off of WIPP, I don't know if it'll ever open," Romer said. Romer vowed that Colorado would not be "the wimp of WIPP." When Romer and other western governors balked at DOE's request that they temporarily store "boxcars" of waste until WIPP opened, the Department considered unpermitted storage at a military base or asking for a variance in WIPP's permit from EPA, both politically dangerous options. The NRDC sued DOE to prevent the opening of WIPP until it met all applicable environmental regulations. Governor Garry Carruthers of New Mexico also threatened legal action.[296]

WIPP's opening date remained unclear, though in January 1991 DOE obtained an administrative land withdrawal from the Interior Department giving the Department full control of the WIPP site. Congressional criticism forced Interior to suspend the withdrawal. As Congress began debating its own withdrawal, New Mexico tried to obtain more safeguards and benefits for the state.[297] □

Part IX: EM Program and Activities, July 1991-January 1993

Third Five-Year Plan (1993-1997): August 1991

In his letter submitting the third five-year plan to Congress in August 1991, Admiral Watkins praised the Office of Environmental Restoration and Waste Management for advancing DOE's culture change and maintained that consolidation of cleanup activities in a single organization "already shows positive returns for DOE." Watkins noted that STGWG and the Stakeholders' Forum had been instrumental in reviewing drafts of the plan, and he contended that "with each iteration of the Five-Year Plan, our efforts are becoming more integrated, more forward-looking, and more capable of addressing the concerns of the many interested parties who have a stake in DOE's environmental restoration and waste management initiatives."[298]

As Duffy stated at a press conference unveiling the third five-year plan in September 1991, the document was a "plan, not a budget." This was a critical distinction, for a budget agreement between the White House (primarily OMB) and Congress reached in 1990 limited EM's budget growth to 10 percent per year. The updated five-year plan projected that EM needed $6.9 billion in fiscal year 1993 to "ensure protection of the public and worker health and safety, to carry out the agreements entered into by DOE [with EPA and host states], to ensure compliance with applicable environmental requirements, and to implement other desired improvements." The problem was that the agreement capped EM's fiscal year 1993 budget at $4.4 billion, creating a shortage of $2.5 billion. For the five-year period 1993–1997, EM's estimate for funds that could be spent productively was $40 billion (up from $29 billion in the previous plan), while the validated budget target was around $28 billion.

At 746 pages, the third five-year plan was even longer than its predecessors and included summaries and milestones for every cleanup site. Projections for 1993–1997 included startup of vitrification (glassification) of liquid radioactive wastes at the Defense Waste Processing Facility at Savannah River and the West Valley Demonstration Project. Savannah River and Hanford were due to begin solidifying low-level liquid waste, the test phase at WIPP was scheduled for completion, and stabilization and isolation of the 149 single-shell high-level waste tanks at Hanford were slated.

The plan cited technology developments, including integrated demonstrations on contaminated groundwater and soils and for waste minimization and avoidance. While detailing technological successes, the plan noted that they were not always transferable to other sites. Examples included a horizontal drilling technique being developed at Savannah River for remediating volatile organic compounds that could not be adapted to a similar problem at Lawrence Livermore Laboratory because of geological differences.

In addition to the usual five-year plan features—lists of regulatory agreements, details of public participation activities, discussions of resource limitations and uncertainties, and information on specific sites—the third plan included success stories from the past year. These included restart of waste calcining activities at INEL, completion of the Defense Waste Processing Facility at Savannah River, and pretreatment of 80 percent of the high-level waste at West Valley.[299]

At the press conference, Duffy noted that his budget had increased by a factor of four since late 1989 and warned that EM's capabilities had not kept pace. Duffy pointed out that the EM program still suffered from serious staff shortages and that the only solution might be

to hire additional contractors since the private sector provided more competitive compensation than the Federal Government.

The cleanup effort was "hamstrung," Duffy argued, primarily because there was no technology for treating mixed waste. This forced DOE to "spend money moving waste from one part of the earth to another" to meet regulatory requirements and to fund temporary solutions to permanent problems, the most visible of which were suspension tents protecting drums and containers from the elements at numerous DOE sites.

A critical unresolved policy issue, Duffy explained, was the lack of cleanup standards. Using Fernald as an example, Duffy stated that the technology existed to restore the site to a radioactivity level near natural background. The cost would be high, and there might be little justification from a public health standpoint. It could be done, but it was not clear whether it should be done. Duffy's point was that until there was agreement on cleanup standards, cost estimates would be uncertain and subject to increase, and remediation would have to err on the conservative side.[300]

Response

Twenty-two environmental groups wrote Watkins and EPA Administrator William Reilly that they could not support the five-year plan as the "cornerstone" of DOE's environmental program because it was "duplicative, confusing and falling short of their goals" and because it preempted decisions that should be reached only after negotiations with EPA, states, tribes, and other affected parties. Environmentalists argued that the PEIS under preparation was the appropriate vehicle for environmental decisions, not the five-year plan, and they cited with approval an OTA model for public participation in environmental decision making.

NRDC noted in a separate analysis that cost estimates had risen dramatically within the past year, prompting skepticism about EM's understanding of its own program. Of particular concern, NRDC warned, was the "cleanup gap"—the growing difference between DOE's funding requirements and its budget plans that raised doubts about the Department's ability to achieve regulatory compliance.[301]

Changing Defense Mission

A dizzying series of events, including the breaching of the Berlin Wall, the collapse of communism in Eastern Europe, and the reunification of Germany, had prompted President Bush to declare the Cold War over in late 1990. Then came the dramatic dissolution of the Soviet Union in fall 1991. The planned phased implementation of Complex 21 had been overtaken by events.

Following the failed coup attempt in the Soviet Union, President Bush on September 27, 1991, announced further unilateral cuts in the nuclear weapons arsenal (further to the July 31, 1991, Strategic Arms Reduction Treaty [START] promise to reduce stockpiles to 6,000 "accountable" warheads). A week later, with tritium needs much reduced, the White House told DOE to take another look at New Production Reactor plans. On November 1, 1991, DOE announced that the environmental impact statement for NPR would be conducted as part of the Complex 21 PEIS and that there would be a two-year delay in deciding on the technology and location of the New Production Reactor (NPR), an announcement that led NPR Director Dominic Monetta to resign several days later. Watkins cut NPR funds in December and asked

William Happer, Jr., his science and technology adviser, to examine the possibility of using a linear accelerator to produce tritium.[302]

Bush made further offers of arms reductions in his January 1992 State of the Union Address. The same week, the Bush administration cancelled orders for further W-88 weapons for Trident II submarine-launched missiles. Since the W-88 was the only warhead on order, the cancellation effectively put DOE out of the nuclear weapons business and left Rocky Flats without a defense mission. For the first time since the beginning of the nuclear age, the U.S. had no warheads on order or in production.[303]

In July 1992, following the Bush-Yeltsin agreement reached the previous month, Bush announced from Kennebunkport that the U.S. would produce no more plutonium or enriched uranium for warheads, a decision presaged when Watkins halted nuclear fuel reprocessing at the Idaho Chemical Processing Plant in late April. With the Chem Plant (which opened in 1953) out of the reprocessing business and Rocky Flats and Hanford no longer producing nuclear materials, only Savannah River's tritium-producing K-Reactor remained capable of replenishing warheads, and it had been closed for safety reasons since April 1988.

While environmental groups maintained that abundant tritium supplies argued against further tritium production (and NPR), Watkins spent considerable time and effort trying to demonstrate the viability of the K-reactor, with restart scheduled and rescheduled every few months. In late December 1991, just prior to another scheduled restart, 150 gallons of tritium-contaminated water leaked from a heat exchanger used to cool the reactor, closing local businesses and oyster beds on the Georgia side of the river. Watkins announced that further safety precautions would be taken but that the restart initiative would continue. In February 1992, environmentalists claimed that DOE's data on the December tritium spill was faulty; in May, during a key test phase, the K-reactor sprang another minor leak. After finally restarting in early June, the K-reactor was shut down later in the month.[304]

After further delays, DOE scrapped the New Production Reactor in September. In December 1992, as the first step in the Complex 21 PEIS process, the Department issued for comment an environmental assessment on consolidation of nonnuclear manufacturing operations in the weapons complex. The proposed action recommended moving most work to Kansas City and phasing out nonnuclear defense operations at Pinellas, Mound, and Rocky Flats.[305]

Competition in the Complex

As DOE's historic defense mission changed from producing weapons to dismantling and storing them (and cleaning up after them), competition within the complex for remaining defense operations intensified and new community relations problems appeared. For example, on December 16, 1991, DOE announced that nonnuclear operations would cease at Mound and Pinellas and be consolidated in Kansas City as part of the reconfiguration process. Miamisburg officials, shocked that they had not received advance warning of the decision, fought back. Senators John Glenn and Howard Metzenbaum, Congressman Bob McEwen, and Mayor Dick Church, wrote Watkins asking DOE to review the rationale behind the Mound cutbacks and provide documentation supporting the cost-effectiveness of the Kansas City consolidation. On January 27, 1992, a meeting was held at the Mound Plant, and two days later another took place in the Forrestal Building at which Glenn pressed Ohio's case. In March, Florida Governor Lawton Chiles wrote President Bush asking for a review of

DOE's decision and arguing that "the specific capabilities that exist at the Pinellas facility are required to keep the current smaller stockpile viable."[306]

Throughout 1992, Mound also lobbied to retain nuclear defense work, specifically tritium activities DOE planned to consolidate at Savannah River. Ohio officials cited a report that DOE could save $2 billion over twenty years or $100 million a year by investing only $6.4 million in Mound's state-of-the-art facilities. Glenn supported Mound's effort, calling upon Watkins to reconsider transferring Mound's work to Savannah River and citing DOE cost estimates that indicated the work could be done more cheaply in Ohio. Governor George Voinovich, who in December 1991 had warned DOE that Ohio would impose fines should cleanup work fail to meet scheduled deadlines, wrote Watkins on February 21, 1992, to express concern over locating tritium-related work at Savannah River. "In view of the greatly diminished need for tritium in a shrinking nuclear weapons stockpile and the documented environmental problems at Savannah River," Voinovich wrote, "it is unclear to me why relocating the tritium recycling activities at Mound to Savannah River is thought to be in the national interest—either on grounds of national security or with regard to safety and environmental concerns." Watkins defended the decision to consolidate tritium work at Savannah River, arguing that the recommendation had been made after thorough analysis of ten objective criteria and partially because Savannah River was not close to a large city. Watkins also reminded Voinovich that reconfiguration decisions would not be final until the environmental assessment had been performed.[307]

Community Relations: Pantex

The community relations dimension of disarmament appeared, among other places, at the Pantex plant near Amarillo, Texas, where final assembly of nuclear weapons took place and where nearby residents and the state of Texas grew increasingly concerned with the accumulation of plutonium pits from disassembled warheads on site. Pantex previously sent pits to Rocky Flats for reprocessing, but, with Rocky Flats closed and no weapons on order, DOE planned to store the plutonium in World War II-era munitions "igloos" for an "interim period" of twenty to forty years. Texas had supported the Cold War mission of the Pantex plant for forty years, but in October 1991 Attorney General Dan Morales wrote Watkins expressing "profound concern" that Pantex was becoming a de facto long-term disposal site for fissile material and urging DOE to share its plans with Texas. After visiting Pantex on January 6, 1992, Watkins responded that the Department understood Morales's concern, and he promised to work with Texas officials to protect local citizens and the environment.[308]

Morales was not satisfied and wrote back on March 3, 1992, as part of an orchestrated state effort that included letters from Governor Ann Richards and Lieutenant Governor Bob Bullock. Morales complained that Watkins had provided "little comfort" about plutonium storage and wanted to know why DOE was not consulting more actively with Texas officials and the public in developing plans for Pantex. Richards also encouraged Watkins to increase DOE's interaction with state and local officials, warned that "any adverse impact to the Ogallala aquifer would be unforgivable," and put forth her view that "the planning for the disposition of a material that could have a tremendous impact on the lives of Texans for thousands of years in the future is too important to leave entirely to the federal government." Bullock asked Watkins to inform Texas how much plutonium DOE planned to store at Pantex and stated that storage of plutonium over the Ogallala aquifer, "which supplies water to millions of people, is very scary to me and a lot of other Texans."[309]

Watkins wrote Morales, Richards, and Bullock similar letters on March 26, reiterating his commitments to operating Pantex safely and cooperating with the state in developing plans for plutonium storage, having written Richards and the Texas congressional delegation on March 12 to report on developments at the plant and to offer briefings at their convenience. Watkins also took time to thank Texas State Representative John Smithee for his letter supporting DOE's open and cooperative relationship with Texas and suggesting that Morales was "'grandstanding' for the liberal environmental groups rather than truly trying to resolve the problem." Friction remained, however, and on May 29, Morales complained again, arguing that the plan to store plutonium from thousands of scrapped nuclear weapons violated NEPA since the most recent EIS dated from 1983 and did not cover dismantling and storage currently in progress. Assistant Secretary Richard Claytor briefed Morales on Pantex in Austin on June 30, and Watkins wrote Morales on July 6 confirming Claytor's commitment that DOE would not make final decisions on long-term plutonium storage until a PEIS was prepared, the draft of which would be available by the end of 1992.[310]

Repository Developments

Site characterization of Yucca Mountain continued in late 1991 and 1992, with the last permit being obtained from Nevada in March 1992. In early December 1992, as site preparation and road building proceeded, the first test drilling took place at the north portal. DOE continued to solicit applications for an above-ground MRS facility that would provide interim storage until Yucca Mountain opened and in September 1992 extended the grant application deadline until March 31, 1993. In a December 17, 1992, letter to Senator J. Bennett Johnston, however, Watkins suggested a new DOE strategy for handling spent nuclear fuel. Conceding that the Office of the Nuclear Waste Negotiator had failed to find a viable candidate MRS site, Watkins advocated shifting the emphasis to developing a standardized container and using federal sites for interim storage of fuel beginning in January 1998, the date the federal government was obligated to take ownership of civilian high-level nuclear waste.[311]

In October 1991, Watkins declared WIPP ready to commence the multi-year test phase with limited amounts of TRU waste but withheld shipments when New Mexico filed suit requesting an injunction against proceeding. In late November, U.S. District Court Judge John Garrett Penn granted New Mexico's motion for a preliminary injunction. On January 31, 1992, Penn granted a permanent injunction, ruling that the Interior Department had exceeded its authority in granting an administrative land withdrawal for WIPP and holding that a congressionally-approved land withdrawal was necessary. DOE appealed, but the ruling was upheld by a federal appeals court on July 10. While the administrative withdrawal foundered, House and Senate conferees resolved their differences on WIPP land withdrawal legislation in early October and sent the bill to the president. President Bush, on October 30, 1992, signed the WIPP Land Withdrawal Act. Key provisions of the act included prerequisites for initial receipt and permanent disposal of waste at WIPP. Regulatory requirements in the act provided EPA with a significant oversight role.[312]

EM Program: Waste Management

On May 13, 1992, Watkins issued a directive mandating development of a strategic plan for waste minimization and establishing an executive board, chaired by Duffy, composed of

senior managers of all programs that generated waste. In late August 1992, Watkins issued the "crosscut plan" on waste minimization and pollution prevention designed to reduce waste management costs, conserve natural and economic resources, reduce health risks to workers and the public, and improve environmental protection. The policy formalized activities already taking placing throughout DOE to avoid waste generation, an effort viewed as critical to reducing EM's waste management budget.[313]

The Hanford tanks continued to be EM's most serious high-level waste management challenge. Testifying before Marilyn Lloyd's (D-Tennessee) House Subcommittee on Energy of the Committee on Science, Space, and Technology, on February 6, 1992, Duffy stated that the tanks "are what we consider the Department's number one problem in our total operation." As an independent technical review team reported in July 1992, the tank farms continued to deteriorate "because corrective maintenance is not keeping up with the equipment failure and the tank farm upgrade program is not being implemented fast enough." The review team observed that Westinghouse Hanford's assumptions for the Tank Waste Remediation System were "optimistic" and, more seriously, that the contractor had not implemented business planning and methods that were the "primary objective" of a managing and operating contractor." An occupational health and safety review conducted by the Office of Environment, Safety and Health at the request of EM concluded that Westinghouse was making slow progress in resolving tank farm issues because management "continues to operate reactively rather than proactively." The November 1992 report concluded that "the historical lack of responsiveness to known or identified hazards" would, in an OSHA regulatory environment, "present a strong case for consideration as a 'willful' violation."[314]

In a May 21, 1992, hearing before Senator J. Bennett Johnston's Committee on Energy and Natural Resources, Duffy promised to continue working on Hanford tank farm safety issues. He also noted that the Hanford Waste Vitrification Project was moving ahead on site preparation and was nearly ready to begin construction. Other priority high-level waste activities Duffy cited included processing of liquid wastes at Idaho and cold chemical test runs at the Defense Waste Processing Facility at Savannah River.

