

## OPERATOR LICENSING HISTORY (1954 - 1994)

The writing of regulations for reactor operators was one of the first tasks that the Atomic Energy Commission undertook after the 1954 Atomic Energy Act became law and made possible the widespread commercial use of nuclear energy. Indeed, licensing of operators was a question that generated comment and debate even before Congress passed the act. In May 1954, during an executive session in which members of the Commission and members of the Joint Committee on Atomic Energy discussed the draft act, the AEC took the position that it should not be charged with the task of licensing reactor operators, which it viewed as burdensome and unnecessary. AEC chairman Lewis L. Strauss argued that it was more sensible to make a plant's owners responsible for training and monitoring its own operators. Some Joint Committee members took sharp exception. Senator John Bricker, for example, declared in response to Strauss: "Pulling the wrong lever might not only be of interest to the company, but of interest to the public generally." The Joint Committee accepted that line of reasoning and included a section requiring the AEC to license operators in the 1954 act.

In the spring of 1955, the AEC drafted a regulation to implement its mandate on operator licensing. The agency sought to keep its role to a minimum. The regulation it prepared required applicants for operator's licenses to pass a test and a medical examination. Otherwise, it left responsibility for training and evaluating operators to plant owners. Harold L. Price, the director of the fledgling regulatory staff, told the Commission that it seemed best to follow the example of the Civil Aeronautics Administration in licensing pilots. "They examine a man's competence, his health," he said. "They leave it to the management to determine if he is reliable and trustworthy.... We thought this was a proper case where we could say that the selection of reliable people is the responsibility of management."<sup>(1)</sup>

The regulation that the Commission approved in 1955 remained in effect without major revisions for a decade and a half. In the late 1960s, however, the regulatory staff revisited the issue of operator licensing. The basic concern that prompted its reconsideration was, as in so many other reactor safety questions at that time, the growth in the size of the plants being licensed. Operators had to renew their licenses every two years, but the AEC's rules did not require that they pass reexaminations in order to do so. Rather, operators could extend their licenses by presenting evidence that they had performed their duties safely and competently. All but about 2% of operators had the opportunity in a two-year period to observe and participate in start-ups, shutdowns, and transient conditions.

The regulatory staff noted, however, that the newer and larger plants would run continuously for much longer periods than older models. This would limit the opportunities for operators to gain experience and maintain proficiency in performing basic functions such as start-ups and shutdowns or in dealing with emergency situations. Therefore, the staff proposed that new provisions be added to the regulations that would require licensees to provide requalification programs as a prerequisite for the renewal of individual operators' licenses. The staff also suggested that the AEC establish minimum standards for requalification programs. This would include lectures and on-the-job training and would apply to both reactor operators and senior operators. The training programs could include use of a recently-developed innovation--reactor simulators--as long as the simulators "reproduce[d] the general operating characteristics of the facility involved." Those who sought to renew their licenses would have to complete either a requalification program or a reexamination. After public comment and Commission review, the new rules became effective in September 1973.<sup>(2)</sup>

The AEC's new requirements and increased involvement did not address all concerns about the qualifications and competence of reactor operators. In 1975, after the NRC took over the regulatory responsibilities that the AEC had carried out, a knowledgeable observer expressed criticism of existing procedures and raised doubts about how effective they were in training capable operators. The observer

was Forrest J. Remick, at that time an administrator at Penn State University, who had participated in training programs as an operator, a senior operator, a trainer of operators, and an examiner of operators. He acknowledged that operator training was receiving more attention than it had 10 or 15 years before and that significant improvements had been made. Nevertheless, he worried that the nuclear industry was not devoting enough care to operator qualifications. "I doubt," he wrote, "that there is always full appreciation of the compelling need for a competent, well-trained and retrained staff who have a professional commitment towards a quality mode of plant operation." Remick complained that operator training was focused too heavily on passing exams rather than understanding reactors. He found that reliance on rote memory to fulfill training requirements, courses taught by indifferent training coordinators, and a lack of professionalism among operators were all too common.

