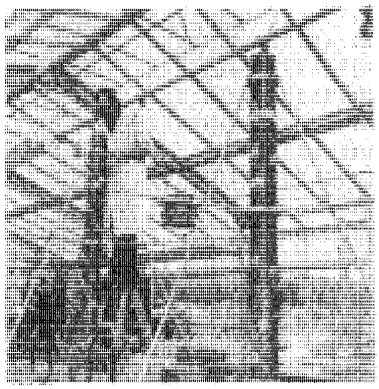
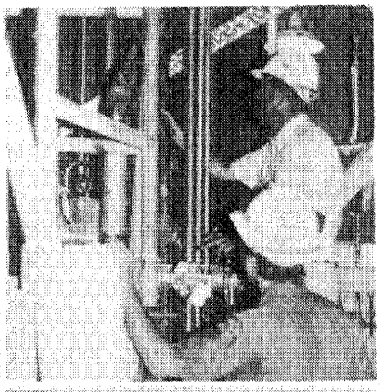
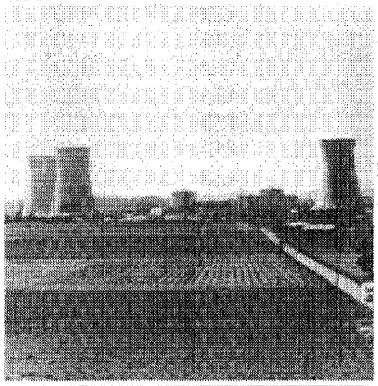
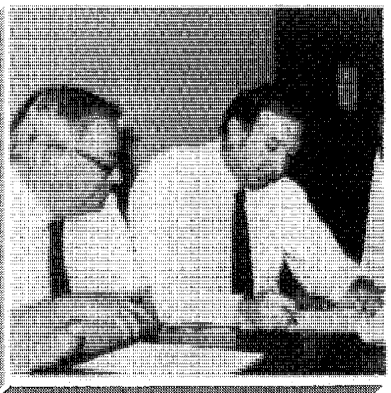
U.S. NUCLEAR
REGULATORY COMMISSION