Duffy's testimony also addressed DOE's management of low-level waste, TRU waste, hazardous waste, and non-defense waste. Duffy noted that DOE disposed of approximately 55,000 cubic meters of low-level waste per year and was building more processing tanks at Savannah River and storage facilities at Mound. DOE had 61,600 cubic meters of TRU waste in storage, more than half of it at Idaho, pending the opening of WIPP. Test phase operations at WIPP continued, while DOE provided impact assistance to New Mexico. Duffy told senators that DOE's policy was to ship hazardous waste to commercial sites, a practice he expected to accelerate. The considerably smaller non-defense waste management program supported vitrification activities at the West Valley Demonstration Project, assistance to states and compact regions required by the Low-Level Radioactive Waste Policy Amendments Act of 1985, and management and disposal of greater-than-Class C low-level waste.[315]

EM Program: Environmental Restoration

During 1991 and 1992, mercury remediation work was ongoing at Oak Ridge downstream from the Y-12 plant, while at K-25 (formerly the Oak Ridge Gaseous Diffusion Plant and now a decontamination and decommission site) the emphasis was on removing PCB-contaminated gaskets in ventilation ducts to meet a regulatory requirement. At the Paducah Gaseous Diffusion Plant in Kentucky, efforts continued to determine the extent of groundwater

contamination in residential wells north of the plant, while at the Portsmouth Gaseous Diffusion Plant in Ohio temporary pump-and-treat facilities were completed and identification of RCRA closure sites continued.

Groundwater remediation activities were taking place at several locations at Savannah River, with additional facility closures planned. Fernald was working on the South Groundwater Contamination Plume Removal Action to remediate Paddy's Run (and providing local residents with bottled water), while INEL moved forward on a novel proof-of-process demonstration to remediate radioactive contamination in soils at the Radioactive Waste Management Complex Pit 9. At Los Alamos National Laboratory, characterization and assessment of operable units continued, and a mobile field laboratory and a portable gas chromatograph/mass spectrometer instrument were built. Sandia National Laboratory in Albuquerque was in the sitewide characterization stage and also was conducting assessment of operable units and performing interim remedial actions.

Decontamination and decommission of buildings and soil cleanup of plutonium contamination dominated Mound's agenda in 1992. The Pantex EM program was still in the characterization and assessment stage, while Pinellas worked on cleaning up two areas of groundwater contamination. The Kansas City Plant completed two cleanups and began treating contaminated groundwater. Installation of groundwater monitoring wells took place at the Nevada Test Site, and site assessments were underway. Rocky Flats continued to work on solidification of solar pond sludge (pondcrete) contaminated with radionuclides and hazardous constituents and on volatile organic compound (VOC)-contaminated groundwater at both the 881 Hillside and 903 Pad areas.[316]

While it may not have gained much attention, an otherwise mundane item in the August 10, 1992, weekly EM report symbolized the day-to-day efforts taking place in the Department's environmental restoration and waste management program. The item reported the recent signing of the first-ever Record of Decision under the CERCLA regulatory framework for an active DOE facility on the EPA's list of Superfund sites. The ROC was for Lawrence Livermore National Laboratory's cleanup of onsite soil contamination and a contaminated groundwater plume that had moved beyond the laboratory's western boundary into a residential area. The technology identified for treating the groundwater was pump-and-treat.[317]

Another noteworthy environmental restoration initiative was Hanford's experiment with expedited response actions to clean up hazardous sites. Benefiting from revised procedures in the Tri-Party Agreement that allowed the normal five to seven years of characterization and laboratory analysis usually required to meet CERCLA requirements to be "short-circuited," Westinghouse was cleaning up sites and taking samples as remediation progressed instead of completing sampling beforehand. For example, Westinghouse recovered 1,600 gallons of hexone, an organic solvent, from forty drums buried in the early 1950s after a five-month regulatory approval process. Characterization alone normally took 3½ years. Another completed action was the removal of contaminated soil from a process trench, while an ongoing expedited response action was using vapor extraction to remove carbon tetrachloride from soil. September 1991 amendments to the Tri-Party Agreement also included the Aggregate Area Management Strategy (AAMS) concept, intended to make site investigations more efficient and reducing documentation needed for regulatory approval.[318]

EM Program: Technology Development

In October 1992, DOE and EPA signed two MOUs to pursue improved environmental technologies, extending earlier research and development agreements with EPA and similar ones with NASA, the U.S. Geological Survey, and the Corps of Engineers. As Duffy explained in his May 21, 1992, testimony, the technology development program was structured to respond to needs identified by users looking for "mutually beneficial technologies," whether they were DOE program offices or other federal agencies.[319]

User-identified needs to be addressed during fiscal year 1993 included developing technologies for monitoring groundwater contamination plumes, characterizing waste without personnel exposure, retrieving waste from underground tanks and dumps, separating complex waste streams into constituent elements, and containing and remediating heavy metals in soil. The emphasis was on applied research and integrated technologies, for, as Duffy put it, "we need to get solutions right now. We cannot wait on a ten-year program to demonstrate a technology when . . . every year we wait it [water] just moves that much farther out, more volume, more contamination." In Duffy's opinion, only through "aggressively" working with National Laboratories, site management and organization contractors, industry, universities, and international firms could enough current technology be mobilized to prevent DOE's contamination problem from getting worse.[320]

Longer-range technological solutions required basic research, either funded elsewhere in the Department or cooperatively with private industry or states through Cooperative Research and Development Agreements (CRADAs). In his February 6, 1992, testimony before Representative Marilyn Lloyd's Subcommittee on Energy, Duffy mentioned several CRADAs, including one between Oak Ridge and General Electric to work on PCBs in uranium enrichment plants. A CRADA with South Carolina provided for the transfer of environmental technology between Savannah River and Oak Ridge, while negotiations with several companies were underway that would reduce the use of chlorinated solvents in electronics manufacturing.

Public Participation

Public and other governmental access to EM information, planning, and decision making reached a significant level by early 1993, by which time EM had developed a public participation strategy and assigned guidance and implementation responsibilities to the Office of Policy and Program Information. The Stakeholders' Forum and STGWG remained active, while newer initiatives added to EM's public participation effort. Native American issues grew in importance, particularly after Watkins issued a seven-point American Indian Policy in November 1991. Calling it "an important building block of the new culture of openness and responsiveness," Watkins promised government-to-government consultations with the 510 federally recognized tribal nations on matters affecting their interests or treaty rights.[321]

In July 1991, DOE signed a Memorandum of Understanding with the Western Governors Association, EPA, DOD, and the Department of the Interior to find "technical solutions to environmental restoration and waste management problems shared by states, commercial entities, and the Federal government." The memorandum called for a committee to manage implementation. The committee was headed by DOE and called the Federal Advisory Committee to Develop On-Site Innovative Technologies for Environmental Restoration and

Waste Management (DO-IT Committee). By early 1993, the committee had plans to provide public access to decisions regarding joint technology demonstrations.[322]

Environmental Restoration and Waste Management Advisory Committee (EMAC)

On October 22, 1990, DOE published a Notice of Intent to prepare the EM PEIS and invited public comments. During scoping meetings held during late 1990 and early 1991, environmental groups pressed DOE to more actively seek outside advice on the PEIS. On January 10, 1992, in a *Federal Register* notice, DOE announced that it would charter the Environmental Restoration and Waste Management Advisory Committee to provide EM with input on the PEIS and other EM projects "from the perspectives of affected groups and State and local governments." The committee, which would have "an appropriately balanced membership," would provide DOE with consensus recommendations "on pragmatic nationwide resolution of numerous difficult issues [that] will help achieve the DOE objective of an integrated environmental restoration program." In February 1992, at the end of the 120-day comment period, DOE issued a Draft Environmental Restoration and Waste Management Programmatic Environmental Impact Statement Implementation Plan, dated January 1992. And on July 2, 1992, DOE named twenty-three people to the new advisory committee. Members represented state and federal agencies, labor unions, community and national environmental groups, Indian tribes, and academia.[323]

EM Program Review, August 1992: EMAC Meeting #1

The first meeting of EMAC took place in Washington, D.C., on August 5-6, 1992, and featured presentations summarizing the mission and current status of EM's program offices. Most of the committee and approximately 100 members of the public attended the sessions.

In his opening address, Duffy pointed out that DOE was a regulated agency and that the Department's biggest waste problem was mixed waste. In fact, DOE had more mixed waste than any other agency in the world. Solvent contamination, particularly from trichloroethylene, was another major concern, as was the groundwater contamination that accounted for eighteen DOE sites being on the EPA's National Priority List (Superfund). Duffy explained that, though non-radioactive chemical wastes caused the groundwater problem, the public's primary concern was radioactive waste.

Duffy then gave his audience a history lesson, expressing his view that DOE had for too many years ignored the 1948 AEC study on waste management that recommended against using single shell tanks, ponds, and shallow burial grounds. The "technological tooth fairy" with a permanent solution to the waste problem "never showed up," and now DOE faced the task of developing cleanup technologies to treat billions of cubic meters of waste generated during the Cold War. Duffy argued that the goal should be to develop technologies that could be transferred to the world marketplace.

Turning to EMAC's mission, Duffy urged the group to "let us know if we are going down the right path." Acknowledging DOE's legacy of "long-term mistrust," Duffy encouraged EMAC to be "a conduit for improved communication with the public" and to focus on how EM could improve as an organization. He concluded by stressing that the EM program could be a good taxpayer investment if the United States achieved world leadership in waste

management and cleanup technologies; "if all we do is clean up, we've lost a big opportunity," Duffy argued.

EMAC Program Review

Jill Lytle's presentation on EM's waste management program stressed the importance of waste minimization and the challenge of treating, storing, and disposing of DOE's forty-year backlog of waste in an environmentally sound way. Lytle, deputy assistant secretary for waste management, also explained how EM planned to manage each type of waste, beginning with solidification of high-level waste through vitrification into borosilicate glass at Savannah River, Hanford, and West Valley. She noted that the Defense Waste Processing Facility at Savannah River was on the verge of trial runs and recounted the many lessons learned during facility construction and testing. The plan for transuranic waste was to continue RCRA-compliant storage until the controversial Waste Isolation Pilot Plant opened. Lytle stated that WIPP had been ready since October 1991 but that Congress was still working on land withdrawal legislation.

Turning to low-level waste, which all DOE sites generated, Lytle explained that the Department was storing almost all such waste because of a lack of treatment methods and permitted disposal facilities. Since RCRA did not permit long-term storage, Lytle stated, DOE had worked out Federal Facility Agreements with states and Federal regulators to allow interim storage until the Department could develop long-term treatment methods. Lytle concluded by telling listeners that the "not-in-my-backyard" syndrome (NIMBY) and the lack of cleanup standards complicated EM's ability to site treatment facilities.

Deputy Assistant Secretary Pat Whitfield provided an overview of EM's environmental restoration program, stressing that it would grow rapidly due to the rapid decommissioning of DOE facilities. Whitfield described the kinds of contaminants EM had to treat, pointing out that groundwater contamination was one of the biggest concerns and that most risk in the DOE complex was chemical-based and not radioactive-based. Whitfield explained that the scope of the environmental restoration problem facing DOE "continually surprises" EM, and he described the "cycle of characterization, followed by cleanup actions, followed by more characterization that revealed surprises."

Responding to questions, Whitfield acknowledged that EM had had problems in fulfilling its regulatory agreements. Whitfield expressed the view that agreements frequently contained unrealistic schedules that were negotiated before the scope of work was well understood. Whitfield also explained that environmental restoration was trying to work with technology development on more efficient restoration techniques but that coordination was difficult because his program had to meet regulatory deadlines whether better technology was identified or not. Whitfield contined with a brief discussion of decontamination and decommission activities and a few comments on the ERMC concept. In conclusion, Whitfield emphasized that the biggest challenge facing his program was to achieve and demonstrate enough progress to the public that Congress would continue to provide funding for EM's "huge" cleanup mission.

Clyde Frank, technology development's deputy assistant secretary, told listeners that the mission of his office was to help environmental restoration and waste management achieve their missions. He discussed some new technologies that showed promise, including in-situ air stripping with horizontal wells at the Savannah River site. One horizontal well could do the work of thirty vertical wells, thus significantly reducing cost. Frank also described

dynamic underground stripping of old vertical wells, in-situ vitrification experiments, grout injection demonstrations, and robotics developments. He noted that the limitation of most current technologies was that they created waste. Frank briefly described other Technology Development programs, including the Transportation Management Program. He noted that the Department had a forty-year record of safely shipping radioactive materials and described the upcoming transportation emergency management exercise that would be held in Idaho.

Frank went into some depth on work being done on volatile organic compounds, which were among the nation's most serious hazardous waste problems. Optimistic that the Department would achieve a breakthrough in this area, Frank thought that the solution would be marketable both in the U.S. and abroad. One major problem area, Frank told listeners, was that EM was facing short-term regulatory deadlines for producing Records of Decision. EM did not enjoy the luxury of waiting for new-generation technologies to be developed but must proceed with remedial actions. That was why, Frank noted, his program was called technology development and not technology research. Frank pointed out that DOE's basic research activities had ten times his budget. He concluded with a description of the tremendous stress associated with working in an environment of regulatory deadlines.

Day Two of the first EMAC meeting began with Tom Elsasser's presentation on the Office of Policy and Program Information. Elsasser described DOE's "past culture" as one that did not involve the public in decision making and explained that this "posture" changed when Watkins announced that environment and safety would take precedence over production. The Office of Policy and Program Information, Elsasser stated, was responsible for implementing EM's "overall goal of pre-decisional public involvement." Elsasser pointed to the work of Rocky Flat's Technical Review Group and Fernald's interactions with Fernald Residents for Environmental Safety and Health (FRESH) as examples of "successful community relations." He also mentioned that WIPP had "a very proactive community relations program, including a speakers bureau." Elsasser concluded with a status report on EM's Public Participation Policy Statement, which his office was drafting.

Glenn Sjoblom, Duffy's special assistant for the PEIS and the designated federal member on EMAC, discussed the PEIS schedule, stating that the goal was to have a draft available for review by August 1993. Sjoblom urged EMAC to provide input on the PEIS quickly, and he raised a number of questions they might consider that addressed analysis of alternatives, responsiveness to public comments, and planning for appropriate risks. In particular, Sjoblom asked EMAC to consider whether EM was looking at the "right risks."[324]

EMAC Comments on the PEIS

By December, EMAC was ready to comment on the PEIS. In a December 21 letter to Duffy, Glenn Paulson, EMAC's Chairman, forwarded recommendations that had been approved unanimously by the committee. EMAC recommended that the PEIS be more specific about how land use would be factored into future cleanup and waste management decisions, emphasized the necessity of fully addressing worker and public health and safety concerns, and suggested more extensive coverage of waste management issues. The committee also stated that the Implementation Plan was "unresponsive" to issues that arose during scoping meetings and that responses to public comments were "too perfunctory to be informative." The pattern, the committee maintained, "is to justify the adequacy of current DOE programs rather than to show how the PEIS will be organized to analyze and discuss the possibilities of

needed reforms in the EM program." The committee suggested modifications to the risk-assessment process that would provide stakeholders with a meaningful role. EMAC argued that "this is the most useful way to build a consensus among the stakeholders and to avoid the inevitable problems that result from dumping only the final results on a surprised public."[325]

Keystone

The first meeting of the National Policy Dialogue on Federal Facility Environmental Management (Keystone) took place in June 1991 in Washington, D.C. Native American and local citizen groups joined with those who had attended the January 1991 planning meeting to hear DOE, DOD, and EPA presentations on approaches to priority-setting for environmental remediation. The Keystone group met again in October to discuss health and risk assessments, how Native American cultural issues should be incorporated in priority-setting decisions, and what role governmental and non-governmental bodies should play in setting priorities for federal cleanup activities. At the October meeting, participants agreed to move beyond information-sharing and work toward development of consensus policy recommendations for federal facility cleanup decisions.

Subsequent meetings in late 1991 and early 1992 resulted in the formation of working groups to study phases in federal facility cleanup decision making and to make recommendations to the larger group. Keystone participants agreed that limitations in science and data precluded the development of consensus cleanup priorities, that objective methods for evaluating some criteria relevant to cleanup priorities did not exist and might even be inappropriate, and that it was "appropriate in a democracy to allow a variety of affected interests to provide input on decisions that affect them."[326]

The Keystone group issued its first full committee draft on September 18, 1992. By this time there were over forty participants, including citizen, environmental, and labor organizations; state governments and associations; Tribal governments and associations; and federal agencies like the Department of the Interior, the Department of Agriculture, the National Oceanographic and Atmospheric Administration, and the National Air and Space Administration. Several draft recommendations related to site-specific advisory boards, "independent public bodies established to provide policy and technical advice to the regulated and regulating agencies with respect to key clean-up decisions." The Keystone group believed that such boards, if provided with consistent and meaningful interaction, benefited both the public and federal agencies. Acting on Keystone's recommendation, DOE planned to work with its regulators—who would develop membership lists—to establish site-specific advisory boards at five pilot sites in 1993: Fernald, Idaho, Rocky Flats, Hanford, and Savannah River.[327]

Duffy Becomes Assistant Secretary

On December 3, 1991, Duffy became the assistant secretary for the Office of Environmental Restoration and Waste Management, having moved smoothly through hearings before both the Senate Energy Committee and the Senate Armed Services Committee in late November. During the hearings, Duffy warned that without new technologies the cost of waste cleanup could exceed $160 billion, and he noted that this did not include funds, as yet unestimated,

that would be required to decontaminate and decommission approximately 700 DOE buildings EM would eventually take over, primarily from the Office of Defense Programs.[328]

At an early 1992 briefing on EM's budget request for fiscal year 1993, Duffy expressed disappointment with technology development funding ($315 million out of $5.5 billion, or roughly 6 percent) and repeated his belief that new technologies were critical to cost-effective remediation. The conundrum was that technology research and development funds, while discretionary, offered hope of treatment breakthroughs that would help EM achieve regulatory compliance at lower cost, but programs with regulatory deadlines continually encroached on technology development's limited funding.