Remick also expressed reservations about the ability of the NRC's regulations to ensure the competence of reactor operators. He was uncertain that the examinations fully addressed issues of vital importance to safe and skillful plant operation. Remick concluded that reactor training deserved more attention from both the industry and the NRC. "I firmly believe," he remarked, "that the magnitude of the capital investment and the safety of the general public warrant and necessitate highly trained personnel to operate our nuclear plants."<sup>(3)</sup>

Remick's observations proved to be prescient. During the Three Mile Island crisis in March 1979, the performance of reactor operators was a major contributor to the severity of the accident. When a pressure relief valve stuck open at the plant and allowed large volumes of reactor coolant to escape, the operators on duty misread the signs of a loss-of-coolant accident, and for several hours, failed to take action to cool the core. Although the plant's emergency core cooling systems began to work according to design, the operating crew decided to reduce their flow to a trickle. By the time that the nature of the accident was recognized and the core flooded with coolant, the reactor had suffered irreparable damage. The President's Commission on the Accident at Three Mile Island, chaired by John G. Kemeny, concluded that "the equipment was sufficiently good that, except for human failures, the major accident at Three Mile Island would have been a minor incident."<sup>(4)</sup>

The Kemeny Commission was sharply critical of the nuclear industry and the NRC for "down-playing...the importance of the human element in nuclear power generation." Its report to President Carter in October 1979 minced no words in citing shortcomings in operator training. It described the training of the operators at TMI as "greatly deficient" and added that "the depth of understanding, even of senior reactor operators, left them unprepared to deal with something as confusing as the circumstances in which they found themselves." The Kemeny Commission blamed both the utility and the NRC for the failures in the performance of plant operators. It declared that the "training of Met Ed operators and supervisors was inadequate" and that NRC standards for training were "shallow" and "minimal." The Kemeny Commission was not alone in its assessment of operator qualifications; the NRC's own investigations of the TMI accident reached the same conclusions.<sup>(5)</sup>

Even before the various studies of the Three Mile Island accident were completed, the NRC had begun to scrutinize its requirements for operator training. As Chairman Joseph Hendrie, NRR director Harold Denton, and others stated publicly, it was apparent that operator error was a major contributing factor to the accident and one that demanded careful NRC consideration. On April 20, 1979, three weeks after the accident, the staff briefed the Commission on the existing regulations. The Commission responded by requesting a "thorough review" of the requirements that the NRC imposed and the guidance it offered to licensees on qualifying reactor operators. It directed the staff to examine a wide range of issues relating to operator training and report its findings and recommendations for changes within one month.<sup>(6)</sup>

The staff responded with a seven-part SECY paper submitted to the Commission over a period of four months. The subjects it covered included results of operator examinations, comparisons of nuclear power training and requalification programs with those of the nuclear Navy, emergency training with simulators used by other agencies, and a statistical profile of nuclear plant operators, commercial airline pilots, and merchant marine engineers. The central policy issue that the paper addressed was the upgrading of reactor operator qualifications. The staff provided sixteen recommendations for achieving this objective, and the Commission accepted the proposals with a few modifications and occasional dissenting views. Among the actions that the Commission approved were additional experience requirements for senior reactor operators, more extensive use of simulators in training and requalification, greater NRC involvement in administering certification and requalification examinations, and a change in the passing grade in written examinations for prospective operators from 70% overall to 80% (and at least 70% in each section of the exam).<sup>(7)</sup>

The staff could take steps to carry out some of the Commission's decisions immediately, but others required formal rulemaking proceedings. The first issue for which the staff drafted revised rules was "Qualification of Reactor Operators." The staff asked the Commission to approve a Notice of Proposed Rulemaking to upgrade the qualification requirements for operators and senior operators in February 1981. While emphasizing that the proposed changes were only the first steps in improving operators' performance and strengthening their ability to deal with emergencies, the staff proposed several amendments to the existing rules. They included specific requirements for education, experience, and certification, more rigorous license examinations that would test applicants' understanding of reactor theory, mandatory simulator training (which previously had been optional), expanded use of simulators, and compulsory participation in requalification programs.<sup>(8)</sup>

The Commission approved the proposed rulemaking in March 1981. But it postponed publication until an issue that generated debate within the Commission and between Commissioners and the staff--the level of formal education that should be required for reactor personnel--could be resolved. Two members of the Commission, Victor Gilinsky and John Ahearne, argued that the regulations should prescribe increased formal educational requirements, phased in over a period of time to reduce the impact on those who did not meet the minimum standards. Gilinsky favored a bachelor's degree or equivalent for senior operators and shift supervisors; Ahearne went further and called for a bachelor's degree for reactor operators as well. In the face of opposition from industry groups and uncertainty among themselves, the Commissioners directed the staff to establish a peer review panel of experts from outside the NRC to examine the question.<sup>(9)</sup>