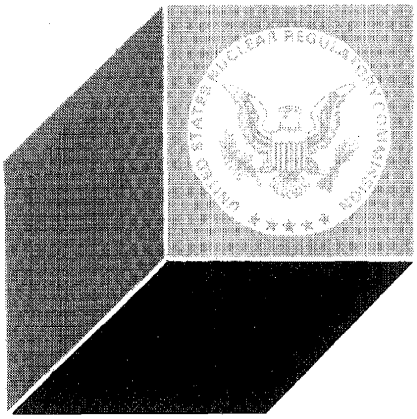
1982
Annual Report











June 17, 1983

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

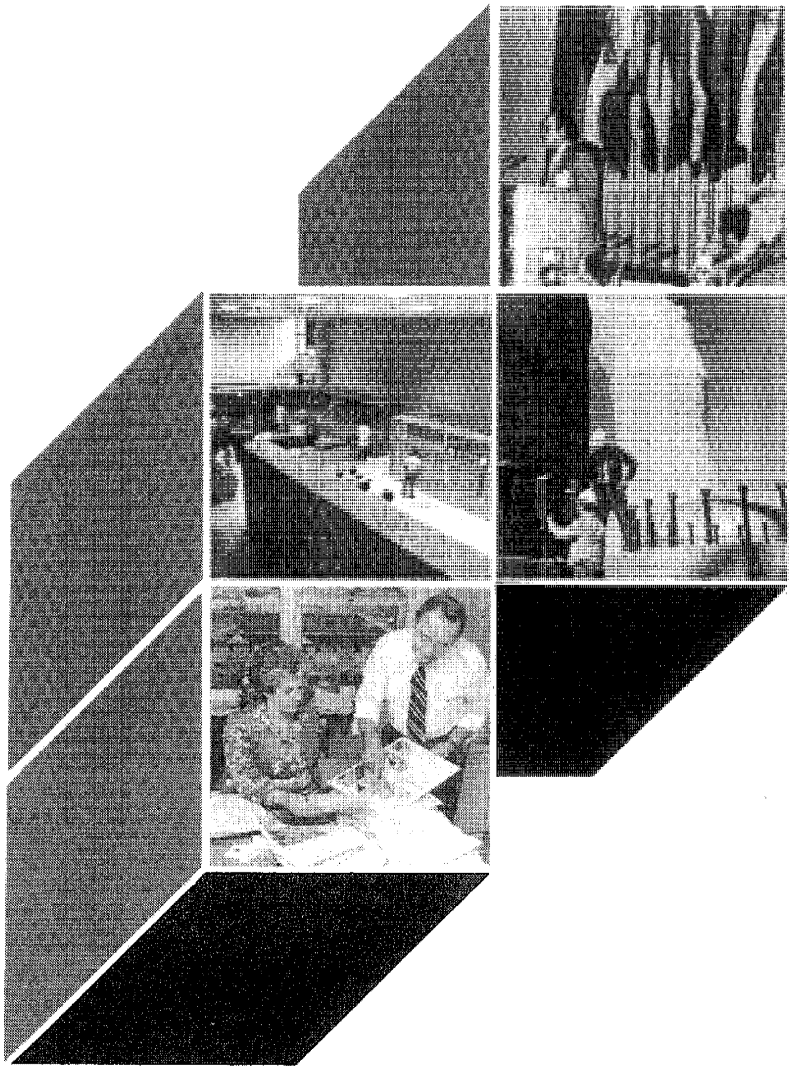
This Annual Report for 1982 of the United States Nuclear Regulatory Commission is forwarded for your transmittal to the Congress, as required by Section 307(c) of the Energy Reorganization Act of 1974.

The report is devoted mainly to coverage of events and activities occurring in fiscal year 1982, with additional treatment of events after that period where circumstances warranted.

Respectfully

Nunzio J. Palladino
Chairman

1982 Annual Report



U.S. NUCLEAR
REGULATORY COMMISSION

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APPENDICES:

NRC Annual Report
Statutory Reporting Requirements

ENERGY REORGANIZATION ACT OF 1974, AS AMENDED

Section 307(c) directs the Commission to include in its Annual Report statements and descriptions concerning:

". . .the short-range and long-range goals, priorities, and plans of the Commission as they relate to the benefits, costs, and risks of nuclear power." (See Chapter 1 for overall statement. Specific goals concerning nuclear power reactors are also discussed in Chapter 2; operating experience in Chapter 4; fuel cycle in Chapter 5; safeguards in Chapter 6; waste management in Chapter 7; inspection, enforcement and emergency preparedness in Chapter 8; nuclear nonproliferation in Chapter 10; and nuclear regulatory research in Chapter 11.

". . .The Commission's activities and findings in the following areas—

"(1) insuring the safe design of nuclear power plants and other licensed facilities. . ." (For reactors, see Chapters 2 and 11; materials facilities ,devices and transportation packages, Chapters 5 and 11; waste facilities, Chapters 5 and 11.)

"(2) investigating abnormal occurrences and defects in nuclear power plants and other licensed facilities. . ." (See Chapters 2 and 4.)

"(3) safeguarding special nuclear materials at all stages of the nuclear fuel cycle. . ." (See Chapters 5 and 11.)

"(4)" investigating suspected, attempted, or actual thefts of special nuclear materials in the licensed sector and developing contingency plans for dealing with such incidents. . ." (Chapters 6, 8 and 11.)

"(5) insuring the safe, permanent disposal of high-level radioactive wastes through the licensing of nuclear activities and facilities. . ." (See Chapter 7.)

"(6) protecting the public against the hazards of low-level radioactive emissions from licensed nuclear activities and facilities. . ." (See Chapters 2, 5 and 11.)