Watkins praised Duffy's management of EM, and both agreed that numerous DOE and interagency audits had created significantly more reliable budget figures than previous years. While Duffy believed that $5.5 billion was sufficient to meet regulatory requirements for the next year, he recognized that he would have to convince the states. Warning that dollars could not be equated with cleanup, Duffy stated that "you can't throw money at the ground and soak up nuclear waste." Duffy announced that Rocky Flats, scheduled to transfer from Defense Programs to EM in fall 1993, would become a showcase of how to perform cost-effective cleanup. Plutonium operations would be concentrated at a central location (the Hanford model), reducing burdensome security costs and allowing remediation to proceed more efficiently.[329]

Fiscal Year 1993 Budget Hearings

During fiscal year 1993 budget hearings held in early 1992, Duffy's prepared statements and oral testimony highlighted the key issues facing the EM program. Duffy attributed the rapid growth of EM's budget to 1) presidential decisions reducing nuclear stockpile requirements that accelerated the transfer of facilities from defense to non-defense purposes (from defense programs to EM) and 2) funding required to keep DOE in compliance with environmental regulations and negotiated agreements. Duffy referred to EM as a *de facto* entitlements program, with 86 percent of the budget dedicated to legal obligations. For example, storage of mixed waste that could not be treated to RCRA land disposal standards represented 40 percent of EM's budget. According to Duffy, the logic was inescapable: "By law we have to follow the compliance agreements. The compliance agreements set the schedule. The schedule sets the budget. The budget is spent on the basis of that schedule."

While supporting objectives stated in House and Senate versions of bills to bring federal facilities into compliance with RCRA, Duffy complained about being penalized for failing to comply when treatment technology and capacity did not exist for DOE mixed waste. Noting that under RCRA DOE's contractors were liable to fines and penalties, which DOE reimbursed unless the contractor was negligent, Duffy questioned the logic of allowing the federal government to be fined simultaneously. "I think that penalizes the taxpayer almost three times," Duffy complained. "If the contractor . . . was not negligent," he explained, "we will reimburse the contractor. And then, if we are fined, we will pay a fine in addition to that. So," Duffy concluded, "the taxpayer pays three times for the same situation." Pointing out that DOE met regulatory requirements for toxic and hazardous materials, Duffy recommended a two-year waiver from enforcement of mixed waste provisions of RCRA "until we can get the EPA trained in the areas where the Department of Energy has unique wastes that are not presently able to be treated under the Resource Conservation and Recovery Act." Duffy also

reported that DOE, working with the Department of Justice, was trying to narrow the scope of contractor liability.

Duffy repeatedly stressed the challenge of planning budgets to meet current and future regulatory requirements when there were no cleanup standards and critical land use decisions had not been made. "To put it in simplest terms," he stated, "we do not know what is clean, how clean is clean." For example, the lack of standards for residual radioactivity prevented unrestricted recycling of slightly contaminated materials resulting from decommissioning activities. Duffy argued that recycling material that was slightly contaminated, that "doesn't represent a health risk to the worker," was more cost effective than building plants to manufacture new material. The barrier to recycling was the absence of risk-based standards, and the result was that even slightly contaminated material was being buried rather than reused.

Duffy explained that not all DOE sites could be returned to their original state, though some could be released to the public if they had neither a future production or waste management mission. "But in many cases," he reiterated, "determinations must be made again on how clean is clean before cleanup and release of these lands," determinations complicated by what Duffy called "radiophobia"—the tendency to regard even very low levels of radioactivity as dangerous while ignoring the perils of hazardous chemicals and heavy metals. Duffy argued that it was essential to work with state and local governments "to arrive at a mutually agreeable process for land use determination."

Radiophobia came into play regarding the Department's most widespread environmental problem—groundwater contamination. "We have 19 sites that have groundwater contamination in aquifers, rivers, streams," Duffy testified. "We have conditions where sites have off-site contamination of very low levels that are emotional in addition to technical." Contrary to public belief, Duffy explained, the "majority" of DOE's "environmental and ecological impairment" resulted from "organic solvents going into the groundwater which then migrated the radioactive material and heavy metals into the groundwater." The problem was particularly acute at Oak Ridge, where waterborne mercury and fission products had entered the site's diverse system of creeks. During forty years of operations at Hanford, Duffy added, 3,300 individual contaminated sites had discharged 400 billion gallons of water to a depth of 200 feet into a highly complex underground water network.

Responding to a question from Senator Sam Nunn (D-Georgia) regarding technology breakthroughs that might make cleanup of DOE (and DOD) sites more economical and effective, Duffy identified some promising technologies for treating groundwater contamination, "the biggest problem that we have." These included "very promising" bioremediation tests at Hanford and Savannah River and a core penetrometer that used fiber optics to sense organics 200 feet below ground. Duffy told Nunn that the technologies were promising "in the next 5 to 10 years." In the meantime, he told the senator, there was nothing but pump and treat, "not a very good technology," one that could not even treat water to drinking water standards. Duffy also explained that finding groundwater technologies was a major thrust of Clyde Frank's Office of Technology Development.

Duffy's budget testimony consistently defended what some criticized as a lack of progress in cleaning up the weapons complex, a criticism similar to that made against the Superfund program. As he noted in an exchange with Howard Wolpe (D-Michigan), EM was in a situation "where we have to take care of 40 years of backlogged waste in the waste management area before we can environmentally restore it." This situation required

substantial investments in storage facilities and explained, Duffy told Wolpe, why the waste management budget was so large and why 80 to 90 percent of the $3.1 billion request was devoted to "old" waste. With time, and the completion of waste storage facilities, the waste management budget would stabilize and be exceeded by the environmental restoration budget.

The apparent lack of progress in cleanup, Duffy argued, resulted from the waste backlog, which was being addressed primarily by adding storage capacity, and the current emphasis in environmental restoration on the "paper program and original assessment program." Simply to measure the extent of the problem was expensive and time-consuming and "required remedial investigation, site assessment, well drilling, and sampling analysis," along with "immediate containment and confinement with regard to pump and treat or immediate removal." And, Duffy noted, no action took place without first producing a veritable mountain of paperwork to gain approval from states and regulatory agencies to proceed with remediation. As he put it at a March 3, 1992, appropriations hearing, "I think we are clear cutting the State of Oregon."[330]

Even though the environmental restoration program's focus was on assessment and characterization, Duffy was able to cite some environmental restoration achievements and promise more. For 1992 highlights, he singled out bentonite work on Fernald's K-65 silos and the reduction of radon emissions from Fernald by a factor of 100. A full replacement of the carbon tetrachloride in Oak Ridge's Y-12 plant, Duffy reported, saved $23 million. He also noted the "excellent" progress being made on a quarry water treatment program at Weldon Springs and emphasized that DOE was negotiating with EPA to expedite cleanups.

No Duffy appearance on the Hill was complete without a plea to increase the number of federal employees in the EM program. Since 1990, he argued, "we have made considerable improvements in running the program. We have developed a 5-year plan, activity data sheets, a progress tracking system, and a cost-quality program." Noting that EM had 25 percent of the Department's budget but only 8 percent of the Department's federal staff, Duffy warned Congress that "this situation must change," that it was "crucial" that he have enough staff to improve EM's management systems and technical capabilities and to provide effective oversight of contractors.[331]

What Has This Money Bought and What Will It Buy?

The NRDC supported EM's $5.5 billion request for fiscal year 1993, but Jim Werner and Dan Reicher expressed concern that DOE was diverting significant amounts from environmental to non-environmental purposes and urged Congress to ask the question "what will the program buy in FY 1993?" Noting that EM's cumulative budget had reached $15 billion since fiscal year 1990, Werner and Reicher argued that the diversion of funds to non-environmental activities "reduce[d] resources available for critical environmental cleanup and research projects." Werner and Reicher cited restart activities at Hanford's PUREX facility as the best example of money being spent on non-environmental programs. The NRDC's prepared statement also argued that spending money to manage unnecessary wastes like those produced at Idaho's Chem Plant, which no longer needed to be operating, was a serious misuse of funds.

The NRDC made numerous recommendations directed at improving EM's accountability. These included reducing wasteful waste management spending and increasing environmental restoration funding, providing better focus to EM's technology development program,

increasing funding for EPA and state oversight, providing full public participation through site specific advisory boards, and developing cleanup standards for residual radioactivity (the lack of which "threatens to undermine the efficacy of DOE cleanup programs and EPA or state regulatory decisions"). Werner and Reicher also asked Congress to enact two key measures "to hasten DOE's transition from Cold War operations,". 1) stopping unnecessary reprocessing of nuclear fuels and 2) developing programs to assist workers being displaced as nuclear weapons facilities closed.[332]

EM Contracting: Environmental Restoration Management Contractors (ERMC)

On December 23, 1991, the Oak Ridge Field Office issued a request for proposals (RFP) for an Environmental Restoration Management Contractor (ERMC) at Fernald. On February 26, 1992, Watkins removed Fernald from Oak Ridge authority and established the Fernald Environmental Management Project as a separate DOE Field Office reporting directly to EM." Fernald, which had been closed since June 1991, joined Hanford as an EM site. In April, DOE published an RFP for an ERMC at Hanford, a bid package so large (approximately $1 billion dollars over five years) that Westinghouse, the Hanford management and organization contractor, announced it would reconsider its previous decision not to submit an offer.[333]

The ERMC approach for cleaning up contamination at nuclear weapons sites was designed to attract independent remediation contractors, who would be solely responsible for environmental cleanup. Incumbent managing and operating contractors would continue to maintain the sites. The Alternate Contracting Task Force, a joint headquarters-field group set up in February 1990 to review options for environmental contracting, had studied ERMC along with several other approaches without reaching a consensus. Despite considerable field concern that hiring environmental contractors would disrupt ongoing operations and predictions that the award would be contested, Duffy decided to test ERMC at Hanford and Fernald. As he stated in a hearing before Peter Kostmayer's (D-Pennsylvania) House Subcommittee on Energy and the Environment in February 1992, ERMC would provide "experience that we need with regard to environmental issues." The Tiger Teams, Duffy reported, "found the major deficiency was in the amount of trained personnel we had in the environmental area" [so] "we are looking to focus attention on bringing in firms that have that experience."[334]

Debate over ERMC

Given the enormity of the task facing the EM program and the amount of tax dollars involved, criticism of both the ERMC concept and the entire EM program was inevitable. Washington lawmakers, for instance, including Republican Representative Sid Morrison, urged Watkins to delay ERMC at Hanford until the experiment at Fernald could be evaluated. Morrison, whose district included Hanford, was concerned that the ERMC transition would force Westinghouse to lay off workers. Criticism of the ERMC concept also came from Congressman John Dingell (D-Michigan), who, on August 25, 1992, forwarded a GAO report to Watkins highly critical of the ERMC initiative. Dingell called the idea a "public relations facade" and argued that DOE had "virtually no idea" how ERMC would work; he urged Watkins to delay implementation. Duffy defended ERMC in a response to Dingell, and Watkins wrote the Congressman that, even though the GAO report's recommendations were well-founded, selection of the Hanford ERMC would proceed.[335]

Republican Senator Charles Grassley of Iowa, a frequent critic of DOE's EM program, brought 1992 to a close with an attack on Duffy for reneging on a promise to make ERMC contractors more accountable through fixed-price arrangements. By the time Grassley wrote Duffy on December 15, the Fernald (previously Fluor Daniel) Environmental Management Company of Ohio (FERMCO) had taken over from Westinghouse at Fernald and DOE was close to making a decision on Hanford's ERMC (a decision made in January 1993 and immediately appealed). Grassley, who had experience in the environmental area, questioned why DOE had not negotiated a fixed-price contract rather than a traditional cost-plus-award fee arrangement at Fernald, finding DOE's answer that it was not possible to define the scope of work "unacceptable" from a business point of view. Grassley was critical of DOE for abandoning Duffy's primary argument for ERMC, that contractors had incentives to avoid cost overruns with fixed-price arrangements. "Your pledge is not being implemented," Grassley wrote Duffy; "the Fernald ERMC contract ended up being another cost-plus arrangement—which is not different than the old wasteful DOE system you sought to change." Duffy continued to defend the ERMC approach, arguing at the December 17, 1992, STGWG meeting that environmental firms would be able to do environmental restoration work for less than operating contractors. "The ERMC may not be the final solution," Duffy stated, "but we have to start somewhere."[336]

Congressional Oversight

Additional criticism of EM came during 1992 when two GAO reports and an interagency study were issued. A GAO report prepared for the House Science, Space, and Technology Committee took EM's technology development program to task, specifically the highly-publicized integrated demonstration projects. GAO noted that technology development's motto was "faster, better, safer, cheaper" [cleanup methods] but argued that planning documents failed to reveal a definition of "better" or how "better" was to be measured. The report stated that the technology development program lacked key management tools, noting specifically the absence of "measurable performance goals, overall project cost estimates and schedules, and major decision points."[337]

A second GAO report, prepared for Senator John Glenn, stated that DOE's EM program was not doing enough to control costs and pointed to a "considerable" 48 percent increase in the past two years. The fundamental problem, GAO argued, was that basic management tools like project baselining and information systems for monitoring cost growth were not in place, a conclusion that implicitly criticized EM's confidence in its latest budget projections. GAO also believed that "in some instances insufficient DOE management oversight has led to poor contractor performance and cost growth." Noting that DOE was putting a complex-wide lessons-learned information system in place, GAO recommended that the Department monitor its use "to ensure that 'bad' as well as 'good' experiences are entered into the system and that mistakes are not repeated because the system is not used."[338]

DOE participated in preparation of the third report, an interagency study that *U.S.News and World Report* cited in a controversial article on waste and fraud in the EM program in December (The cover read, "A $200 billion scandal").[339] Along with the Defense Department (and its Corps of Engineers), the Justice Department, EPA, and OMB, DOE examiners spent three months in early 1992 evaluating the EM program, concluding that DOE's $5.5 billion cleanup budget would be sufficient for the upcoming fiscal year. In a report otherwise devoted to suggestions for improving cost estimates, planning for technology development,

and budget execution, the interagency group caused quite a stir when it concluded that DOE's overhead costs were double those for comparable Corps of Engineers cleanup programs.[340]

While Duffy admitted that DOE could cut administrative costs and improve the five-year planning process, he was quick to point out that the Corps had no experience in handling mixed radioactive and hazardous wastes and did not pay overhead costs at sites where it was doing work. EM, on the other hand, paid substantial sums for overhead costs at its sites (security costs being one of Duffy's common complaints), making the comparison with the Corps, in Duffy's opinion, misleading.[341]

How Clean is Clean?

Significant regulatory developments took place during 1992, including the addition of more stringent land disposal restrictions for mixed waste in RCRA, which was reauthorized in May. In the same Senate hearing during which the interagency review report was discussed, Senator J. Bennett Johnston (D-Louisiana), Chairman of the Senate Energy Committee, and Senator Malcolm Wallop (R-Wyoming), the ranking minority member, both complained that cleanup of the weapons complex would be virtually impossible if mixed waste regulations were too stringent. "Do we want to be able to eat the dirt or have sites that are acceptably clean?" Johnston asked, while Wallop accused EPA of making decisions without rationality and urged EPA to "drop back into the world where all of us live." Encouraging a basic rethinking of cleanup standards, Johnston noted that EPA set standards but did not do the work. "There is no connection between the setting of standards and paying the bill," he stated.[342]

Federal Facilities Compliance Act

Legislation waiving sovereign immunity from environmental regulations for federal facilities that had been working its way through both houses of Congress since the late 1980s finally made it to the White House, and, on October 6, 1992, President Bush signed the Federal Facilities Compliance Act (FFCA) into law. For DOE, which was technically unable to comply with RCRA's storage prohibitions for untreated mixed wastes, the FFCA posed significant problems as it subjected DOE to fines and penalties for violations of RCRA or state hazardous waste requirements. While in most instances the waiver of sovereign immunity was immediate, the FFCA delayed the waiver of sovereign immunity for untreated mixed wastes for three years, giving EPA time to issue new mixed waste standards and DOE time to develop a compliance plan for mixed waste.

The FFCA required DOE to develop plans for RCRA compliance at each of its sites and gain approval for site-specific plans from EPA or states by October 1995 or face fines. Since many of DOE's mixed waste streams probably would not have approved treatment technologies in place by October 1995, DOE facilities with mixed wastes but without approved plans at the end of the grace period would be vulnerable to EPA or state fines and penalties. Facilities in compliance with EPA- or state-approved treatment plans would maintain sovereign immunity after the three-year grace period.

DOE's first step in response to the FFCA was to publish a draft Strategy for Development of a National Compliance Plan for DOE Mixed Waste in the Federal Register on December 3, 1992. In addition, the FFCA required DOE to submit two inventories to the states and EPA by April 5, 1993, (180 days from enactment) one describing DOE's mixed waste streams and the

other detailing existing and planned mixed-waste treatment capacities and technologies. Following a ninety-day comment period, DOE would finalize the inventories. The FFCA also required DOE to publish in the Federal Register by April 6, 1993, (six months from enactment) a schedule for submitting site-specific plans for development of treatment capacities and technologies at each facility where DOE generated or stored mixed wastes.