In response to the Commission's instructions, the staff recruited a "Peer Advisory Panel on Operator Qualifications." It consisted of six federal employees who were experts on human resources management. To encourage a "fresh perspective" on the issue, only one of the panel members had experience in nuclear plant operations. The panel met twice, enlisted the assistance of consultants, held a workshop with nuclear industry representatives, and visited nuclear plants and simulators before submitting its recommendations to the NRC. It hoped that its suggestions would enable nuclear utilities to: 1) maintain the existing level of experience, 2) enhance the technical capabilities of operating crews, and 3) improve training.

The panel argued strongly against requiring bachelor's degrees for reactor operators, senior operators, or shift supervisors. It cited many reasons for taking this position, including the small probability of finding college graduates of high quality who would want a job as a reactor operator and the likelihood of high turnover, poor performance, loss of able and experienced but non-degreed operators, and the curtailment of the selection pool of capable applicants. Further, the panel noted that available evidence for "similar,

high vigilance, high stress occupations" did not indicate that college graduates necessarily performed better than those without degrees.

The panel recognized the advantages of having a trained engineer on duty in "off-normal situations," and recommended that a position called "shift engineer," requiring a degree in engineering or a related field, be created. This person would be on site if an emergency occurred, but would not spend all or even most of his or her time in the control room with the operators. This position would replace the need for a "shift technical adviser," which, in 1979, the NRC had required plant owners to add to their operating crews. The shift technical adviser had an engineering or science degree (or equivalent) and received special training in handling abnormal occurrences or accidents. In addition, the panel advised the NRC to take an active role in accrediting utility training programs, either by undertaking the task itself or by overseeing the efforts of another organization, such as the Institute of Nuclear Power Operations (INPO). After reviewing the panel's report, the Commission directed the staff to prepare a new proposed rule or policy statement on operator qualifications.<sup>(10)</sup>

By mid-1982, three years after the TMI accident, the NRC had taken several actions to improve operator performance. It had required that on-duty operating crews include two senior operators (instead of one) as well as a shift technical adviser. It had increased the level of experience needed to qualify as a senior reactor operator and the amount of on-the-job training that both operators and senior operators received. It had raised passing grades on operator exams and added new categories that applicants were expected to master. It had directed licensees to make greater use of simulators in operator training.<sup>(11)</sup> And it had discussed, considered, and sponsored studies on other vital issues relating to operator licensing. But it had not issued new regulations, and important questions, particularly with regard to operator qualifications, remained unresolved.

The fact that the NRC had not issued comprehensive regulations on operator training and qualifications in a timely manner attracted the notice and the disapproval of Congress. In the Nuclear Waste Policy Act of 1982, Congress, acting on a proposal sponsored by Senator Lowell Weicker of Connecticut, directed the NRC to "promulgate regulations, or other appropriate Commission guidance" for training and qualifications not only of operators but of other plant personnel as well. In addition, the act specifically called for rules on "simulator training requirements." It further mandated that the NRC issue its regulations or guidance within twelve months. The act provided new incentive for the agency to address promptly outstanding issues relating to operator qualifications.<sup>(12)</sup>

The problem was that, despite the mandate from Congress, the post-TMI recommendations, and the commitment of the NRC to improve operator training and performance, the specific issues confronting the agency were complicated and controversial. In writing regulations for simulator training, for example, the NRC's Division of Human Factors Safety faced the task of balancing costs and benefits for a still-developing technology. Initially the staff leaned toward requiring full-scale "plant-specific" simulators. But it later found that "plant-referenced" simulators that could serve more than one facility might achieve the same goals for a smaller cost. With many licensees planning to build simulators and others seeking to upgrade existing ones, the staff was reluctant to "lock the utilities into one course of action when practical alternatives might be available in the relatively near future." If the agency elected to adopt a "plant-referenced" approach, however, it raised potentially thorny questions of defining terms precisely, designing exams, and training examiners.<sup>(13)</sup>