Section 205 requires development of "a long term plan for projects for the development of new or improved safety systems for nuclear power plants" and an annual updating of the plan. (See Chapter 11.)

Section 209 requires the Commission to include in each Annual Report a chapter describing the status of NRC's domestic safeguards program. (See Chapter 6.)

Section 210 directs the Commission to submit "a plan providing for the specification and analysis of unresolved safety issues relating to nuclear reactors," and to include progress reports in the Annual Report thereafter concerning corrective actions. (See Chapter 2.)

NUCLEAR NONPROLIFERATION ACT OF 1978

Section 602 requires annual reports by the Commission and the Department of Energy to "include views and recommendations regarding the policies and actions of the United States to prevent proliferation which are the statutory responsibility of those agencies. . ." (See Chapter 10.)

ATOMIC ENERGY ACT OF 1954, AS AMENDED

Section 170i directs the Commission to report annually or indemnity operations implementing the Price-Anderson Act which provides a system to pay public liability claims in the event of a nuclear incident. (See Chapter 9.)

PUBLIC LAW 96-295

Section 303 directs the Commission to report annually a statement of—

"(1) the direct and indirect costs to the Commission for the issuance of any license or permit and for the inspection of any facility; and

"(2) the fees paid to the Commission for the issuance of any license or permit for the inspection of any facility." (See Chapter 13.)

PUBLIC LAW 97-415

Section 10(c) requires that the "Commission include as a separate chapter a description of the collaborative efforts. . .by the Commission and the Department of Energy with respect to the decontamination, cleanup, repair or rehabilitation of facilities at Three Mile Island Unit 2. . ." (See Chapter 3.)

1
NRC Highlights of 1982

This is the eighth annual report of the U.S. Nuclear Regulatory Commission, covering the major actions, events and planning that occurred during fiscal year 1982, with some additional treatment of events taking place in the last quarter of 1982. Section 307(c) of the Energy Reorganization Act of 1974 requires that this annual report be submitted to the President for transmittal to the Congress. Other statutory requirements are set forth on the preceding page. The most recent of these was included in the NRC's authorization legislation for fiscal years 1982/83 (PL 97-415) and calls for a separate chapter on the collaborative efforts being undertaken by the NRC and the Department of Energy to bring about a thorough and expeditious cleanup of the Three Mile Island Unit 2 nuclear power plant. Chapter 3 responds to this directive. Other chapters cover the agency's various functions and areas of activity, including reactor regulation, nuclear materials regulation, safeguards, waste management, inspection and enforcement, emergency preparedness, cooperation with the States and other nations, research, licensing proceedings and litigation, adminstrative matters and communications services.

This highlights chapter deals with actions and decisions taken in 1982 which represent important advances toward the realization of NRC policy goals adopted in 1981, and with the most recent policy and planning guidance.

Streamlining and Stabilizing the Process

The first full year of NRC operations under the Chairmanship of Dr. Nunzio J. Palladino saw a number of important new developments in the agency's structure and its way of doing regulatory business. There was a change on the Commission itself when James K. Asselstine was appointed Commissioner on May 15, 1982, replacing Peter Bradford, who had resigned from the Commission on February 18 (see Chapter 13 for Commission and major staff changes). A significant staff realignment took place in November 1981, with the creation of the post of Deputy Executive Director for Regional Operations and Generic Requirements (DEDROGR) and of the Committee to Review Generic Requirements (CRGR), which is chaired by the DEDROGR.

The work of the CRGR in 1982 was pivotal in the implementation of a policy goal promulgated in 1981 that calls for regulatory requirements to be brought under tighter control and coordination. The volume of post-Three Mile Island requirements being issued from several different offices of the NRC had evoked a protest from affected licensees that a heavy, unpredictable load of new requirements coming down with the force of law was counter-productive and even detrimental to safety. The need for an organizational element to filter out unjustifiable demands and to serve as focal point for issuance of necessary requirements led to creation of the review committee.