Fourth Five-Year Plan (1994-1998): January 1993

DOE released the fiscal years 1994-1998 five-year plan in mid-January 1993. The plan was several months late and reflected the uncertainty felt throughout the Federal Government as the Bush administration prepared to give way to the Clinton administration. For example, the plan called for $6.1 billion in fiscal year 1994, less than that proposed in the final Bush budget projection. The plan was late, according to DOE, because of cost reviews, interagency reviews, and "other unforeseen events." While DOE "has worked hard to meet the intent of Congress," the plan's authors conceded that the requirements mandated in the December 1991 National Defense Authorization Act for fiscal years 1992 and 1993 had not all been met.[343]

Slightly shorter than its predecessor though issued in two volumes like a big-city telephone book, the plan included features familiar to readers of earlier versions. In addition, the fourth five-year plan's authors identified five critical issues and trends affecting the EM program: changing DOE mission, safeguards and security, land-use planning, contingency fund, and legal and regulatory climate. The five were interrelated.

The "changing DOE mission" was roughly synonymous with facilities transition. A significantly reduced defense mission resulting from the end of the Cold War meant less waste production and the eventual transfer of over 1,000 Defense Programs facilities to EM custody as cleanup sites. For example, when Watkins announced the decision to phase out reprocessing of spent nuclear fuel on April 29, 1992, the result was less high-level waste production but the need to study issues associated with deactivation, decontamination, and final disposition of facilities by EM. Responding to this need, EM established the Office of Facility Transition on August 17, 1992. Headed by Willis Bixby, EM-6 was responsible for the "entire transition effort," which included working with local communities to identify alternate uses for former defense sites and to decommission those with no further use.[344]

As EM took over transition and landlord responsibilities at numerous sites, safeguards and security became significant considerations, particularly since landlords typically were responsible for control of special nuclear material. The plan's authors noted that EM's approach, being tested at Hanford, was to concentrate classified material in specific areas so that decontamination and remediation work using uncleared personnel could take place elsewhere. Fewer cleared personnel and a smaller protective force meant potential cost savings.

DOE's changing mission was linked with land-use planning, which in turn was linked with reconfiguration. A smaller, reconfigured nuclear weapon complex meant that structures would either be converted to other uses or dismantled and that large amounts of land might be available for alternative uses. The plan's authors stated that the Nuclear Weapons Complex Reconfiguration PEIS and the EM PEIS would incorporate land-use considerations at both the complexwide and local levels to determine future site use. This process would include balancing the redefined weapon production mission with treatment, storage, and disposal of production and cleanup waste. As the plan's authors noted, demographic

considerations would be important in future land-use decisions. When Rocky Flats was built in 1952, for example, the location was considered remote. Now it was nearly contiguous with the Denver suburbs.

Discussion of the contingency fund focused on the uncertainty of EM activities that necessitated more budgetary flexibility than that provided in the current federal system. Traditional annual funding and cumbersome reprogramming requirements made it difficult for EM to respond to unexpected developments during site characterization and cleanup, when initial cost estimates almost invariably proved insufficient because more contamination was found than was originally anticipated. The plan's authors noted that an EM task force continued to study the contingency fund issue, fulfilling a congressional requirement contained in the 1991 National Defense Authorization Act.

The 1994-1998 five-year plan contained a six-page list of DOE's regulatory agreements. By mid-1992, DOE was party to eighty-seven regulatory agreements with EPA and state governments, all quite specific and varying from site to site.[345] Sixty-two percent of EM's budget was "compliance driven." Combined with 24 percent required for DOE ES&H activities, only 14 remained for other activities. Technology development, counted on to cut remediation costs and thus critical to DOE's strategy for achieving regulatory compliance, was not compliance driven and constantly had to fight to protect its budget. For example, Duffy was unable to meet his goal of devoting 10 percent of EM's budget to technology development; the level hovered nearer 6 or 7 percent throughout his tenure.

Changing the Culture

At the December 1992 meeting of the State and Tribal Government Working Group held to review the latest draft of the 1994-1998 five-year plan, commentors touched on EM's (and DOE's) credibility problem when they expressed concern that the culture change identified with the Watkins administration received such little attention in the draft. Noting that the change from a closed, top secret culture to one of openness and accountability had been emphasized in earlier five-year plans, commentors also voiced their feeling that DOE Field Offices and sites had not fully demonstrated their commitment to the new culture.

The plan's authors argued that changing the culture of a large and complex organization was a lengthy process and that "a great deal of progress has been made" in providing public input to DOE activities, "though there is still work to be done in this regard." Noting EM's attempts to increase public involvement, the authors stated that "the entire EM organization reflects DOE's ongoing efforts to instill this culture change throughout the weapons complex." In his comments to STGWG on December 17, 1992, Duffy maintained that "DOE and EM still have a credibility problem, but it isn't as great a problem as when the Office was formed in 1989. DOE's credibility," Duffy believed, "is improving."[346]

Environmentalists consistently rated Watkins and the Department higher on talk than on achievements in the report cards they issued between 1989 and 1993. For example, the Military Production Network's December 1992 report—"Rhetoric vs. Reality, Admiral James D. Watkins at the Helm"—gave Watkins little credit for the "de facto shutdown of the bomb manufacturing plants," arguing that grassroots opposition and congressional and media scrutiny preceded DOE's "belated recognition of a transformed geopolitical landscape." The report also blasted Watkins for nominating Stello in 1989 and for opposing, "despite overwhelming, bipartisan congressional support," passage of the Federal Facilities

Compliance Act. As for DOE's new culture, the environmental coalition concluded that "while DOE may be more sensitive to problems, the old culture still thrives" at the facility level.[347]

In an interview shortly before he left office in January 1993, Watkins disagreed with his critics and gave DOE a grade of B-minus, maintaining that the Department's performance was better than its reputation. Watkins believed that while he had interited an "abyss of mismanagement and incompetence" in 1989, the situation had improved and that Secretary-designate Hazel O'Leary would be taking over "a department that is one of the finest in all of government." Admitting that serious challenges remained, Watkins nonetheless thought that the Department was on the right path and had "come a long way towards understanding the magnitude of the environmental restoration and waste management tasks ahead of it."[348]

DOE's EM Task: January 1993

As the executive summary to the 1994-1998 five-year plan made clear, DOE and the EM program faced major challenges on the eve of the Clinton administration. The Department owned a nationwide complex of approximately 4,000 contaminated sites comprising tens of thousands of contaminated acres at thirty facilities located in vastly different climatic and geological areas and regulatory jurisdictions. The weapons complex contained 250,000 cubic meters of transuranic waste, millions of cubic meters of low-level radioactive waste, and thousands of buildings/facilities awaiting decontamination, decommission, and dismantling. The December 1992 National Compliance Plan draft strategy noted that DOE generated 52,000 cubic meters of mixed waste each year, not including substantial amounts that would result from future cleanup efforts. Stored and generated wastes represented 700 separate waste streams, many solvents mixed with radioactive components for which there were no current cost-effective treatments. A 1992 manpower needs assessment concluded that DOE would need as many as 25,000 scientists, engineers, and technicians over the next five years.[349]

Complicating the situation was that during the past decade, and mostly within the previous four years, DOE had negotiated regulatory agreements defining scope and schedule but not budget. During site characterization, the scope of work frequently increased. This required renegotiation with EPA and states, both of which resisted changing schedules and threatened to impose penalties. Barring some combination of technological breakthroughs, agreed-upon cleanup standards (how clean is clean), and politically acceptable land-use decisions, DOE would not be able to meet its regulatory obligations under any credible funding scenario, a situation made even more critical because of the large number of Records of Decision that would be issued in the mid-1990s determining remediation technologies for volatile organic chemicals in and soils. According to some, renegotiation also would be politically ticklish, as it would raise doubts about DOE's judgment and intent and rekindle arguments from various parties that would call for another approach to cleanup of the weapons complex.[350]

Duffy's Final Report

On January 15, 1993, Duffy provided his perspective on near-term issues facing EM in a two-page memorandum to Robert Hanfling, O'Leary's transition chief. Several items dealt with the recently enacted Federal Facilities Compliance Act, including the need to develop site-specific plans for managing and treating mixed waste. Duffy listed the Hanford tanks,

Idaho's Pit 9 demonstration project, Savannah River's Defense Waste Processing Facility, and Hanford's Waste Vitrification Plant as the technical activities most in need of attention. He also included the need to continue negotiations with states and EPA on enforceable cleanup and compliance agreements and to make progress on EM's Programmatic Environmental Impact Statement. Duffy also identified near-term management/policy issues. These included development of the next five-year plan, conversion of Rocky Flats from a Defense Programs site to an EM site, review of ERMC's performance, implementation of new cost-control procedures to contain contractor costs, adjustment of field staffing levels, evaluation of DOE's negotiation policy on compliance agreements and agreements-in-principle, and comparison of compliance and cleanup funding requirements with OMB funding targets.[351] □

Part X: Change of Leadership: 1993

O'Leary Appointed Secretary

On November 3, 1992, Bill Clinton was elected President of the United States. In his first post-election press conference, the President-elect stated that the Department of Energy would play a major role in efforts to stimulate the Nation's economy and create jobs. Clinton told reporters that the secretaries of energy and commerce would be key players in implementing the economic changes he had outlined during the campaign and that the performance of these "very major appointments" would "affect the success or failure of this administration's economic efforts.". According to a Clinton adviser, "the economy is job one," and "energy will be part and parcel of economic policy."[352]

If secretary of energy was a critical cabinet slot for Clinton, his ultimate choice to fill the position was perhaps the biggest surprise of the cabinet selection process. Clinton's goal was to put together a diversified cabinet composed of "team players" with whom he felt "personal compatibility." Those mentioned for the energy job early on included Texas Land Commissioner Gary Mauro, Representative Philip Sharp (D-Indiana), and Jessica Matthews of the World Resources Institute, but by early December Senator Timothy Wirth (D-Colorado) emerged as the clear frontrunner. Wirth had considerable experience in both energy and environmental issues, had campaigned hard for the Clinton-Gore ticket, and was a close friend of the vice-president elect. But many Republicans opposed Wirth as too "green," while several powerful Democrats, including Senator J. Bennett Johnston (D-Louisiana), also contributed to "back-channel" criticism that gradually convinced Clinton to look further for an energy secretary.

On December 21, Clinton announced that he would nominate Hazel Rollins O'Leary as secretary of energy. O'Leary had been on no one's early short or long list for the position, and she had not even met the president-elect until he invited her to Little Rock to meet with him on December 18. As a black woman, O'Leary helped Clinton fulfill his commitment to diversity, but the secretary-designate had impressive energy credentials gained over a twenty-year period, beginning with the Federal Energy Administration in 1974. O'Leary was present at the creation of the Department of Energy in October 1977 and served in the Economic Regulatory Administration, becoming Administrator in 1980. From 1981 to 1989, O'Leary worked with the energy consulting firm founded by her late husband John F. O'Leary, who served as deputy secretary of energy during the Carter administration. In 1989, she joined Northern States Power Company of Minneapolis, Minnesota, and became senior vice president of corporate affairs in charge of environmental issues, the legal and personnel departments, and public relations. O'Leary held numerous board memberships and was a Keystone Center trustee.[353]

As he explained when he announced his intention to nominate her on December 21, 1992, Clinton looked to O'Leary to redirect DOE's priorities from an overemphasis on nuclear issues to a concentration on natural gas, efficiency, alternative resources, and the development of energy policies compatible with the administration's environmental and economic goals. The President-elect maintained that O'Leary had the "best mix" of business and government experience among available candidates and that she would reinvigorate DOE, which had been "sorely underutilized" and suffered from "little credibility out here in the heartland."[354]

Reaction to O'Leary

O'Leary's appointment received mixed reviews from environmental and oversight groups. Some expressed disappointment with her lack of experience regarding weapons complex and cleanup issues, which, according to Daryl Kimball of Physicians for Social Responsibility, "is about two-thirds of DOE." One environmental group feared that O'Leary's inexperience could lead to her "getting rolled" by DOE's contractors. The Safe Energy Communications Council, a coalition of environmental groups, was more optimistic given O'Leary's energy expertise and apparent commitment to energy efficiency and renewables, though the coalition was cautious because of the nominee's "past support of [Northern States Power's] position favoring nuclear power."[355]

Trade groups and journals generally supported O'Leary. The Interstate Natural Gas Association of America declared her to be "extremely capable," while the American Gas Association was "pleased and proud" to see an executive from a member company nominated as energy secretary. The *Oil and Gas Journal* observed that O'Leary had more energy experience than any past secretary and would reflect Clinton's "proconsumer, proconservation plans" for the Department. The nuclear industry, according to *Nucleonics Week*, was a bit more wary and viewed O'Leary as a "mixed blessing." While she had "first-hand knowledge" about nuclear operations and high-level waste issues, she clearly supported Clinton's agenda that placed greater emphasis on energy conservation, renewables, and natural gas than on nuclear power.[356]

O'Leary Confirmed

Unlike some of Clinton's other cabinet nominees, O'Leary experienced little difficulty in the confirmation process, receiving a generally friendly reception from J. Bennett Johnston's Senate Committee on Energy and Natural Resources on January 19 and gaining full Senate confirmation on January 21. During her hearing, O'Leary stressed the need for change at the Department of Energy and stated that her goals for DOE were "very simple . . . [but] difficult to undertake: To maximize all energy conservation and efficiency and alternative energy use; to provide flexibility in response to crises through adequate and reliable supply of traditional energy sources."[357]

O'Leary stated that her management philosophy was one of "practical idealism" and pledged that she would build upon her predecessor's work to restore DOE's credibility, which "could stand lots of improvement." O'Leary believed that her years of work with the Keystone Center demonstrated the value of a consensus style of management, of dealing with contentious issues by "bring[ing] all people to the table to try and resolve issues. . .. All stakeholders," she believed, "have really got to be heard . . ., and we have got to attempt to try to reach accomodation with each other."[358]

DOE and the Clinton Economic Plan

During February and March, O'Leary joined other senior administration officials in lobbying for Clinton's economic plan, which the president outlined in his State of the Union address on February 17. In particular, O'Leary promoted the president's BTU energy tax proposal that ultimately failed to survive tough congressional and interest group opposition. Regarding DOE specifically, O'Leary noted that under Clinton's plan increased funding would be devoted to conservation and renewable energy research, though the Department's overall

budget would decline during the 1994-1998 period by over $8 billion. Most cuts would come from reductions in defense-related programs, a trend begun in the administration's proposed fiscal year 1994 DOE budget with defense programs funding dropping from $5.7 to $4.5 billion. The Department's Environmental Restoration and Waste Management program, with a budget request of $6.5 billion, was now DOE's largest program.[359]

O'Leary Reorganizes DOE

On April 2, 1993, Secretary O'Leary announced a major restructuring of the Department of Energy consistent with her philosophy that a "flatter" organization would be more rational and easier to understand than the "mess" she inherited, a situation she believed had changed little since the Carter administration. The reorganization divided the Department into three mission teams: energy, weapons and waste cleanup, and science and technology. Nuclear Energy lost assistant secretary status, while the Defense Programs and Environmental Restoration and Waste Management team accounted for well over half of the Department's resources. O'Leary placed crosscutting functions under the Office of the Secretary and made it clear that she intended to delegate more authority to the field, reversing a trend toward headquarters consolidation that many identified with the Watkins era.[360]

As a strong advocate of reinventing government, O'Leary stressed not only structural change but "revitalization" of DOE's "work culture" to make it more accountable and cost-effective. She spoke of DOE's "customers" and "stakeholders," and she emphasized diversity, "a new spirit of inclusiveness, communication, and openness" to give employees "a sense of mission . . . and pride." O'Leary brought management guru Stephen Covey to Washington to address her senior staff and arranged for a "who's who" of DOE managers to attend quality training at Motorola/Milliken Quality Institute. The Secretary strongly endorsed strategic planning and total quality management, and DOE employees grew increasingly familiar with a vocabulary that included quality, customer service, empowerment, teamwork, core values, mission, and vision.

O'Leary also met with oversight groups that previously had little access to senior DOE officials. She initiated the "Green Team," bringing together public affairs representatives from agencies involved with natural resource and environmental issues to "coordinate the Administration's public outreach efforts."[361]

O'Leary's reorganization placed the Office of Nuclear Safety, which had reported directly to the secretary, in the Office of Environment, Safety, and Health. O'Leary believed that "one coalesced group" should work on safety issues, "not a series of people checking each other . . .. My style of management is, we need to be each other's junkyard dogs" on safety. This move brought criticism from Watkins, who, in a letter to John M. Spratt, Jr. (D-South Carolina) of the House Armed Services Committee in late April, wrote, "I sense the department is regressing to the very philosophy that created the mess we found in the late 1980s," that "what may be occurring is counterpressure on top management by the still unconverted 'old guard'. . . to revert to their old way of doing business, i.e., trust the contractors" and avoid both line management responsibility and independent internal oversight.[362]

New EM Leadership

At the time O'Leary announced DOE's restructuring on April 2, 1993, the Department was operating with none of the eight assistant secretaries in place. Nor did DOE have a deputy secretary or under secretary. Between the Clinton administration's difficulties in satisfying the pent-up demand of Democrats for positions and negotiations between the White House and cabinet officers over specific nominees, many senior jobs in the federal government were unfilled. The energy secretary, operating with a considerably smaller staff than her predecessor, was relying on a cadre of special assistants and DOE's senior careerists for day-to-day program management.

The situation in EM followed this pattern. Paul Grimm, a career federal employee who had been principal deputy, was Acting Assistant Secretary for EM and had been since Leo Duffy, along with most senior DOE appointees, left at noon on January 20. Duffy's departure ended speculation that he might remain at DOE until a successor was named or even be asked to stay on by the Clinton administration. Rumors regarding Duffy's successor had had little time to circulate when, on March 20, President Clinton announced his intention to nominate Thomas P. Grumbly to the position.