Other issues relating to operator licensing and qualifications caused equal uncertainty and greater acrimony. In April 1983, the NRC's Office of Inspector and Auditor (OIA) submitted a report to the Commission on operator licensing procedures. While acknowledging that improvements had been made since TMI, it cited continuing shortcomings. It criticized the management of the operator licensing

program on the grounds that operator exams were too often administered by contractors rather than NRC staff, that no requalification exams had been performed and renewal applications had been automatically approved to avoid a large unprocessed backlog, that operator licensing had been "regionalized" without sufficient preparation, and that the staff did not have an information system for collecting even basic statistics on operator licensing. The OIA analysis brought sharp rejoinders from EDO William J. Dircks and other senior staff members, who conceded that problems existed but denied that they were as serious as the report suggested. Nevertheless, it was apparent that more attention and resources were needed to carry out the Commission's instructions, issued in 1982, that the NRC staff design and administer a sound requalification program.<sup>(14)</sup>

The differences of opinion over the OIA report were a prelude to serious divisions among the Commissioners over the issue of operator training and qualifications. In February 1984 the staff submitted a proposed rule for operator licensing and for training and qualifications of nuclear plant personnel. This paper was intended to fulfill the requirements of the Nuclear Waste Policy Act. Rather than specifying requirements for the education, experience and training of operators and other plant employees, the staff proposed that the NRC adopt a "systems approach to training." Under this approach, utilities would determine their job performance requirements and the NRC would evaluate the appropriateness and effectiveness of licensee programs. In addition, the staff proposed a series of steps to codify and clarify NRC policies on operator examinations, medical requirements, and use of simulators. In general, it proposed performance-based rather than prescriptive regulations.<sup>(15)</sup>

The staff's proposals on training were met with anguished protests from the industry. Industry groups, particularly INPO, had been working for some time and at considerable expense to develop their own accreditation programs, and they feared that new NRC regulations would undermine their efforts. While they expressed no general objections to NRC rules dealing with licensing exams, simulators, and medical evaluations, they were deeply concerned about rules in the area of training. In an emotional appeal at a Commission meeting in February 1984, Eugene P. Wilkinson, retiring president of INPO, urged the NRC to postpone action on training until the industry could draft its own proposals. If the Commission went ahead, Wilkinson declared, it would "bring most of the industry accreditation effort to a halt" and "end the march to excellence."

In general terms, the industry worried that an agency rule would, in the words of an official of the newly-formed Nuclear Utility Management and Human Resources Committee (NUMARC), "destroy industry initiative." The result would be that licensees would settle for meeting NRC requirements rather than striving to meet a higher standard of excellence. Thus, NRC regulations could undercut rather than promote operational safety. Industry spokesmen conceded that the agency was obligated to issue certain rules in order to carry out the mandate of the Nuclear Waste Policy Act. But they insisted that the law provided enough flexibility to allow the NRC to publish guidelines or a policy statement rather than rules on issues relating to training.<sup>(16)</sup>

In addition to its wariness of training rules on general principles, the nuclear industry was concerned about some specific proposals that the staff had prepared (for cases in which a systems analysis was not available). One was a proposed rule requiring that a new position called "senior manager" of shift operations have a bachelor's degree and five years of nuclear power plant operating experience (in accordance with the recommendations of the Peer Advisory Panel on Operator Qualifications in 1982, the senior manager would take the place of the "shift technical advisor"). Another source of industry concern was a proposal that senior reactor operators have at least four years experience working in a reactor control room. Industry representatives urged that the NRC wait to make a decision until the industry could develop alternatives. In early 1984, 11 plants were within a few months of applying for operating licenses, and there was a shortage in the supply of experienced operators. The industry,



therefore, wished to avoid new rules that seemed likely to increase the difficulty of ensuring an adequate number of qualified operators.<sup>(17)</sup>

The Commission dealt with the more immediate issue--specific operator qualifications that would apply at least for the short term--first. In June 1984 it approved, by a vote of 3-2, most of the proposals submitted by industry and sent out a generic letter to announce its decision. The industry had drawn up a weighting system for judging operator qualifications that gave credit for service in the nuclear Navy, a college degree, and training on simulators in addition to experience in operating nuclear power plants. The minimum requirements were one year of experience of some kind (not necessarily in a power plant) for operators and two years for senior operators. One of two senior operators on a shift had to have spent six months at a similar plant and gained at least six weeks of "hot operating experience." The Commission's decision was sharply disputed by its two dissenting members. Commissioner James K. Asselstine found the "hot participation experience" requirement to be inadequate. Gilinsky, whose second term on the Commission was drawing to a close, was even more outspoken in his disagreement. He voiced his unhappiness with the decision of his colleagues but was especially critical of the industry. "In pressuring the Commission to accept a feeble approach toward shift experience requirements," he wrote, "the industry is jeopardizing its long standing safety record....It says to me the industry is not yet capable of policing its members."<sup>(18)</sup>