Action was taken during the year on other policy fronts as well. Pursuant to the goal of streamlining the licensing process, the Regulatory Reform Task Force came forward with a number of proposals. Some of these changes are internal adjustments designed to reduce delays and eliminate the slack from procedures and schedules, especially in the conduct of licensing hearings. But other proposed changes would go beyond tightening schedules and sharpening issues to avoid delays. These measures, which will require new legislation, "hold the promise of bringing a new and lasting stability to the regulatory regime for nuclear power in America," in the words of Chairman Palladino. The changes involve three closely inter-related concepts: the use of standardized power plants with designs that would be valid for

On May 17, 1982, James Asselstine was sworn in as a member of the Nuclear Regulatory Commission to serve a term ending June 30, 1987. Mr. Asselstine had previously served as Associate Counsel of the Senate Committee on Environment and Public Works, and as Minority Counsel for that committee's Subcommittee on Nuclear Regulation. Earlier, he served as Assistant Counsel for the former Congressional Joint Committee on Atomic Energy, and as a staff attorney in the Regulations Division of the NRC's Office of Executive Legal Director.

many years into the future; the availability of preselected plant sites, approved in advance of specific applications; and the authority to issue a combined construction permit and operating license. Given explicit assurance that there would not be any changes required in a selected standard design (except in extraordinary circumstances), applicants could more confidently make plans to build a nuclear plant. The advance approval of the design, and also of the sites available, would remain in effect for a substantial period, 10 years or so, and be renewable thereafter. Standardization in design would stimulate standardized programs of quality control; make for better, faster training of operators and workers; and generate learning useful to a whole class of reactor operators. A legislative package incorporating these and other steps calculated to give greater stability and predictability to nuclear power regulation is to be submitted to Congress in early 1983. The task force is also considering reforms in NRC policy regarding backfitting, or making facilities already licensed for construction or operation comply with the latest requirements placed upon plants in the planning or early construction stages. Because of the expense involved in construction delays or interrupted operation, as well as in the purchase of equipment at these plants, it is important that backfit requirements be fully justified and documented in terms of a demonstrable and significant safety improvement.

The licensing process was further facilitated in 1982 by the elimination of former requirements that, before an operating license could be issued, a need for the new electrical power in the area served by the facility had to be demonstrated and explicit consideration be given, if power was needed, to an other-than-nuclear source to provide it. The Commission concluded that these pre-licensing demands, intended to accommodate provisons of the National Environmental Policy Act, were not necessary or desirable. The Commission also acquired statutory authority in 1982 to issue and make immediately effective any amendment to an operating license upon a determination by the Commission that the amendment involved no significant hazard to public health and safety. Thus an amendment may be issued even though a hearing on it may be still pending.

Reorganization and Regionalization

As noted above, a Committee to Review Generic Requirements (CRGR) determines whether a proposed requirement will contribute significantly to the protection of public health and safety, and if it entails an unnecessary burden on industry or agency resources. With respect to the backlog of regulatory actions—mainly those accumulated through the period when much of the NRC's time and effort was diverted to Three Mile Island followup—the DEDROGR was assigned responsibility to oversee the ordering of priorities and implementation of these corrective and precautionary actions at nuclear power plants.

The CRGR focuses primarily on proposed new requirements, but it also reviews existing requirements that may place unnecessary burdens on industry or agency resources and examines other NRC documents, such as license amendments, unless they refer only to requirements or staff positions already approved by the Commission or the EDO.

CRGR reviews are based upon an array of criteria, of which the most prominent are the need for regulatory action, i.e., safety and reduction of the industry burden; risk reduction assessments employing the data base and methodology commonly used in the NRC; assessment of costs to NRC and impact on industry, including, besides financial costs, such factors as occupational dose increase or added operational complexity; and other considerations.

As of December 31, 1982, the CRGR had held 28 meetings with a total of 67 agenda items. Of these, the committee recommended that 7 be approved, 23

be approved after modification, 2 not be approved, and 15 be returned to the sponsor and resubmitted after more staff work. It also was decided that a number of the items submitted did not call for CRGR review.