Grumbly was on the DOE transition team. A transition team update issued by outgoing Deputy Secretary Linda Stuntz on December 14, 1992, listed Grumbly along with Gus Speth, President of World Resources Institute and head of Clinton's natural resources cluster; Doug Costle, EPA administrator during the Carter administration and a Keystone Center trustee; Dan Silver, an expert on Hanford environmental issues who had served under Washington Governor Booth Gardner; Sidney Drell, who had headed a House Armed Services Committee panel that wrote a report on nuclear stockpile safety; Michael Woo, a staffer on John Dingell's House Energy and Commerce Committee; Karl Hausker, a staffer on Bennett Johnston's Senate Committee on Energy and Natural Resources; Jim Hoecker, a lawyer who was a Clinton energy advisor during the presidential campaign; William Massey, a friend of White House Chief of Staff Mac McClarty; Bernice McIntyre, a Georgetown University law professor; Ellyn Weiss, a consultant with Arthur Little; Dan Reicher, a senior attorney with the Natural Resources Defense Council; and others. For the most part, the transition team had strong environmentalist credentials.[363]

Grumbly had extensive experience in both the public and private sectors. Following a brief stint as a management analyst with the Department of Justice, he was a budget examiner for OMB from 1975-1977 and an executive assistant and then Deputy Administrator at the Department of Agriculture from 1977-1981. During 1981-1982, he was staff director for the Subcommittee on Investigations and Oversight of the House Science and Technology Committee, chaired by then-Representative Albert Gore, Jr., with whom Grumbly became close. From 1982-1984 Grumbly worked with an environmental and health consulting firm in Boston, then directed the Health Effects Institute in Cambridge, Massachusetts from 1984-1987. Since 1987, Grumbly had been head of Clean Sites, Inc., a non-profit organization of industrialists, environmental groups, and former government officials formed to develop solutions to the nation's hazardous waste problem through site management, dispute resolution, and policy analysis.[364]

Grumbly Hearings and Confirmation

As extensive as his experience was, Grumbly did not have the near-encyclopedic technical expertise of his predecessor, a fact he addressed during his Senate hearings on May 4 before the Energy and Natural Resources Committee and on May 13 before the Armed Services Committee. Grumbly stressed instead his understanding of hazardous waste problems, the ability to run large projects and meet a payroll, the ability to work with all sides to get sites cleaned up, and Congressional and Executive experience that taught him how large institutions behaved. Joking that Washington insiders considered the position a "prune" and that colleagues expressed their "condolences" on hearing of his nomination, Grumbly stressed the challenge of meeting the "arduous" task of "grappling with the environmental consequences of defending our nation over the last five decades . . .." Thanking his predecessor for establishing a foundation on which to build, Grumbly maintained that "the job now is to shape a program that will withstand the pressures of the long haul."[365]

Arguing that there was reason to be optimistic about the program's future, Grumbly listed five priorities that required immediate attention, beginning with addressing the "truly urgent risks" in the system. These ranged from the high-level waste tanks at Hanford to worker safety and health issues throughout the complex. Grumbly's second priority was to improve EM's management and financial practices, "the linchpin upon which everything else must be based." Better cost estimates would improve EM's ability to manage its contractors, as would decentralizing decision making and placing enough management and technical staff in field offices that DOE would be "at least the equals of our contractors."

Singling out the Superfund program's "analysis paralysis," "in which the country studied more than it acted," Grumbly argued that the EM program must be more "outcome-oriented." Working with academic and health communities to gain credibility, EM must identify the risks at DOE facilities and show progress "in the near-term," progress obvious to the public. Grumbly's fourth priority was to bring more focus to EM's technology development program, counted on to develop solutions to major problems like mixed waste treatment. Grumbly's fifth priority, developing a stronger partnership with DOE's stakeholders, was consistent with Secretary O'Leary's goal of improving the Department's credibility with its various "publics." From an EM perspective, Grumbly argued that the only way to meet requirements of regulatory agreements in a time of budgetary constraints was to "reach out to regulators and stakeholders," and he acknowledged the difficulty of this task "in light of substantial public distrust of DOE, born of decades of secrecy in the weapons complex." To gain public confidence, Grumbly testified, "it is important to reach out and permit the public to participate in our decisionmaking processes for very pragmatic reasons; if we do not, we have no hope of squaring our commitments with our resources." Grumbly concluded that his five priorities constituted a large but "manageable agenda."[366]

Grumbly received Senate confirmation on May 20, 1993, and was sworn into office on May 27, by which time Acting Assistant Secretary Paul Grimm had presented EM's fiscal year 1994 budget request to several Congressional committees, most recently to the Senate Committee on Armed Services on May 19. Grimm's presentation hewed closely to the O'Leary-Grumbly line and began by setting forth priorities identical to those Grumbly articulated in his hearings earlier in the month. Grimm then itemized the president's budget request, which was up 18 percent from the 1993 appropriation. The request included $3.1 billion for waste management, $1.9 billion for environmental restoration, $.7 billion for facility transition, $.4 billion for technology development, and $.3 billion for uranium decontamination and

decommission. With a budget of $6.5 billion, Assistant Secretary Grumbly was taking over the largest environmental program of its kind in the world, one that had spent over $15 billion since its inception in 1989.[367]

EM Headquarters Staffing Review

During the fiscal year 1994 budget revision process, EM requested 1,125 additional FTEs. Given President Clinton's mandate in Executive Order 12939, "Reduction of 100,000 Federal Positions," to streamline the federal work force and OMB guidance directing DOE to reduce its twenty thousand plus federal work force by several hundred each year for several years, the likelihood of EM achieving its goal was remote. To assess EM's staffing needs in the broader context of DOE's organizational goals, the Office of the Secretary asked the Office of Administration and Management to conduct a review of EM at headquarters and in the field. The brief and intensive headquarters review took place during late March and early April 1993 and provided Grumbly with conclusions and recommendations to consider as he began his tenure.

The review team concluded that EM's headquarters staff was talented and highly-motivated, despite poor working conditions and hectic schedules that required significant overtime. The team reported considerable staff frustration with EM's highly-centralized management approach and suggested that greater delegation of authority should be considered, noted the need for more integrated planning and policy development, and concluded that there should be more active management of support contractors. Interviews with EM managers also revealed criticism of the firefighting management style of the previous administration that featured "crisis du jour" decision making. The review team recommended the formulation of a priority-setting process and reported that managers believed that a major priority should be renegotiations of compliance agreements that were driving the EM program. These renegotiations should actively seek stakeholder involvement and include headquarters oversight and guidance to ensure that individual site agreements fit into a national plan. Other recommendations included decentralization of management responsibilities consistent with the Secretary's philosophy, integrating technology development decision making, clarifying responsibilities within headquarters and between headquarters and the field, and seeking ways to consolidate similar functions to achieve savings.[368]

Defining the Mission

During his first months in office, Grumbly presented his view of EM's mission in forums as varied as Capitol Hill hearing rooms, the auditorium of DOE's Germantown, Maryland, facility and numerous DOE field locations. In addition to reiterating the five priorities he laid out in his nomination testimony in May, Grumbly added a sixth—establishing a cost baseline to estimate EM's "mortgage," or its cumulative long-term cost. Grumbly believed that DOE must "[diverge] from the limited five-year snapshots of the past" and owed it to Congress and the public to "paint an accurate picture of program costs on a site-by-site basis."[369]

Grumbly summarized his views on the EM program in an appearance before Senator J. Bennett Johnston's Energy and Natural Resources Committee on July 29, 1993. In his prepared statement, Grumbly referred to EM's "unprecedented challenges" and "the troubled legacy we inherit—in the soil, in the water, in the air, and, all too often, in people's hearts."

Grumbly promised senators that DOE would develop a better understanding of health and environmental risks at its facilities, outlined cost and budgeting initiatives consistent with recommendations contained in an April 1991 GAO report, and pledged that DOE would retrain displaced workers and "mitigate negative economic impacts" during the transition from production to cleanup at DOE facilities. He also discussed improvements in contractor accountability and stated that implementation of the ERMC concept at Fernald showed "promise."

Long-Term Strategy

Grumbly's prepared statement laid out a long-term strategy for cleaning up DOE facilities, a "multi-phase approach" that was risk-based and that would be designed with full stakeholder participation. Rather than following "the old paradigm" of cleanup that mechanically progressed from "discovery to investigation to remedial construction," Grumbly advocated applying "interim remedies" to slow or halt migration of contamination in situations that could not wait until a perfect remedy was available. Situations posing less risk would be stabilized while long-term remedies were developed, thus providing focus to the technology development program. This approach, Grumbly argued, would "avoid the temptation to throw money at problems that do not present any exposure risk merely to appear to be 'doing something.'"

The Assistant Secretary noted that the Office of Technology Assessment and private contractors with extensive Superfund experience supported this "action-oriented approach," as did EPA and the Defense Department. All agreed that public participation in decision making was critical to the success of this approach, Grumbly noted, because understandable public concern that interim solutions would become de facto permanent remedies otherwise would lead to organized opposition to federal initiatives.

The strategy Grumbly outlined needed "three critical tools" to make long-term progress: cleanup standards, land use policy, and new technologies. The EM program's "biggest uncertainty," according to Grumbly, was that there were no standards for residual radioactivity at DOE sites. The absence of such standards made it impossible to estimate costs, design remedies, or choose appropriate technologies. Given DOE's low credibility resulting from "the legacy of a half century of DOE self-regulation," Grumbly argued, only standards worked out with stakeholders and Congress would be acceptable.

Another barrier to faster cleanup was the absence of a land use policy. Until decisions were made on future land use, it would be impossible to establish cleanup levels. The implicit assumption that many sites would be released for unrestricted use, Grumbly argued, stopped remedial actions in the study phase "because no technology exists to meet unrestricted use standards."

The third critical tool was effective cleanup technologies. Grumbly noted efforts taking place at national laboratories to develop new technologies, and he stated his intention to provide more incentives for DOE sites to use innovative technologies. He also pointed to DOE's designated lead role on the DO-IT Committee, the cooperative technology development initiative between DOE, other federal agencies, and western states.

Grumbly's testimony included a description of the role of the Office of Facility Transition and Management, which Duffy set up in August 1992 to provide surplus defense and energy research facilities with landlord and decontamination and decommission (D&D) services.

Grumbly told senators that the office would coordinate D&D activities for the approximately 3,000 contaminated facilities in DOE's property inventory and cooperate with local communities in evaluating possible alternative uses and economic opportunities of surplus properties.[370]

Grumbly concluded with a discussion of the status of the 177 Hanford tanks, which contained 61 million gallons of mixed liquid high-level radioactive waste. Grumbly noted that in March 1993, DOE, with the agreement of the Washington Department of Ecology and the EPA, finished a fifteen-month rebaselining study of the Hanford tank farm program. The study proposed a new technical strategy to remediate tank waste that would also resolve critical safety issues identified in a DOE Red Team review in July 1992 and in several OSHA inspections. The Department, Grumbly informed senators, working with Washington State and the EPA, "is engaged in a 6-month negotiation and public involvement effort to determine how best to modify the Tri-Party Agreement." In the interim, Grumbly promised that the tanks would remain a high priority and reported that DOE was working with the Defense Nuclear Facilities Safety Board to design a new safety program.[371]

Renegotiating Agreements

Grumbly's comment that modifications to the Hanford Tri-Party Agreement were being negotiated was significant. Earlier in his July 29 statement, Grumbly had suggested that DOE needed to take a hard look at the many environmental compliance agreements it had signed, "agreements [that] establish timetables for conducting environmental activities." Grumbly stated that DOE took the agreements seriously and had entered into them in good faith. Since they had been signed, however, investigations had revealed that some cleanups could be accelerated, while in other cases they had revealed that "the problem is larger, more complex, or simply different than we had originally expected." Some situations lent themselves to an interim strategy of stabilizing while developing solutions. "We developed existing agreements based on the best information available at the time," Grumbly argued, "and we can renegotiate them, within the terms of the agreements, if good cause can be shown." Grumbly concluded that the "states and EPA are likely to be willing participants in such renegotiations only if we demonstrate our credibility and commitment to cleanup."[372]

Grumbly's views on renegotiating agreements echoed those he made several weeks earlier in remarks before the Idaho Conference on Technology and Economic Growth in Idaho Falls. On July 7, 1993, before an audience that included Governor Cecil Andrus, Idaho's U.S. Senators Dirk Kempthorne (R) and Larry Craig (R), Idaho Operations Office Manager Augie Pitrolo, Beatrice Brailsford of he Snake River Alliance, representatives of the Shoshone-Bannock Tribes, and business and academic leaders, Grumbly noted that Congress might not provide sufficient funding for EM to fulfill its regulatory requirements. As an example, Grumbly pointed out that Congress had cut $280 million from EM's fiscal year 1994 request. In light of the "fierce competition" for funds in a time of federal deficits, Grumbly noted, there could be a "fiscal train wreck soon." If "meaningful environmental results" were not forthcoming, Grumbly warned, "Congress and taxpayers will lose their patience and we will all deservedly lose their support. In the words of Benjamin Franklin, 'we must all hang together, or most assuredly, we shall all hang separately.'"[373]

Alice in Wonderland (Writ Large)

Chairman Johnston's opening statement at the July 29 hearing expressed both his frustrations and expectations concerning the lack of progress in the cleanup of the weapons complex. Johnston stated that Congress remained committed to cleaning up DOE sites but could not continue "to just shovel billions of dollars into this program" for "paper pushing." Johnston wanted to see results—"the frightening thing is, nothing has been cleaned up yet." Johnston argued that four areas needed immediate attention for EM to move forward: project management, particularly improved DOE oversight of contractors; technology development; standard setting (how clean is clean); and priority setting based on health risks rather than total reliance on compliance agreements that produced, in Johnston's words, "the race to the courthouse."[374]

Johnston summarized the current EM dilemma in blunt terms. "To say that the program has been mismanaged in past years," Johnston alleged, "is a vast understatement. I mean, these compliance agreements that have been signed which are unrealistic, which cannot be complied with, which have schedules which cannot be met, and which all call for simultaneous expenditure of billions of dollars that we do not have, with the management teams that are not in place, with management personnel that we do not have, and with no priorities set, is just incredible policy." Even if there were standards and technologies and management personnel, Johnston continued, "there is no way to get enough money to do it all simultaneously." But the Federal Facilities Compliance Act, which Johnston had opposed, meant that DOE facilities could be fined "for things it cannot possibly comply with because it sets no standards for itself. And as yet, in some instances there are no technologies. Now," Johnston concluded, "if that sounds like Alice in Wonderland, it is Alice in Wonderland writ large in billions of dollars."[375]

Listening to the Senate

Grumbly and his co-panelist, EPA Deputy Administrator Robert Sussman, answered questions and listened as several senators explained their major concerns. Ben Nighthorse Campbell (D-Colorado) accused the federal government of dragging its feet on environmental compliance issues and promised to closely monitor environmental restoration and waste management activities to cut down on "waste, neglect, inefficiency and corruption. These practices must stop," Campbell warned. Larry Craig, after listening to Grumbly and Sussman praise the better working relationship between their two agencies, expressed his skepticism regarding interagency agreements. Craig stressed that previous interagency agreements had brought "everything to a halt in certain areas because it did not result in agreements, it resulted in second guessing." Craig complained that bickering between DOE and EPA had caused business failures, and he asked Grumbly and Sussman to "back off" and avoid "second guessing" to arrive at sensible agreements. Craig also complained about unreasonable standards that had stranded rotting transuranic waste containers in Rocky Flats because WIPP was not open. The result was, Craig argued, that "the greatest risk to human life is not in New Mexico, it is in Colorado."[376]

Jeff Bingaman (D-New Mexico) asked Grumbly and Sussman to work toward a coordinated research and development strategy that would be more cost effective than current approaches and that would show concrete results. Harlan Mathews (D-Tennessee), appointed to fill Vice President Gore's seat, stated that he would support DOE and EPA

requests as long as they were based on science and not public opinion, a position that coincided with that of Johnston, who often complained about unrealistic cleanup standards. Mark Hatfield (R-Oregon) asked Grumbly a number of questions regarding the Hanford vitrification plant and on the status of Tri-Party negotiations. Hatfield too was encouraged by Grumbly's testimony, though he warned that "it is against an awfully big backdrop of frustration . . ." and $20 billion already spent on what Hatfield called the "toxic abyss." "At times," Hatfield remarked, "we do not know whether we are using a steam shovel or a hand shovel, but we have sure been doing a lot of shoveling as far as money from the Appropriations Committee."[377]

Robert Bennett (R-Utah) echoed Craig's argument that overregulation and unrealistic cleanup standards bankrupted firms and repeated several senators' complaints that standards appeared to be grounded more on expediency than good science. Pete Domenici (R-New Mexico) pressed Grumbly and Sussman on the WIPP test phase approved in the 1992 land withdrawal legislation. Domenici wanted assurances that DOE and EPA would stop talking, "hitting the tennis ball back and forth," and get on with the process.[378]

In response to a question from Johnston, Grumbly made it clear that he understood congressional frustration with the current cost-cleanup ratio. Grumbly argued that understandable distrust of DOE explained some of the poor coordination between DOE and EPA and state regulators, and he committed himself to improving the situation. Increased trust, Grumbly maintained, would create an environment conducive to reasonable renegotiations of current compliance agreements and reduce costs. Nonetheless, Grumbly admitted that "even in the 2 months that I have been in office I have sometimes heard things from various people and various regulatory authorities that sound like they live on some other planet than we do, and the tone goes like this: We negotiate an agreement. We get down to how it is going to be funded, and some folks want to say well, we do not care whether you have the money or not, you are still obligated to do it. And I said, well, I cannot agree to that. And they said well, why not? And I said because I have taken an oath of office that, among other things, does not let me get into violation of the Antideficiency Act."[379]