Having decided the issue of operator qualifications for the near-term, the Commission returned to the staff's proposals of February 1984 for a systems approach to training and qualifications. The industry continued to oppose the publication of a rule; it argued that a generic letter or policy statement would satisfy the requirements of the Nuclear Waste Policy Act. The NRC staff disagreed, and submitted a revised proposed rulemaking to the Commission in June 1984. After careful consideration, the Commission adopted much of the industry position by issuing a proposed rule for public comment that dealt with operator examinations, use of simulators, requalification procedures, and medical requirements. The Commission also agreed on publishing a policy statement that endorsed INPO's accreditation program while affirming the NRC's responsibility for evaluating licensees' training efforts. The agency announced its intention not to impose new rules on training and qualifications of operators for a period of two years provided that the industry fulfilled its pledge to implement satisfactory accreditation procedures. In a separate but related action, the Commission also disapproved the staff's proposed rule on replacing station technical advisors with "senior managers."<sup>(19)</sup>

On March 14, 1985, the NRC published its policy statement on "Training and Qualification of Nuclear Power Plant Personnel." It stated that "in recognition of industry initiatives underway to upgrade training programs," the agency endorsed INPO's program to apply "the elements of performance-based training." The NRC made clear that it would monitor the progress and effectiveness of INPO's programs to make certain that they carried out their objectives. It also reiterated that the agency would continue to provide appropriate regulatory requirements for licensees and applicants outside the scope of INPO training and accreditation.<sup>(20)</sup>

By September 1985 INPO had set up the National Academy for Nuclear Training, headquartered in Atlanta, to carry out the process of accrediting utility training programs. Within five months, INPO had accredited a total of 131 training programs at 31 sites. The Commission was impressed with INPO's activities but concerned about the 61 plants and 610 programs that had not yet received accreditation. INPO President Zack T. Pate promised that the organization would set tight deadlines for meeting its requirements. Utilities that failed to meet the deadlines would be publicly identified, he said, and would "suffer considerable public embarrassment."<sup>(21)</sup>

In March 1987, the NRC issued its final rule on operators' licenses in accordance with its obligations under the Nuclear Waste Policy Act. The new regulation continued to assign the industry primary responsibility for training, but it also cited the appropriate regulatory guides for facilities to follow in the event that they were not accredited. The rule spelled out agency requirements on operators' exams, medical conditions, and requalification. One new provision was that operators' and senior operators' licenses would not expire for six years (rather than two) after their issuance. The rule did not pass the Commission without dissent. Both Commissioners Asselstine and Frederick Bernthal commented that they believed that the rule was too lax in not requiring every licensee to obtain plant-referenced simulators.<sup>(22)</sup>

Within a few days after publication of the new rules, it became vividly apparent that neither the NRC's policies nor INPO's training programs were sufficient in themselves to prevent serious lapses in reactor control rooms. On March 31, 1987, the NRC shut down the Peach Bottom-2 reactor after discovering that plant operators and shift supervisors routinely slept while on duty. (Peach Bottom-3 was closed for refueling at the time that the NRC acted, but, like its twin, could not restart without agency approval). This was the first time that a plant had ever been closed for operator misconduct and violation of regulations. Further investigation of conditions at Peach Bottom revealed that the abuses had occurred over a period of at least five months and included not only sleeping but also reading magazines, playing video games, and engaging in rubber band fights. The situation at the plant reflected poorly on both Philadelphia Electric (PECO) management and the nuclear industry as a whole. It was, in the words of an INPO report, "an embarrassment to the industry and to the nation."<sup>(23)</sup>

The industry and the NRC took prompt and firm action to correct the problems at Peach Bottom. Both were convinced that the problems began at the top and that major changes were needed in the management of the company. INPO's evaluations of Peach Bottom's performance had cited glaring weaknesses for years. In 1984, for example, INPO had identified "a pervasive unwillingness by managers and supervisors to ... enforce standards of expected performance" and "long standing company practices [that were] an impediment to change or improvement." Later INPO inspections found little improvement. After the shutdown, INPO told Philadelphia Electric's board of directors that the highest levels of management in the company were fundamentally to blame for the problems in the control room.