The number of items to be considered by the CRGR is expected to range from 70 to 80 items per year. The long range CRGR agenda is updated monthly; in the near term, CRGR meeting announcements, including agenda, are issued about two weeks prior to each meeting.

Reducing the Backlog of Licensing Actions. The responsibility for overseeing the reduction of the backlog of actions has been assigned to the DEDROGR and his staff. Priorities and procedures have been developed to bring down the backlog as expeditiously as that can be done with the limited resources available. Many of the approximately 5,000 operating reactor licensing actions pending at the start of 1982 were part of the TMI Action Plan implementation, but others have been awaiting staff action for years. Reduction of the backlog in 1982 was faster than anticipated, mainly because of a reduction in the volume of additional licensing actions coming in during the period to less than half of that projected. The latter reduction is attributable to the screening activities of the CRGR. To speed up the reduction of the backlog even further, over 300 licensing actions were assigned to the regional offices for resolution.

Enlarging the Role of Regional Offices. Late in 1981, the Commission concluded that there would be advantages to bringing regulatory functions as close as practicable to the people and facilities affected by them. Consequently the Commission developed policy goals calling for expansion of the NRC regional office operations.

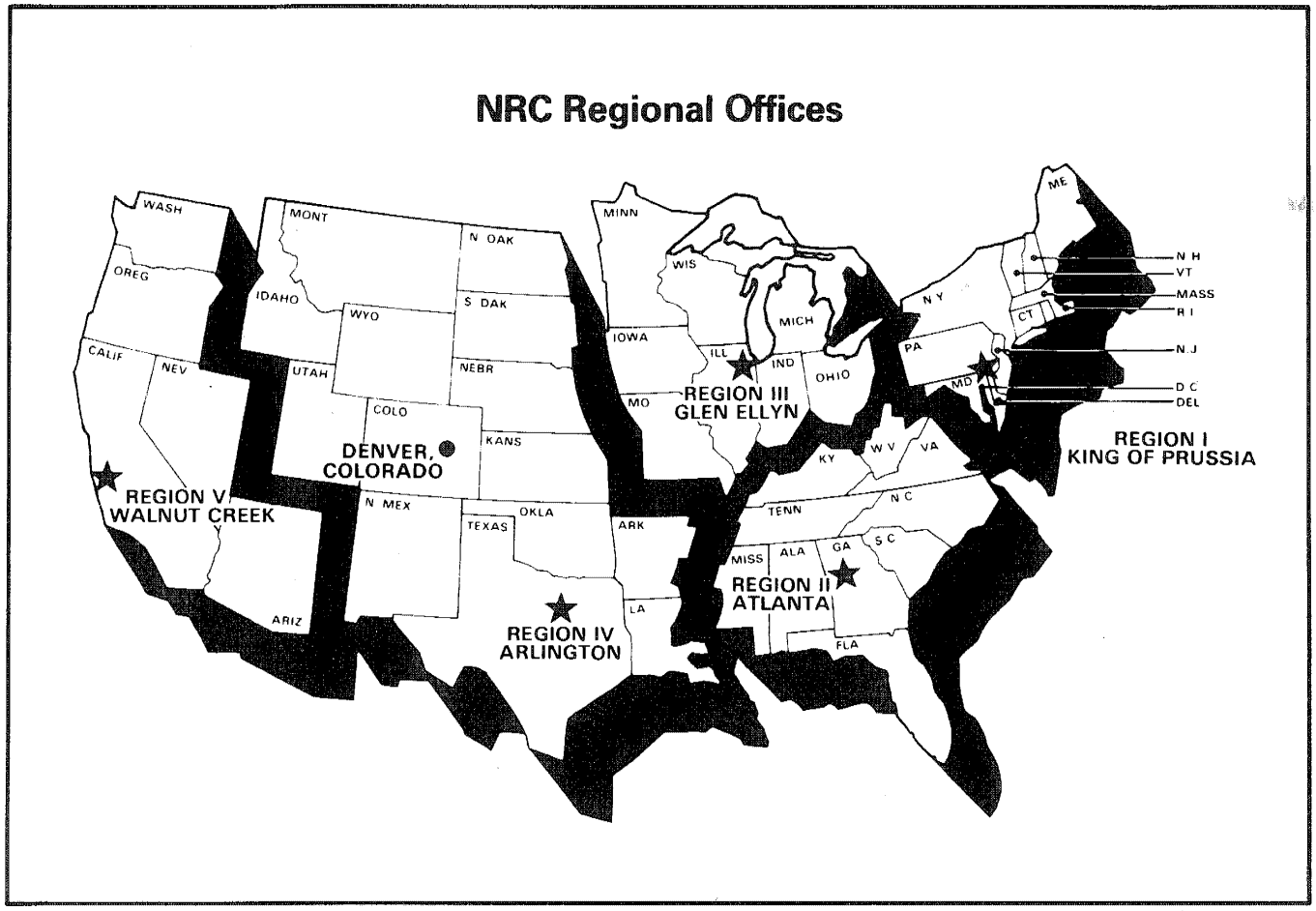
As a first step in enlarging the role of regional offices, the NRC organizational structure was changed, in October 1981, to bring the regional offices under direct control of the EDO, and the new DEDROGR post was created to assist the EDO in managing regional operations. Through 1982 the scope of regional activity was carefully expanded and, if the approach proves worthwhile, gradual expansion will be continued.