Chairman Johnston's final remarks emphasized that cleaning up federal facilities was too important to "contract out," though he admitted that it would be tricky to obtain enough DOE oversight positions within the current federal budget. Johnston promised to do what he could, and he encouraged Grumbly and Sussman to "tell us what you need from us. We do not have a carte blanche," Johnston continued, but since "this administration has high environmental credibility," the chances were "pretty high" that requests would be met. And Johnston strongly emphasized his hope that DOE and EPA would take a hard look at land use decisions and risk-based cleanup standards as soon as possible. Land use, Johnston concluded, "will drive technology, it will drive priorities, it will drive decisions, and it will certainly drive costs."[380]

Public Participation Initiatives

Secretary O'Leary and Assistant Secretary Grumbly consistently stressed the need to provide the public with meaningful input into DOE and EM decision making. Both believed that an aggressive campaign to involve stakeholders as partners in DOE's day-to-day business decisions was fundamental to improving the Department's credibility as it made the transition from production to cleanup. Both envisioned an open and accessible process that

would find stakeholders contributing to decisions on cleanup priorities, budgetary allocations, and land-use policies.[381]

For example, in a statement timed to coincide with the release of the interim Keystone report on April 20, 1993, DOE announced that it "strongly" endorsed the report's consensus recommendations for improving public participation in federal facility cleanup decisions. These included involving interested parties in setting priorities and allocating resources, establishing site-specific advisory boards, and extending efforts to disseminate information on cleanup activities.[382]

In an initiative announced on June 22, 1993, DOE invited stakeholders to help the Department identify ways to reduce the cost of cleaning up nuclear weapons sites. DOE asked federal agencies, Congress, states, tribes, industry, labor, and other interested groups to participate in a benchmarking study to find "potential areas for cost savings and strategies for achieving the savings." In his letter introducing the study's final report, Grumbly thanked those who had been involved for "excellent insights . . . and the manner in which the initiative was conducted." Grumbly called the report "a first, but significant, step," that would contribute to the program vision that "by the year 2000, DOE's Environmental Management Program will serve as the benchmark for all public management at the Federal level." Specifically, the study concluded that benchmarking would be cost-effective and yield results, that several EM programs would benefit from benchmarking, and that EM benchmarking efforts should operate systemwide and in the field.[383]

On July 30, 1993, EM hosted the first-ever WIPP stakeholders' meeting in Washington, D.C. In addition to Grumbly, Mark Frei (Director, Office of Waste Management Projects), and others from EM, attendees included congressional staffers, regulators, oversight and advocacy groups, New Mexico officials, and federal representatives. At the Environmental Restoration and Waste Management Advisory Committee's sixth meeting in Idaho Falls on September 22, 1993, Grumbly announced that he wanted to "elevate" the committee's status and have it serve as an executive level "board of directors" providing advice on a wide range of programmatic issues. He also remarked that EMAC could serve as an "umbrella" organization for DOE's pilot site-specific advisory boards, further increasing the committee's role in EM decision making.[384]

The Hanford Summit

The Hanford Summit, held in the Tri-Cities area September 13-15, 1993, provided further evidence of the Department's desire to improve relationships with its key constituencies. The meeting, co-hosted by DOE and the state of Washington, held sessions on public involvement, regulatory issues, training and education, technology transfer, and economic development and partnerships. O'Leary made so many promises at the end of the conference that former Washington Governor Dan Evans could only say "Wow." Among other things, O'Leary promised to declassify large amounts of DOE material, provide for more Indian involvement in site decisions, explore funding for public activities at Hanford, cooperate with the state to create a community-oriented Hanford advisory panel that "we will not seek to control," and push to transfer site lands to public use as soon as possible.

The summit generated favorable publicity and clearly impressed one key DOE constituent, Governor Mike Lowry, who called the event "historic." "The summit has more than met each and every one of our expectations," Lowry stated, and has made it "abundantly clear that it is a new day for the Department of Energy . . . in terms of openness and the involvement of

local people." "I am confident we are going to have real progress come out of this," he predicted.[385]

"60 Minutes" and DOE Response

On October 17, 1993, just two days after the Hanford Summit, CBS television's "60 Minutes" broadcast a story on DOE's performance in managing the nuclear weapons complex that served as a reminder that the Department's poor public image continued to make the agency an attractive target of investigative journalism. Lesley Stahl's report on cleanup of the weapons complex focused on DOE's contractor management practices and featured interviews with Leo Duffy; Victor Rezendes, GAO's Director of Energy and Science Issues; and Steve Richardson, DOE's Assistant Manager at Savannah River, who showed Stahl around the tank farms that stored the high-level liquid waste slated for treatment in the Defense Waste Processing Facility.

Rezendes told Stahl that DOE historically compensated contractors "for all costs incurred" and that currently the Department had no way of knowing whether or not contractor expenses were justified because it "doesn't have the information systems to know . . . and relies on the contractor for self-reporting." Responding to criticism that DOE paid Westinghouse bonuses despite cost overruns and missed deadlines at Savannah River, Richardson provided a lukewarm defense, characterizing the company's overall performance as "probably average to above average." Stahl reported Duffy's statement that while he was at DOE, "on an average cleanup project 35 percent of the money went right down a rat hole." Duffy pointed to the Rocky Flats solar ponds project as a prime example. Rezendes agreed, telling Stahl that many of the pondcrete blocks of solidified radioactive sludge from plutonium processing intended for burial at the Nevada Test Site were mixed improperly and began to crumble, turning a $27 million cleanup into one estimated to cost $180-200 million. As Stahl put it, "two hundred million dollars to clean up the mess they made trying to clean up the mess they made."[386]

Within thirty-six hours, the Department's Office of Public and Consumer Affairs circulated an internal memorandum that provided "factual responses" to the "60 Minutes" broadcast. The memorandum included information on DOE's contract reform initiatives, point-by-point rebuttals of "60 Minutes" allegations, a list of cleanup accomplishments, and a fact sheet on cleanup contracting at DOE sites (the last a joint effort of Defense Programs, EM, Human Resources, Procurement, and the Contract Reform Team). The talking points attacked Stahl's report as "dated" since it criticized practices of previous administrations and failed to "acknowledge the actions taken by Secretary Hazel O'Leary to fix this broken system since the Clinton Administration took office 10 months ago." Leo Duffy took his lumps. "Incredibly," according to the Department's briefing material, "'60 Minutes' allowed the person who previously supervised the cleanup to lay the blame for the Department's mismanagement at the feet of the employees who carried out his decisions." The DOE response to Duffy's rat hole comment pulled no punches: "He was in charge of clean-up at the time, so he had oversight responsibility and that included any rat holes he watched money go down."[387]

Contractor Issues

DOE's aggressive response to the critical and sometimes derisive "60 Minutes" broadcast stemmed directly from sensitivity within the Department on the issue of contractor management. Few arguments generated more unanimity among the Department's critics than that mismanagement of the weapons complex had bequeathed a legacy of public mistrust and environmental degradation. Contractor reform initiatives announced early in O'Leary's term recognized that DOE's credibility depended on improving contractor performance in an era of tight federal budgets and heightened public expectations regarding environmental health and safety.

At a May 21, 1993, cabinet meeting, President Clinton and Secretary O'Leary announced short-term contract management initiatives that included a one-year salary freeze (a savings of $1.5 billion over five years), reducing the use of support services contractors, increasing contractor accountability for civil penalties, controlling indirect costs, and improving DOE acquisition regulations. Appearing before John Dingell's House Subcommittee on Oversight and Investigations five days later, O'Leary announced the formation of a DOE-wide contract reform team directed by the Deputy Secretary that would perform "a top-to-bottom review of the Department's contracting mechanisms and practices . . .[and] explore the advantages and disadvantages of each and the appropriate circumstances for their use." O'Leary tasked the team to report on long-term contract reforms by the end of the year. Chairman Dingell and Secretary O'Leary agreed that a major challenge would be providing more and better DOE oversight of contractors at the same time that the administration was trying to reduce the federal workforce. Dingell argued forcefully that cutting the level of DOE employees in contract managing and auditing would be "extremely counterproductive."[388]

Contracting: GAO and Reinventing Government

The day prior to O'Leary's appearance before Dingell's subcommittee, GAO briefed her and several members of her staff on the results of an assessment of DOE's organizational and management situation based primarily on 174 interviews with DOE managers both at headquarters and in the field. This was the first of several planned reports on DOE undertaken at GAO's initiative rather than, as usual, at congressional request. GAO's conclusions provided further evidence to those who believed that DOE and its predecessor agencies had done a poor job of managing its contractors, that, in fact, "contractors . . . dominate the Department's activities while they elude management and financial oversight." GAO recommended that O'Leary address DOE's poor internal communications and coordination, put in place management systems that would provide adequate contractor oversight, and tackle "DOE's most fundamental problem, . . . the lack of skilled staff in program and contracting oversight positions." During the briefing, O'Leary stated her agreement with the general thrust of GAO's recommendations, which were consistent with those made in a GAO High-Risk Series study on DOE published in December 1992 and presented to, among others, Secretary-designate O'Leary.[389]

Vice President Gore's reinventing government task force complemented O'Leary's contract initiatives. In mid-summer, science and technology team members worked through several drafts of position papers entitled "Make Contracts at DOE Field Facilities (GOCO's) More Outcome-Oriented" and "The Department of Energy Should Take Steps to Improve Environmental Contract Management" prior to Secretary O'Leary's meeting with the Vice

President to agree on final wording. EM's Robert Muller and Dan Reicher, a special assistant to the Secretary soon to be named her deputy chief of staff and counsellor, were DOE's points-of-contact for these issues.[390]

Contracting: The IPA Study

In July 1993, Grumbly ordered a task force to gather data for an initiative designed to save money and improve productivity on EM projects. In his July 28 memorandum to EM program offices, Grumbly stated that EM must "work together across program lines to find more efficient ways of doing business." Grumbly noted that he had promised to improve EM's management performance "in hearings before congressional committees and in other public statements." The task force spent several months conducting interviews at DOE facilities and compiling standardized data that Independent Project Analysis, Inc., the support contractor, plugged into its proprietary database containing information on hundreds of comparable government and industry environmental projects.

The IPA Project Performance Study, released on November 30, 1993, concluded that there was room for "considerable improvement" in EM's execution of environmental remediation and waste management projects. Noting that EM ranked below industry norms in all key measurements, IPA's analysts pointed out that DOE paid on the average 32 percent more than industry for similar work, that DOE's higher costs resulted primarily from management costs nearly four times those in the private sector and more than double those in other federal agencies, and that poor project definition led to cost overruns and delays.[391]

Calling the IPA study "the most compelling report I have seen since taking office," Grumbly stated that it was time to "draw the line" to get the cleanup under control and announced a two-day employee "stand-down" in January to focus on ways to lower costs and minimize project delays. Consistent with the planning philosophy that headquarters should decide "what" needed to be done and leave the "how" up to the sites, Grumbly wanted the two-day exercise to produce local action plans for making improvements across a range of program quality issues. In line with an IPA conclusion that DOE often used inappropriate contract strategies, Grumbly placed particular emphasis on identifying cost-effective contract mechanisms and stressed the need to increase the number and quality of DOE managers overseeing EM contracts. "Finding ways to lower costs and complete cleanup projects on time and on budget represents both a great challenge and a great opportunity for the environmental management program to make a lasting contribution to the nation," Grumbly maintained, and he committed EM to "improving our cost and schedule performance by 20 percent over the next two years in all key measures identified."[392]

ERMC, Fernald, and FERMCO

During 1993, debate over the Environmental Restoration Management Contractor concept continued as part of the larger debate over DOE contract management. With the Hanford ERMC contract still in dispute at the end of 1993, Fernald was the only DOE site using an ERMC for environmental work. Complicating the situation at Fernald was the necessity of reducing the contractor work force by about 500 workers to meet fiscal year 1994 funding levels. The responsibility for designing a work force restructuring plan rested with Robert DeGrasse, named by O'Leary to head the Task Force on Worker and Community Transition in April 1993. As DeGrasse noted in his October 21 memorandum to the Secretary attached to the

final Fernald restructuring plan to be submitted to Congress, problems with the unions arose because "the ERMC subcontracting approach is somewhat at odds with the section 3161 [of the fiscal year 1992 Defense Authorization Act] objective of providing preference to displaced workers to any new hiring on site." Unions claimed that hiring new workers for environmental restoration projects while longtime employees were being terminated rather than being retrained violated the collective bargaining agreement, and they filed unfair labor practice charges with the National Labor Relations Board and initiated legal action in Cincinnati's federal court. DeGrasse explained to the Secretary that the hiring preference issue was unresolved, but he recommended that the restructuring proceed while discussions with the unions and local stakeholders continued.[393]

The complicated situation at Fernald was the subject of a December 1, 1993, hearing before John Dingell's subcommittee. In his prepared statement, GAO's Victor Rezendes informed the committee that DOE had not fully implemented recommendations contained in GAO's August 1992 report. That report had criticized the absence of a plan to evaluate the ERMC approach and argued that success or failure of ERMC depended heavily on the quality and number of DOE oversight personnel. Rezendes noted that an evaluation plan was scheduled for completion in May 1994, but he pointed out that neither Hanford nor Fernald had enough DOE oversight staff and that "DOE has not prepared a plan for how it will acquire and train the needed staff." Rezendes also noted that the Defense Nuclear Facilities Safety Board had informed the Secretary on June 16, 1993, that DOE needed to improve its technical ability to manage the Fernald ERMC and that the Secretary's August 6, 1993, response to the board "promised that DOE would prepare an implementation plan for complying with the Board's oversight-enhancing recommendations."[394]

Grumbly's prepared statement provided a broad historical perspective on DOE's traditional reliance on cost-plus contracts and limited government oversight, an approach dating from the 1940s that "no longer adequately serves the public interest or the needs of our new mission of environmental restoration at the Department of Energy. Now the question is, 'What next?'" Grumbly then discussed the background of the transition from Westinghouse to FERMCO at Fernald in late 1992, presented the results of a preliminary review of FERMCO's first year, identified areas where both DOE and FERMCO could improve, and outlined future actions to resolve current problems. Grumbly's prepared statement ended with a description of contract reform initiatives that would benefit from lessons learned at Fernald and be consistent with the Clinton administration's goals. These initiatives—overhaul the project definition process, reform contract management, and change contracting strategies for EM projects—followed findings of the IPA study.[395]

Fernald and FERMCO: A Rocky Start

During his testimony summary, Grumbly characterized FERMCO's first year on the job as "a rocky start." Grumbly reported that FERMCO had improved relationships with EPA and Ohio EPA regulators and that some opportunities for cost savings had been identified. Grumbly then turned to the problems: unsystematic approach to operations safety, inadequate project baseline, thorny labor relations, unsafe workplace practices, and a weak occupational safety and health program. While admitting that DOE needed to clarify roles and responsibilities between DOE and FERMCO and that there was inadequate federal oversight staff, Grumbly took FERMCO to task for "failing to address some very serious matters such as worker health and safety ('systematically inadequate attention'), cost controls, and labor

relations." Grumbly stated that he hoped that FERMCO's performance improved, but he admitted that "we are growing increasingly impatient with the performance of FERMCO" and vowed to look for another Fernald contractor if the situation did not improve by the end of January 1994.[396]

Dingell's questions focused on FERMCO's project baseline and more broadly on the company's on-the-job attitude. When asked by Dingell if he agreed with FERMCO's Nick Kaufman that FERMCO had submitted an acceptable baseline, Grumbly stated that he did not agree, that "perhaps he is not using that word 'acceptable' in the same way that we are." Grumbly explained that DOE thought FERMCO's cost assumptions were faulty and had conveyed that opinion in an October 22, 1993, letter. When asked by Dingell to characterize FERMCO's written response, Grumbly said that he didn't "think it was a wise letter to send to a customer," and he noted that Kaufman later tried to withdraw the letter. Dingell also criticized FERMCO's health and safety plan, labelling it a "defensive document to deal with problems of potential litigation; am I correct?" Grumbly responded, "it is not very thoughtful." "I am not even sure there are a lot of Fortune 500 companies that would appreciate that kind of policy in health and safety these days," Grumbly offered. Dingell asked if Grumbly thought FERMCO had a "bad attitude" on this issue, and Grumbly responded that he thought "there needs to be an attitude adjustment with respect to the health and safety plan."[397]

A New Wind Blowing

Dingell did not blame FERMCO's mixed record at Fernald on Grumbly. In fact, Dingell commended Grumbly on his testimony, calling it "excellent," as demonstrating "a remarkable change of philosophy and orientation at DOE." After blaming the AEC's poor stewardship of the weapons complex for causing the "enormous problem sitting in your lap," Dingell promised committee support for O'Leary and Grumbly's initiatives "as long as you are proceeding in the direction that you have indicated." Dingell stated that "it appears that there is a new wind blowing and our job is going to be to keep that wind blowing and to keep it blowing in the right direction with the proper force and intensity so that when next we meet, or when we meet at the end of our careers, we will be able to say that we have done a good job and we have been able to turn things around." Grumbly returned Dingell's compliments in kind, thanking the congressman for his October 26, 1993, letter to OMB Director Leon Panetta supporting DOE's request for more EM employees, a request that if fully implemented would "double the number of feds who will have a role in this system in an attempt to take back control of this system."[398]