This view received strong support from NRC Chairman Lando W. Zech, Jr. At a meeting in September 1987 in which PECO officials outlined their plans for improvement and hopes for a prompt restart, Zech declared: "Part of the problem is leadership, right from the top down. I mean that. You've had a serious situation go on for a number of years.... We're dealing here with a breakdown in management control." After INPO leveled another blast at PECO's top management, the board of directors replaced the president and chairman of the company (both of whom took early retirement). Peach Bottom finally resumed operation in March 1989. The entire affair was a test case for INPO's effectiveness and willingness to take strong action against a utility that refused to meet its standards. Even more, it was a sign, as Matthew L. Wald noted in the New York Times, "of a basic shift in safety concerns since the accident at Three Mile Island.... Now the message seems to be that faulty operators will not be tolerated any more than faulty equipment, and that top management will be held more accountable when there is a human problem."<sup>(24)</sup>

The problems at Peach Bottom did not force a reexamination of the NRC's regulations on operator qualifications. The shutdown was not made necessary by shortcomings in requirements but by failures in management and a lack of professionalism among operators. The attitude of operators was a major concern to INPO, which undertook efforts to increase their professionalism. "We are now seeing

troublesome events that cannot be traced to inadequate training," observed Pate. "Instead, our conclusion is that the principal root cause is a shortfall in professionalism."<sup>(25)</sup>

While INPO focused on enhancing operator professionalism, the NRC continued to consider some questions about operator qualifications that had not yet been resolved. One of these--educational requirements--had, in one form or another, received a great deal of attention since TMI. The Commission seriously considered making a college degree mandatory for senior operators, but, in the face of strong opposition and evidence that utilities were encouraging operators to further their education, decided against imposing a rule. Instead, it issued a policy statement in August 1989 that urged "nuclear plant licensees to continue to develop and implement programs that permit operating personnel to obtain college degrees from accredited institutions." It added: "Those persons with ability and desire should be given every opportunity to further their education in order to best serve the interest of nuclear safety."<sup>(26)</sup>

The policy statement settled the long-standing issue of educational requirements, but two other major questions--accreditation programs and requalification examinations--continued to command attention. In its 1985 policy statement on operator training, the Commission, in response to appeals from industry, had announced that it would evaluate INPO's training programs for a two-year period without issuing new regulations. After the staff reviewed INPO's accreditation procedures in the period between March 1985 and March 1987, it concluded that "the program is effective in ensuring that personnel have qualifications commensurate with the performance requirements of their jobs." In November 1988 the NRC published a new policy statement that made minor revisions to the previous one and declared that it was satisfied with industry efforts to improve operator training. In its view, the policy guidelines fulfilled its mandate under the Nuclear Waste Policy Act of 1982.<sup>(27)</sup>

The U.S. Court of Appeals for the District of Columbia Circuit disagreed. In April 1990, it issued a ruling on a suit filed by the Public Citizen organization, which contended that the NRC's response to the Waste Policy Act was insufficient. The court found that the agency's policy statements on operator training did not meet the statutory requirements. According to the law, the court said, the NRC "must establish instructional requirements, and nonmandatory suggestions fail to do this." It added: "When Congress gives the agency its marching orders, the agency must obey all of them, not merely some."<sup>(28)</sup>

As a result of the court's decision, the staff drafted a new rule on training and qualification of plant personnel and sent it to the Commission in April 1991. The Commission unanimously disapproved publication of the proposed rule because it believed that the "highly prescriptive" approach that the staff suggested was "not only unnecessary to accomplish the intended objective, but may prove to be unnecessarily disruptive of the highly successful training programs that have been established." It instructed the staff to draw up a proposed rule that used a systems approach to training requirements and that took advantage of the "considerable knowledge and expertise" that licensees had acquired. The staff's new draft proposed to require licensees to implement performance-based training procedures that included several key elements without imposing changes in INPO's existing accreditation programs. After public comment, the Commission approved the final rule with minor revisions in March 1993. It was added to Part 50 as a requirement for each applicant for and holder of a power plant license.<sup>(29)</sup>