The NRC has decentralized its operations on a limited basis in the past. The resident inspector program, some materials licensing, reactor operator licensing, and some operating reactor licensing actions have been introduced on the regional level. Resident inspection has now been fully implemented: each site with an operating reactor has at least one resident inspector assigned to it, as has each construction site with a reactor facility at least 15 percent complete. The resident inspector program is generally considered successful in increasing the effectiveness of the inspectors and improving the quality of interaction between the NRC and licensees. The most important advantage of decentralization seems to lie in the improved access of regulator and regulated to each other, with improved access, closer communication and first hand interchange becoming commonplace.

Early in 1982, headquarters and regional offices identified regulatory activities that might be decentralized successfully. The planning assumptions for moving these functions to regional offices were incorporated into the budget process for fiscal years 1983 through 1985. Transfers include the assigning of the implementation stages of licensing programs for several categories of materials licenses to Regions I (Philadelphia) and III (Chicago). The Region III office has also assumed some reactor operator licensing functions. Both materials and operator licensing are continuations of pilot programs that have been in place for two-to-four years. For operating power reactors, 364 pending licensing actions were transferred to the regions for technical review and safety evaluation. In October 1982, the NRC opened a Denver field office to administer uranium recovery licensing. Limited authority for issuing license amendments for the Fort St. Vrain reactor in Colorado was transferred to Region IV (Dallas) in December. And plans call for continued shifts in fiscal year 1983, with materials licensing authority going to Regions II (Atlanta), IV and V (San Francisco), license amendments authority for non-power reactors to Regions I, IV and V, and additional administrative functions going to all regions. The various headquarters activities that were transferred to the regions in fiscal year 1982 and the transfers planned during fiscal years 1983 through 1985 are set forth in tabular form in Chapter 13.

The responsibility for licensing program areas is assigned by law to the directors of licensing offices in NRC headquarters. That responsibility will not be transferred. Instead, the authority to implement the licensing programs will be delegated to Regional Administrators. The headquarters program offices will continue to set policies and oversee the implementation of regional activities in their particular areas of responsibility. And program offices will carry out evaluations of regional implementation of their programs. These prerogatives of the headquarters offices are important to assuring consistency in regional operations. Their management oversight activities are complemented by other mechanisms for maintaining coordination, feedback and information exchange among regions and headquarters.