Full implementation was problematic given federal budget projections, a fact Dingell had in mind when he asked Grumbly if DOE would be able to fulfill the many compliance agreements currently in place. Grumbly answered that budget limits made the situation difficult and that, if DOE attempted to fully implement the seventy-plus agreements, the annual compliance cost would be $15 to 18 billion by the year 2000. Grumbly told Dingell that one way to lower costs was to improve DOE's performance, "to drive down the project management costs."[399]

Grumbly's understanding of the need for "fundamental structural change" in the way DOE wrote and managed contracts, and the fact that O'Leary had committed the Department to contract reform, clearly played well with Dingell. Grumbly's argument that contracts should be tailored to each site, that the Department should not wed itself to a single cleanup

contract mechanism like ERMC, also met with Dingell's approval. Grumbly also noted that DOE was moving to a more logical approach to contractor indemnification along the lines Dingell advocated when he forwarded a GAO report to the Secretary on September 3, 1993, entitled "DOE Management: Consistent Cleanup Indemnification Policy Is Needed." Grumbly was especially well-informed on this and related contracting issues since he was serving as the head of the indirect costs subcommittee on the Deputy Secretary's contract reform team. The Secretary's response to Dingell came on December 16 and expressed her "personal commitment to developing contracting policies and mechanisms which increase contractor accountability and responsibility" consistent with section 119 of the Superfund Amendments and Reauthorization Act of 1986. As General Counsel Robert Nordhaus noted in his memorandum to O'Leary, the SARA issue was "of particular concern to Mr. Dingell." Deputy Secretary Bill White's contract reform team, running slightly late, planned to release its report for public comment in late January 1994 after extensive internal review.[400]

Hanford: Reinvention Laboratory and Consensus on 200 Area

Speaking at the Weapons Complex Monitor's Hanford Facility Management Conference on August 11, 1993, Grumbly pointed out that Vice President Gore's National Performance Review had designated Hanford a Reinvention Laboratory. White House teams and internal DOE teams agreed that two critical EM issues lent themselves to reinvention principles and practices: land use planning and management of environmental restoration management contracts. Grumbly believed that DOE policies corresponded "very nicely" with those advanced by Gore's task force. "With our increasing emphasis on stakeholder involvement in our decisions and activities in particular," Grumbly argued, "we are already demonstrating a commitment to customer service." Noting that the challenge of being a Reinvention Laboratory put Hanford in the national spotlight, Grumbly stressed the need to turn potential for innovation into evidence; "we must not lose sight of the trials before us," he concluded.[401]

Significant progress in land use planning at Hanford came late in Duffy's tenure. In December 1992, the Hanford Future Site Uses Working Group produced its final report, entitled The Future for Hanford: Uses and Cleanup. The broad-based working group included "federal, state and local officials, environmental activists, academics and Indian tribes." The working group, which met nine times and held eight public open houses, turned a problem into an opportunity when it agreed that it made little sense to try to clean up the severely contaminated 200 Area where chemical separation processing had taken place but that the area could be used temporarily as a waste management site for 260 square miles of lightly contaminated property. The strategy of consolidating waste in the restricted 200 Area meant that 260 square miles could be remediated immediately and released for public use. The teams preparing position papers for Vice President Gore's National Performance Review noted that the working group "successfully piloted a site-wide land-use planning process at the Hanford Reservation."[402]

Hanford Tri-Party Agreement Revised

The original Hanford Tri-Party Agreement was signed in May 1989, early in the Watkins-Duffy era and prior to the establishment of EM as a separate DOE program office. Much had changed in the following four years, four years that must have seemed like a lifetime to many in the program. A new chapter in Hanford's history began on September 30, 1993,

when federal and state officials announced the successful completion of six months of negotiations that made major changes to the 1989 agreement. The tentative agreement placed greater emphasis on converting tank waste into solid form, included initiatives to protect the Columbia River and address urgent risks first, and projected cost savings of $1 billion resulting from DOE management reforms and EPA and Washington Ecology regulatory streamlining. Ten new cleanup projects promised to clean up contaminated soils and groundwater faster than scheduled in the 1989 agreement. Grumbly praised the new agreement, maintaining that it "gives us a better strategy for a safer, more cost effective cleanup of the tank wastes at Hanford [and] reflects a higher priority on dealing with urgent safety problems and will allow us to get the majority of the waste out of old, deteriorating tanks on a faster schedule." Grumbly noted that revisions factored in values and concerns expressed in numerous public meetings held between April and the end of September.

The new agreement outlined a significantly different strategy for treating tank waste, one designed in response to "widespread public concerns." The agreement delayed until 2002 construction of the long-planned vitrification facility to solidify high-activity waste from double-shell tanks that had caused such strife between DOE and Washington, with completion scheduled for 2009. Priority now would be placed on a facility to treat low-activity waste in single-shell tanks that constituted 90 percent of Hanford's hazardous and radioactive tank waste, with construction beginning in 1997. Responding to public input, DOE dropped plans to use a grout technology to convert the waste into a cement-like solid and switched to glassification, which, if nothing else, would make it easier to remove the waste from the site in the future.[403]

Grumbly's memorandum to O'Leary recommending release of the tentative agreement for public comment noted several sensitivities. Grumbly pointed out that, since DOE was relying on existing technology, the use of innovative technologies in the future required approval from regulators, who had little incentive to experiment when current methods worked—even if they were not cost effective. Grumbly stated that he hoped DOE could work with stakeholders to convince regulators to experiment with cost-cutting technologies when they became available. Grumbly also informed the Secretary that cost estimates exceeded budget targets and that milestones could only be met with "productivity gains and privatization (which unions find objectionable) and streamlining management processes to reduce overhead and unit cost." A third sensitivity was that there were problems with cleanup milestones. While schedules would be reevaluated over the next year, in the interim "we may be vulnerable to fines and stipulated penalties, but," Grumbly reported, "at least we are talking in a more collegial fashion about the need to work on the highest priority tasks first." Grumbly concluded by mentioning that the Nez Perce tribe had objected to their exclusion from the negotiating process and that the Yakima and Umatilla tribes might also complain.[404]

Changing the Political Equation in the Northwest

In May, shortly after Tri-Party negotiations began, a citizens task force formed to focus on tank farm issues. Chaired by Marshall Drummond, President of Eastern Washington University, the Tank Waste Task Force included a broad spectrum of stakeholders composed of "local and county governments, environmental and special interest groups, economic development and business interests, agriculture and labor groups, and members of the Washington and Oregon State Hanford Advisory Boards." The task force, which submitted a final report in September, made recommendations for future Hanford planning and provided

guidance to Tri-Party negotiators. According to Gerald Pollett, Executive Director of the Heart of America Northwest and a task force member, "we have carved out a new regional consensus about Hanford, and we have changed the political equation in the Northwest." Pollett praised the process, noting that "we are in agreement on a new cleanup approach that no one believed was possible."[405]

The forty-five-day public comment period for the renegotiated pact ended in early December 1993 without producing significant complications, and plans for signing the accord early in 1994 proceeded. On January 25, 1994, DOE, EPA, and Washington approved the new Hanford Tri-Party Agreement.

The Honeymoon's Over

During fall 1993, Grumbly's standard text began including references to the implications if EM failed to achieve results. For example, at the fifth annual Amelia Island forum on the weapons complex, Grumbly's September 30 presentation stressed the necessity of moving beyond recognition of the task facing EM to implementation. In the course of a frank talk that strongly endorsed Vice President Gore's reinventing government initiative, argued that the EM program needed to be decentralized ("we're not going to do any more stalinistic planning in this progam"), stated that it was "shameful" that so little progress had been made on defining risk, guaranteed that land use decisions would be acceptable to mainstream environmentalists and the business community, and discussed the need for setting priorities in a time of tight budgets (to avoid the fiscal train wreck), Grumbly concluded with a balance sheet of success and failure. Progress would demonstrate that tax dollars were being spent wisely, that DOE could do what it said it would do ("We can talk about credibility until we're blue in the face, but we won't have it until we get out there and deliver"), and that a risk-based approach to cleanup made sense. Failure would lead to budget cuts, which would in turn lead to less work getting done. Failure also would confirm the prevalent public view that DOE was inept and reduce vital local support for EM programs. The worst thing that would happen, according to Grumbly, was that failure would lead to "an emaciated research and development program." "Any time money's tight," Grumbly observed, "critics quickly attack R&D programs as 'just another pork barrel project.'" The result would be "an absolute disaster for our nation. It would be," Grumbly continued, "an opportunity lost not only to solve this problem, but to become the technological leaders for environmental development in the world."

Grumbly urged his listeners to join him "on the road to success," and he had a credo for each group present. For the corporate community, he invoked the Ford slogan, "Quality is Job One." For contractors, he used the Nike slogan, "Just Do It." For those hoping to become DOE contractors, Grumbly called on Super Nintendo, "The Best Play Here." Grumbly used GE for the press, "We Bring Good Things to Light." And for the public ("if there are any of those strange people here in this room"), Grumbly went to Burger King, "Have It Your Way." In conclusion, Grumbly argued that EM's mission, "while perhaps not under circumstances as clear as it was before," was "as honorable and as important as what our predecessors undertook in the Manhattan Project."[406]

Grumbly's Senior Headquarters Staff (and O'Leary's)

By fall 1993, Grumbly's senior staff had taken shape. Deputy assistant secretaries from Duffy's tenure remained in place. The most obvious front office departures were Paul Grimm and Tom Elsasser, both of whom moved to the private sector. Grumbly reorganized Elsasser's Office of Policy and Program Information, replacing it with the Office of Strategic Planning and Analysis and the Office of Public Accountability. Jim Werner, a Senior Environmental Engineer with the Natural Resources Defense Council since 1989 and an experienced environmental consultant, took over the policy and planning office. Werner's responsibilities included working with Congress and governors on budget and authorization issues, developing reliable analytical tools for policy development, and dealing with issues cutting across program areas. For the Office of Public Accountability, Grumbly recruited Cynthia Kelly from EPA. Kelly had extensive experience in toxic substance regulations and community outreach. Her new office was responsible for stakeholder initiatives, including site specific advisory boards, and for "honestly portray[ing] where the taxpayers' money is going." As Grumbly explained in his talk at the Weapons Complex Monitor Decisionmakers' Forum at the end of September 1993, "there aren't five people in the country outside of this room who know what it is that we really accomplished in this program so far. We have to do better. To help us do better I have instituted a new Office of Public Accountability . . . to get the message out about what this program is accomplishing."[407]

Rear Admiral Richard J. Guimond replaced Paul Grimm as principal deputy assistant secretary. Guimond was a Public Health Service officer who most recently had headed the Superfund program at EPA and who had, according to O'Leary's memorandum to Health and Human Services Secretary Donna Shalala requesting Guimond, "a unique combination of public health, environmental/technical, and managerial experience" in environmental restoration. Another addition to Grumbly's team was Jeff Crater, who came from John Dingell's staff to work on administrative matters.[406]

Additions to EM's senior headquarters staff had strong credentials in environmental areas including regulatory affairs, science and technology, public outreach activities, and health and safety. Grumbly and his senior management team reflected in microcosm the distinct philosophical shift taking place in DOE under O'Leary that emphasized stakeholder involvement and open decision making. Another obvious example included O'Leary's choice of Dan Reicher, an NRDC colleague of Werner originally slated as EM's principal deputy, as her deputy chief of staff and environmental counsellor. Reicher, a strong advocate of consensus decision making in environmental affairs, headed NRDC's Defense and Environment Project and was a member of the National Academy of Sciences Board on Radioactive Waste Management. Werner and Reicher appeared together at numerous DOE-related hearings between 1989 and 1992. Under Secretary designate Charles B. Curtis, principal author of the DOE Organization Act and first head of the Federal Energy Regulatory Commission, was a Keystone Center trustee. But few appointments signalled a shift of emphasis or raised more eyebrows at DOE than when Robert Alvarez, a senior staff member on John Glenn's Senate Committee on Governmental Affairs and long-time critic of the Department, joined Sue Tierney's domestic and international energy policy staff.

Breaking the Silence: Openness and Credibility

The most significant event in O'Leary's first year in office occurred on December 7, 1993. Before an overflow audience, O'Leary announced that, as part of President Clinton's commitment to a more open government, DOE was taking the first step in lifting "the veil of Cold War secrecy." The step consisted of releasing previously classified information and committing the Department to releasing additional material within six months. O'Leary passed out a large packet of fact sheets that revealed that one-fifth of U.S. nuclear weapons tests were kept secret, identified the location and quantities of weapons grade plutonium, provided information about fusion energy, and documented the large quantities of mercury used in weapons production.

O'Leary explained that the openness initiative had four goals: reducing the amount of classified information, particularly related to environmental and health and safety issues; speeding up DOE's declassification process in accordance with priorities developed with stakeholder input; reviewing classification guides and the Atomic Energy Act and making revisions consistent with national security needs in the post-Cold War era; and establishing an interagency process for expediting declassification and release of shared information. O'Leary also gave examples of how DOE was becoming a more open agency, which included encouraging whistleblowers and providing information on human plutonium experiments.[409]

The openness press conference generated considerable media attention, most of it favorable and, at least initially, focused on the previously secret weapons tests. Attention quickly turned, however, to the issue of radiation experiments on humans like the plutonium injection program begun near the end of World War II. The situation rapidly turned into a feeding frenzy, with information and misinformation on radiation experiments and informed consent issues gaining top billing in both national and international newspapers and broadcasts and with DOE offices instructed to search their files for anything related to human experimentation. O'Leary appeared on "McNeill/Lehrer News Hour," the "Today Show," and "Larry King Live," while growing public interest convinced DOE to set up an "800" telephone number that was soon overwhelmed with callers. O'Leary's comment that the government would have to consider compensating victims of the experiments drew a vacationing President Clinton into the picture. Clinton defended O'Leary's handling of the situation, and the administration announced shortly thereafter that the search for information on human experiments would be extended to all federal agencies and that an interagency task force would be organized in early 1994.[410]

The Secretary's openness press conference was designed, in part, to demonstrate that DOE was doing business in a new way, which hopefully would improve DOE's credibility. As O'Leary pointed out at the press conference, DOE headquarters was ranked next to last in a summer 1992 survey designed to measure public trust in a number of institutions. Congress occupied last place, while the National Academy of Sciences enjoyed the top rating. Banks, utilities, environmental groups, the military, and organized religion ranked high. EPA topped the bottom half, followed by the Nuclear Regulatory Commission, DOE contractors, DOE field offices, the media, and the nuclear industry (followed by DOE headquarters and Congress).

John Glenn Keeps Watch

Negative publicity like the "60 Minutes" broadcast was an irritant, but criticism also came from important members of Congress and from within the Department in late 1993. John

Glenn, for example, continued the active oversight of the nuclear weapons complex that he began in the mid-1980s. On November 23, Glenn released a GAO report on weapons disassembly at Pantex that he called "a wake-up call for the U.S. government." Glenn, who had criticized DOE for compromising worker health and safety when producing nuclear weapons, now warned the Department not to leave safety issues unresolved during the builddown and cleanup phase. Stating that he supported U.S. and former Soviet Union treaty schedules, Glenn cautioned that "we cannot allow DOE to slip into a culture where disassembly is put ahead of worker, public, and environmental safety. That kind of thinking," Glenn continued, "created the Fernalds and Hanfords of our country." Glenn's November 22 letter to O'Leary noted that GAO's report suggested that Pantex might fall behind schedule because it had too few disassembly technicians, inadequate storage facilities, and state concerns about plutonium storage."[411]

On December 9, 1993, Glenn wrote O'Leary again, this time warning that the potential for chemical explosions like the one that occurred in April 1993 at the Tomsk-7 fuel processing plant in Russia existed at numerous DOE sites. Noting that he had been studying chemical storage at DOE sites since 1989, Glenn cited concerns with organic nitrates, also known as red oils, at Hanford, Savannah River, Portsmouth, Oak Ridge, Idaho, and Los Alamos. Glenn urged O'Leary to take action to prevent improperly processed red oils from being placed in waste tanks, where they could cause explosions like Tomsk-7. "I've been investigating the potential for tank explosions at the DOE's Hanford facility," Glenn commented, "but as this report indicates, the potential for explosions is widespread throughout the entire DOE weapons complex."[412]

The Potential for Vicious Cycles

An internal study released to coincide with O'Leary's openness press conference contained conclusions addressed directly to the credibility of the EM program. Entitled Earning Public Trust and Confidence: Requisites for Managing Radioactive Waste, the final report of the Secretary of Energy Advisory Board Task Force on Radioactive Waste Management culminated a two-year project begun at the direction of Secretary Watkins. On April 25, 1991, Watkins established the task force—made up entirely of non-DOE members—to examine "the critical issue of ensuring public trust and confidence in the Department's [Civilian Radioactive Waste Management] program," and on September 5, 1991, expanded its mandate to include other DOE programs, including defense waste management. Among the many who attended and made presentations at task force meetings were Tom Grumbly of Clean Sites, Inc., and Dan Reicher of the Natural Resources Defense Council.[413]

The task force's overall conclusion was that, while some progress had been made in the past four years, there was widespread distrust of DOE's radioactive waste management programs that would probably persist in the forseeable future. Concerning EM specifically, the task force had five findings. The group thought that EM, "whether by accident or design," operated in an open and pluralistic environment "mandated by law" that helped rather than hindered public trust efforts. The task force also agreed that EM generally demonstrated sensitivity to public trust in its activities and modified plans to improve credibility, though the unilateral decision to miss a Hanford deadline eroded relations with Washington and demonstrated that EM did not always make the best choice. A third finding was that EM had numerous stakeholder initiatives underway, though it was too early to predict whether they would weaken or strengthen public trust in the long run. The fourth finding argued that EM

had not yet demonstrated the ability to create and retain public trust when dealing with highly controversial issues like "assigning priorities for allocating scarce resources and developing a process for siting new treatment or disposal installations." The final finding warned that "the potential increase[d] for vicious cycles to take over" as the consensus that created EM eroded amidst "insufficient resources, slipped schedules, and overly optimistic projections of technological advances." The task force put forth a hypothetical scenario that placed EM in "a hostile institutional context" of zero-sum decisions that would make it difficult to maintain trust. "For many," the group observed, "this scenario becomes more likely and less hypothetical as time passes."[414]

Some Good News: EM Field Organization and Staffing Review

During October and November 1993, the Office of Human Resources and Administration conducted a review of EM's field operations that produced some good news regarding EM's credibility, at least with one critical constituency. In an otherwise predictable report covering headquarters/field responsibilities, planning and resources, and contractor management issues, the review team remarked that "all regulators interviewed stated that good working level relationships had been established with DOE field organizations. Trust and professional respect have developed across the complex. DOE reportedly compares favorably with industry and is viewed as more responsive than other government entities. They believe that a partnership rather than adversarial relationship is developing." The review team had further good news, reporting that "a powerful commitment to the objectives of the environmental management program exists throughout the DOE complex. Cleaning up the environment," reviewers noted, "is viewed as a noble and necessary endeavor. Further, there is a broad understanding of the six program goals that the incumbent Assistant Secretary, EM, has established."