The second question--administering requalification examinations--generated even more discussion. In February 1987 the Commission had decided that, as a condition of the renewal of his or her license, every operator would have to pass an NRC-administered requalification exam within the six-year term of the license. The 3-2 majority who favored this requirement regarded it as a way to provide assurance that individual operators were maintaining high standards of proficiency and to measure the effectiveness of licensees' requalification programs. Within a short time it became apparent that NRC administration of examinations created problems both for the agency and for licensees. For the NRC, conducting a larger



number of examinations strained agency resources. After considering various options to reduce the burden on NRC examiners, in May 1989 the Commission decided to modify the walk-through portion of the test. Rather than having a single NRC examiner for each candidate, it agreed to allow an agency examiner to evaluate two operators during the walk-through process.<sup>(30)</sup>

The NRC-administered exams prompted cries of distress and calls for relief from licensees. The primary complaint of industry representatives was that the NRC-administered examinations placed undue stress on operators. One shift supervisor commented that "the one week of `requal exams' was worse than the year I spent in Vietnam," and another operator said that "the stress I felt during my exam was the worst I ever experienced." Utility executives and the NRC staff expressed concern that the pressure of taking the exam would force experienced and able operators to seek other employment, producing an adverse effect on plant safety. After studying the issue to evaluate the causes of the stress and the validity of the complaints, the staff made several changes in the administration of the exams to eliminate unwarranted sources of anxiety.<sup>(31)</sup>

By early 1992 the staff had concluded that the performance of individuals and the improvements in licensee programs had reached a point where NRC-administered requalification exams were no longer needed to ensure suitable testing of operators. It proposed a change in the rules to eliminate the requirement for the agency requalification tests. Instead of devoting scarce resources to examining individual operators, the staff argued that it should center its attention on the performance of facilities. Many of the problems with failures on requalification exams, it pointed out, were rooted in weaknesses in licensee programs rather than in the ability of individuals. After reviewing the issue, the Commission agreed in January 1994 that NRC-administered examinations were not necessary as a general requirement and that it would carry out its mandate under the 1982 Waste Policy Act as long as it provided active oversight of licensee programs.<sup>(32)</sup>

In the cases of both operator training and requalification, the NRC decided to focus on evaluating the programs and monitoring the performance of the industry. The agency placed substantial confidence in and reliance on industry initiatives, but the term of "self-regulation" that trade journals sometimes used was misleading.<sup>(33)</sup> The NRC made clear its intention to exercise its regulatory authority as necessary. After forty years of experience with a complicated and sometimes controversial issue, it seemed apparent that a strong regulatory presence in the areas of operator training and qualifications was an unavoidable part of promoting reactor safety.

#### **Footnotes:**

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3. Forrest J. Remick, "Training of Nuclear Facility Personnel: Boon or Boondoggle?," Nuclear News, 18 (October 1975): 73-78.

4. The President's Commission on the Accident at Three Mile Island, The Need for Change: The Legacy of TMI (October 1979), p. 8.
5. Kemeny Commission, The Need for Change, pp. 10, 21-23, 49-53; Nuclear Regulatory Commission Special Inquiry Group, Three Mile Island: A Report to the Commissioners and to the Public (January 1980), Volume 1, pp. 102-108; NUREG-0600, Investigation into the March 28, 1979 Three Mile Island Accident by Office of Inspection and Enforcement (July 1979), pp. 1-3.
6. Samuel J. Chilk to Lee V. Gossick and Al Kenneke, April 30, 1979, Elmer B. Staats to Richard S. Schweiker, May 15, 1979.
7. SECY-79-330 (May 14, 1979), SECY-79-330A (May 29, 1979), SECY Files; SECY-79-330B (June 12, 1979), SECY-79-330C (July 2, 1979), SECY-79-330D (July 5, 1979), SECY-79-330E (July 30, 1979), SECY-79-330F (September 11, 1979), Samuel J. Chilk to Lee V. Gossick, November 27, 1979.
8. SECY-81-84 (February 2, 1981).
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10. SECY-82-162 (April 15, 1982), Samuel J. Chilk to William J. Dircks, May 19, 1982; "Report of the Peer Advisory Panel ... on Operator Qualifications," March 1982, SECY Files; Senate Committee on Environment and Public Works, Subcommittee on Nuclear Regulation, Nuclear Accident and Recovery at Three Mile Island: A Special Investigation (Staff Studies), Serial No. 96-14, July 1980, p. 92.
11. Subcommittee on Nuclear Regulation, Nuclear Accident and Recovery at Three Mile Island, pp. 91-102; J. R. Wargo, "Draft NRC Training Revisions Require More Simulator Use," Nuclear Industry, 30 (August 1983): 20-21.
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