As the decentralization process unfolds, it will be important to maintain at the headquarters level the expertise needed for resolving complex generic issues—such as pressurized thermal shock and steam



An NRC reorganization in 1982 saw a number of headquarters functions transferred to regional offices. A new field office also was opened in Denver, Colorado, to administer the licensing of uranium recovery operations. Creation of the Denver office was accomplished as some nuclear materials licensing functions were transferred from the headquarters Office of Nuclear Materials Safety and Safeguards to Region IV in Dallas, Texas, which will administer the Denver sub-office.

generator tube integrity (see Chapter 2)—and for conducting the highly specialized reviews of nuclear power plant applications for construction permits and operating licenses. These activities will not be regionalized. As construction permit and operating license activity decreases over the next several years, the activities of technical review organizations in headquarters will shift toward servicing the technical needs of the regions in such activities as processing license amendments, resolving new generic issues as they arise, and formulating and interpreting regulatory policy. Thus headquarters offices will have to maintain the level of technical capability needed to accommodate the changing character of their workloads.

Actions and changes brought about in the various program areas by the move to decentralization within the NRC are treated in subsequent chapters of this report, wherever relevant.

Noteworthy Events of 1982

Safety Goals Published for Comment. The Commission first affirmed its intention to develop a safety policy statement in a document sent to the President's Office of Science and Technology Policy in late 1979. The document contained the NRC's comments in response to the report of the President's Commission on the Three Mile Island accident. The objective was to put forward an expression of the ultimate purpose of nuclear regulation in the United States, an articulation of the basic safety concept with sufficient clarity to be usable by the NRC staff, the licensees, the Congress and the general public.

In February 1982, the Commission issued for public comment a "Proposed Policy Statement on Safety Goals for Nuclear Power Plants" (47 FR 7023). The policy statement expressed the Commission's views on safety philosophy, the role of safety-cost tradeoffs

in NRC safety decisions, and the acceptable level or radiological risk to the public health and safety created by nuclear power plant operation. The policy statement may be considered the Commission's preliminary answer to the question, "How safe is safe enough?" The statement was accompanied by a series of questions on basic issues related to the safety policy with a request for comment.

More than 160 individuals and groups submitted written comments on the statement and responses to the questions. To obtain even broader public response, a series of one-day meetings was arranged in certain major cities during 1982. Transcripts of these meetings, together with the written comments— including those of the Advisory Committee on Reactor Safeguards and the NRC staff—are being considered by the Commission in its revision of the February 1982 proposed policy statement. A revised safety goal policy statement will be published early in 1983. It will carry a discussion of the Commission's plans for evaluation and ultimate implementation of the policy in the regulation of nuclear power plants.

Severe Accident Rulemaking. Severe accident issues received greater attention following the Three Mile Island accident and were addressed in considerable detail in the TMI Action Plan, issued in May of 1980 (NUREG-0660). One of the tasks defined in the action plan, "Rulemaking Proceeding on Degraded Core Accidents," envisioned a long-term rulemaking effort beyond 1982 which would establish policy, goals and requirements related to potential severe core-melt accidents, i.e., accidents whose consequences exceed those allowed for in the design of the reactor and its built-in defenses. On October 2, 1980, the Commission issued an advance notice of rulemaking inviting public comment on long term proposals for treating severe accident issues.

On January 4, 1982, the staff submitted a policy statement on severe accident rulemaking to the Commission; a revised version of the paper went to the Commission in November. The policy statement proposed that, instead of a long-term generic rulemaking effort, there be a short-term severe accident rulemaking which would certify specific standard plant design applications. Final decisions on severe accident considerations for operating plants and plants under construction can be accomplished in parallel with the standard plant reviews.

The policy statement on severe accidents is being circulated to all affected nuclear power plant licensees and applicants, and other interested parties, for comment.