The review team's general observations were that roles and responsibilities for executing EM's mission needed to be clarified; that EM needed to integrate its planning activities, renegotiate some compliance agreements, involve stakeholders in the planning process, and establish meaningful priority and performance systems; that standardized training and rotational assignments would help produce a better skill mix among EM staff; that contract reform initiatives needed to be implemented; and that EM field staff should work with regulators to clarify environmental requirements and share timely information without day-to-day headquarters involvement. The review team also reported that regulators were frustrated because some of the "need to know" mentality associated with the weapons production culture survived in parts of the DOE complex, preventing full disclosure of data needed to make informed decisions about cleanup activities. Among the many actions the review team recommended, four received priority: 1) clarify roles and responsibilities of EM headquarters and field organizations; 2) develop an integrated planning system acceptable to all stakeholders; 3) assign most new field FTEs to key technical areas like project management, environmental risk analysis, industrial hygiene, and cost estimating; and 4) reduce or eliminate reliance on support service contractors, especially for inherently governmental functions.[415]

EMAC Meeting #7

The seventh meeting of the Environmental Restoration and Waste Management Advisory Committee took place during a month dominated by daily revelations regarding radiation experiments on human subjects. The meeting, which took place in Alexandria, Virginia, on December 14 and 15, included three new members. Alvin Alm and Douglas Costle took over as co-chairs. Alm's extensive resume included stints with the Atomic Energy Commission and EPA. He also served with James Schlesinger, Carter's energy czar and DOE's first secretary, working on Carter's National Energy Plan and becoming DOE's first assistant secretary for policy and evaluation in 1977. Costle was EPA administrator during the Carter administration, a member of Clinton's DOE transition team, and a Keystone trustee. The Sierra Club's Jay Sorenson, a Defense Department veteran who served on the START negotiating team, was the other new member.

Following through on his previously-stated intention, Grumbly explained that he would treat EMAC as a board of directors and ask the committee for input on major policy decisions. If his ultimate decision deviated significantly from committee advice, Grumbly promised, he would provide a full explanation for the difference.

The meeting focused on major "cross-cutting" policy issues that dominated EM's agenda at the end of 1993 and featured presentations by the major program offices. Randy Scott, deputy assistant secretary for the Office of Oversight and Self-Assessment, explained that hazards facing workers during cleanup might well be greater than during the production phase, while Grumbly stated that worker safety was a high priority for newly allotted EM positions and that OSHA would gain regulatory status over EM within five years.

Ellen Livingston, director of the Office of Programmatic Guidance and Compliance, provided an overview of EM's compliance and cleanup agreements, noting that ninety-three agreements had been signed since 1979 and that another twenty were being negotiated. Grumbly added that former Under Secretary John Tuck believed that many earlier agreements were designed primarily to allow DOE to continue weapons production. Grumbly's view was that many technical requirements in these agreements were inappropriate now that production had ceased and that the agreements should get a fresh look. Environmental Restoration's Deputy Assistant Secretary Pat Whitfield, noting that the major problem was estimating scope more than cost and that some agreements suffered from "insufficient advanced planning," suggested that DOE review agreements to figure out "what scope goes with the schedule and dollars." Waste Management's Deputy Assistant Secretary Jill Lytle discussed the Federal Facilities Compliance Act and the issue of the waiving of sovereign immunity. DOE had three years from October 1992 to produce treatment plans for 1,450 waste streams and over forty technologies, Lytle explained. Making the task even more difficult was that, while the legislation required plans for mixed waste treatment only, states were also pushing for disposal plans.

Willis Bixby, deputy assistant secretary for the Office of Facility Transition and Management, discussed the transition process for facilities no longer having a defense mission that his program took over from previous landlords. Larry Weiner, Bixby's deputy, provided a status report on the complex-wide inventory of buildings and structures that was being compiled to assist EM in planning corrective actions and developing cost estimates.

Cynthia Kelly, Director of the Office of Public Accountability, talked about site specific advisory boards, noting that boards were up and running at Rocky Flats, Fernald, and Grand Junction and that Hanford and Savannah River would join them in January 1994. A half

dozen other sites were working to establish their boards. EMAC indicated its willingness to serve as an umbrella organization for the boards on an interim basis, though some concern was expressed that boards might be perceived as less credible with EMAC sponsorship. Gary Voelker, associate deputy assistant secretary for the Office of Technology Development, discussed a joint DOE-DOD technology program and stressed that Clyde Frank's technology development program needed more money to help EM meet compliance agreement milestones. Grumbly summed up by announcing his intention to set up an EM office on risk assessment with Dr. Carol Henry as director.[416]

Risk Assessment: If Everything is a Priority, Nothing is a Priority

On November 9, 1993, Senator J. Bennett Johnston convened his Committee on Energy and Natural Resources to discuss "The Use of Risk Analysis and Cost-Benefit Analysis in Setting Environmental Priorities." Johnston's opening comments reiterated his strongly held views that government regulation was "a tremendous drag on competitiveness" and that the U.S. spent billions of dollars "on the basis of prejudice and emotion rather than on the basis of hard scientific fact." Senator Patrick Moynihan (D-New York) bemoaned the lack of risk standards and cost-benefit analysis in environmental regulations, while Senator Max Baucus (D-Montana), noting that budgetary limitations required Congress to make tough decisions, argued that "we have no choice but to solve our most important environmental problems first. If everything is a priority," Baucus argued, "nothing is a priority."[417]

Grumbly appeared with the Defense Department's Sherri Goodman late in the hearing, after Joseph Stiglitz of the Council of Economic Advisors had testified that the Clinton administration's reinventing government initiative was committed to performance-based regulatory standards and that "we need first to ascertain all of the costs and benefits of alternative actions in the most thorough manner possible." Stiglitz stressed that uncertainty would remain but that reasonable and consistent policy decisions could be made with limited information.[418]

Grumbly emphasized that EM's highest priority was to control immediate risks, but he pointed out that risk assessment efforts were not far enough along to produce reliable complex-wide data. Grumbly noted that the National Research Council, EPA, the Office of Technology Assessment, and DOE had studied risk assessment but that "nobody over the past 10 years, either inside or outside the Government, has made, in my view, an adequate or credible effort to actually define what the risks in the defense establishment are on a site-by-site basis." Part of the problem, Grumbly argued, was that those producing the assessments were often those perceived as having caused the problem. "I think it is fair to say," Grumbly remarked, "that DOE probably could not sell its own credibility if it were listed as a blue chip stock on the New York Stock Exchange these days." Grumbly noted that DOE was working with stakeholders to develop consensus risk assessments for individual sites and pointed out that the National Research Council had conducted a workshop at his request to begin a two-year process of designing a credible risk evaluation program, a process mandated by Congress and supported by Grumbly as "the right thing" in a November 17 House hearing. Results of these risk evaluation efforts would be included in DOE's fiscal year 1997 budget request, which would be submitted in January 1996.[419]

How Clean is Clean? Revisited

In answer to a question from Chairman Johnston regarding cleanup standards, Grumbly responded that a basic problem was that "we do not have de minimus standards for radioactivity." The inability to define "how clean is clean at the very lowest end of the scale," Grumbly explained, meant that plans had to be made without knowing the end point, making it difficult, among other things, to determine what cleanup technologies to develop. Grumbly argued that risk benefit analysis, combined with consensus stakeholder recommendations regarding site disposition, could produce savings on the order of 20 percent in the $2 billion annual environmental restoration budget. A credible and consistent risk system would ensure that compliance agreements addressed the most pressing problems and would, according to Grumbly, end DOE's current approach of "lay[ing] out all of the problems and try[ing] to attack them en masse in as orderly a fashion as possible."[420]

Grumbly's testimony included an exchange with Johnston on the "60 Minutes" broadcast, contained comments on contractor reform initiatives and the need to provide better DOE oversight, expressed support for the administration's Superfund reform effort, and noted that many compliance agreements signed in the previous administration stemmed from a need to gain credibility but suffered from insufficient risk-based analysis. Grumbly again linked risk assessment with land use and made it clear that the two issues loomed large on EM's daunting policy landscape at the end of 1993. "It is clear," Grumbly stated, "that we have to use land use considerations in making judgments," and we have "to involve citizens in making good common sense choices about what kinds of land uses are actually going to be done."[421]

Land Use: Forging the Missing Link

In mid-1993, Grumbly established the Environmental Management Future Land Use Working Group and charged it with preparing a study that would help DOE site managers identify the essential elements ("guiding principles") of future use planning. The guiding principles would "enhance the ability of the Department and regulatory decisionmakers to make timely and defensible decisions; define a range of acceptable alternatives; expedite remediation and siting of treatment, storage, and disposal facilities; and identify surplus parcels and facilities for transfer to other ownership or beneficial use."[422]

Chaired by EM's Randy Harris, the working group's members came from EM, Associate Assistant Secretary Don Pearman's Field Management Staff, Archer Durham's Office of Administration and Human Resources, affected program offices, and operations offices. National laboratories, DOE contractors, universities, and other groups also contributed. Building on the work of the Hanford Future Site Uses Working Group and EMAC and STGWG subcommittees on land use, the group held meetings around the country, met with a wide range of interested parties, and asked over 200 people to comment on the November 10 working draft. On December 20, 1993, Harris delivered the working group's final draft, Forging the Missing Link: A Resource Document for Identifying Future Use Options.[423]

Following the preface and introduction were sections on the process for identifying preferred future use options, on headquarters and site management roles and responsibilities, and on integrating future use options into planning and decision making (twelve appendices were scheduled for March 1994). The working group stated that the report was "nonprescriptive" and was "intended to begin an immediate process for identifying

stakeholder-preferred use options at each site." The report would be updated to incorporate "lessons learned and additional guidance based on experience and other information."[424]

Land Use: Stakeholders and Credibility

The study reflected the working group's view that the missing link in land use planning was credibility with DOE's stakeholders. The working group noted that "long-term future use goals are needed to accomplish near-term objectives" and that previous DOE land use planning efforts had been uncoordinated and "lack[ed] credibility among stakeholders." The critical link between effective planning and credible decision making, the group argued, "lies in the strength of stakeholder input and quality. Stakeholder-preferred future use options forge that link. *Future use options are defined as a select range of preferred uses based on stakeholder, technical, and legal constraints and opportunities.*" The group noted that DOE had promised Congress that the Department would work with stakeholders to identify site-specific land use options by the end of 1995.[425]

The working group believed that the process of reaching stakeholder-preferred future land use decisions would create "a stronger partnership with [DOE's] stakeholders" that would in turn "assist the Department in defining complex-wide and site-specific missions." The group identified numerous Departmental activities that would be affected by consensus decisions reached between DOE and stakeholders. These included planning and siting facilities needed to fulfill the Department's missions, providing effective stewardship for lands and buildings required for current and future needs or of historic value, and identifying lands and buildings eligible for transfer or lease "to other federal, tribal, state, local government, or private sector use." Perhaps most importantly, the working group linked future land use decisions with the critical issues of risk assessment and cleanup standards. The group argued that land use decisions could help answer the question "How clean is clean?" by deciding "Clean for what use?"[426]

The working group ended a busy half year with the submission of its final draft report. Developing stakeholder-preferred future land use options became the responsibility of Cindy Kelly's Office of Public Accountability, which already had the lead in working with site-specific advisory boards. Included in the working group's report was an initial list of sites required to identify future use options by December 1995 that illustrated how much work remained to be done in roughly two years. Above the single "smiley face" next to Hanford Reservation indicating that future use options had been identified were twenty-four DOE sites (and an indication that more might be added) in sixteen states and nine EPA regions that were more or less along the road toward achieving consensus with their neighbors on DOE's local role in the post-Cold War world.[427]

Endnotes

1. F. G. Gosling, *The Manhattan Project: Science in the Second World War*, DOE/MA-0417P (Washington: U.S. Department of Energy, August 1990) pp. 5-43; Richard G. Hewlett and Oscar E. Anderson, Jr., *The New World, 1939-1946*, Volume I of *A History of the United States Atomic Energy Commission* (University Park, PA: Pennsylvania State University Press, 1962), pp. 55, 108.

2. Vincent C. Jones, *United States Army in World War II, Special Studies, Manhattan: The Army and the Atomic Bomb* (Washington: United States Government Printing Office, 1985), pp. 268-72. Groves quoted on p. 272.

3. Richard G. Hewlett and Francis Duncan, *Atomic Shield, 1947-1952*, Volume II of *A History of the United States Atomic Energy Commission* (University Park, PA: Pennsylvania State University Press, 1969), pp. 20.

4. Harold Orlans, *Contracting for Atoms* (Washington: The Brookings Institution, 1967), p. 5; Jones, *Manhattan: The Army and the Atomic Bomb*, pp. 117-223.

5. Bush quoted in Jones, *Manhattan: The Army and the Atomic Bomb*, p. 37; Abel Wolman and Arthur E. Gorman, "Environmental Sanitation," in Report of The Safety and Industrial Health Advisory Board, April 2, 1948, p. 73.

6. Barton C. Hacker, *The Dragon's Tail: Radiation Safety in the Manhattan Project, 1942-1946* (Berkeley: University of California Press, 1987), pp. 2-4, 28-29, 38-39; Hewlett, *Federal Policy for the Disposal of Highly Radioactive Wastes From Commercial Nuclear Power Plants: An Historical Analysis*, DOE/MA-0153 Draft (U.S. Department of Energy, Executive Secretariat, History Division, March 9, 1978), p. 5; Hewlett and Anderson, *The New World*, pp. 206-7.

7. Jones, *Manhattan: The Army and the Atomic Bomb*, pp. 416-20; Hacker, *The Dragon's Tail*, pp. 48-58, 67. See also *Manhattan District History*, Book I, General, Volume 7, Medical Program.

8. Hacker, *The Dragon's Tail*, p. 56.

9. *Ibid.*, pp. 56-57; Rodney P. Carlisle and Joan M. Zenzen, *Supplying the Nuclear Arsenal: Production Reactor Technology, Management, and Policy, 1942-1992*, draft manuscript, October 1993, ch. 2, pp. 9-10.

10. A. E. Gorman and J. A. Lieberman, "Disposal of Radioactive Wastes," in Disposal of Radioactive Wastes, AEC 180/5, March 30, 1956, AEC/NARA. Relative overall significance of waste management in the Manhattan Project is indicated by coverage in the two major "nuts and bolts" histories (Hewlett and Anderson cited in fn. 1 and Jones cited in fn. 2) in which the subject is virtually ignored. The Army's multivolume *Manhattan District History* deals only briefly with waste issues in volumes covering selected sites.

11. Hacker, *The Dragon's Tail*, p. 9, *Manhattan District History*, Book IV, Pile Project, Volume 6, Operation, p. 2.23; Carlisle and Zenzen, *Supplying the Nuclear Arsenal*, ch. 1, p. 20.

12. Hacker, *The Dragon's Tail*, p. 56.

13. Hewlett and Anderson, *The New World*, pp. 482-530; Sect. 1(a) and 2(c), Atomic Energy Act of 1946 (Public Law 585) 78th Cong. 1st sess.

14. Richard G. Hewlett and Francis Duncan, *Atomic Shield, 1947-1952*, Volume II of *A History of the United States Atomic Energy Commission* (University Park, PA: Pennsylvania State University Press, 1969), pp. 362-409, 521-72, 586-87, 669.

15. *Ibid.*, pp. 19-20.

16. *Ibid.*, p. 316.

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336. Grassley to Duffy, December 15, 1992; "Senator Says DOE Not Following Pledges on Contractor Accountability," *Inside Energy*, December 21, 1992, p. 4; Summary of Points Made by Leo Duffy During Discussion with STGWG, December 17, 1992.

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