Financial Qualification Review Eliminated. In March 1982, the NRC amended its regulations to eliminate the financial qualification review of utilities seeking construction permits or operating licenses. In place of a review, the applicant for permit or license must show that it has or can secure the funds to pay for construction and operation and permanent shutdown of the proposed facility and to acquire property damage insurance after issuance of an operating license. The determination was also made that any consideration of the funding for decommissioning of a facility should be eliminated from the current licensing process; decommissioning is part of an ongoing rulemaking procedure.

Office of Investigations Established. In order to improve the NRC's capability to perform thorough, timely and objective investigation of alleged violations of regulations or other improper actions with safety implications by licensees or permittees or their agents, the NRC Office of Investigations was established in 1982, staffed by investigative personnel transferred from the Office of Inspection and Enforcement and the regional offices. (See Chapter 13 for Commission and major staff changes.)

Hearings on Restart of TMI-1. On November 9, 1982, the Commission conducted a day of hearings in Harrisburg, Pa., on the question of whether Three Mile Island Unit 1, which has been shut down since the accident to Unit 2 in March of 1979, should be restarted. All five commissioners were in attendance to hear statements and exchanges on all aspects of the issue from numerous interested parties. At year's end, the matter had not been decided. (See Chapter 3).

Policy and Planning Guidance for 1983

Each year every member of the NRC staff is provided with a document which sets forth the basic policy positions of the Commission on important issues to enable the staff to frame program plans and objectives accordingly. The policy and planning guidance for 1983 (NUREG 0885) deals with seven major themes: the safe operation of licensed facilities; near term licensing problems; coordinating regulatory requirements; improving the licensing process; waste management and the Three Mile Island cleanup; improvements in certain regulatory methods; and safeguards. Certain salient aspects of each of these themes and associated planning guidance are capsulized below.

Safe Operation of Licensed Facilities. The highest NRC priority continues to be that operating nuclear facilities maintain adequate levels of protection of the public health and safety. Licensees and their suppliers bear the principal responsibility for the safe design, construction and operation of these facilities and there will be prompt and vigorous response by the NRC wherever licensees are found to be in violation of regulations.

Planning Guidance: On-site inspection of operating reactors should continue to focus directly on the operations of licensees, using data analysis and systems assessment to help focus inspections; special attention will be given licensees with poor performance histories.

Near-Term Licensing Problems and Responses. Actions should be taken to eliminate all unwarranted delay in reaching regulatory decisions, especially through the more efficient conduct of licensing hearings. But nothing should be done in the name of efficiency which could constitute a compromise in safety of a licensed operation.

Planning Guidance: Staff reviews and public hearings should be completed on schedules that assure that the licensing process will not of itself occasion unnecessary delay in startup of operations of a completed facility; it should not ordinarily take more than 11 months from the issuance of a final supplementary safety evaluation report to an operating license decision by the Commission, even assuming the action is contested.

Coordinating Regulatory Requirements. Strong measures are needed to control the volume of new requirements and to see to it that they genuinely and significantly contribute to greater safety, in themselves and in the context of the protections already in place. Cost-benefit evaluations are indicated for proposed requirements involving incremental reductions in residual risk.

Planning Guidance: The Committee to Review Generic Requirements should continue to exercise control over the issuance of new requirements according to the criteria currently employed (see "CRGR Tasks and Activities," earlier in this chapter). Where conflicting priorities in establishing and impelmenting new requirements exist, the potential risk reduction to be realized by a new requirement will be determinative.

The EDO shall establish a mechanism for controlling the issuance of specific backfit requirements for individual licensees and have it in place in 1983. By mid-year the EDO should submit for Commission approval a priorities list of generic safety issues—including Three Mile Island-related issues —based upon the potential safety significance and implementation costs of each.

Improving the Licensing Process. Substantial improvements in the licensing process will be sought in 1983, including improved opportunities for public participation in the process. Standardization, early site approvals and one-step design review and approval will, if Congress agrees, be introduced into the construction permit application process, and internal reforms, such as changes in the hearings formats and the role of the NRC staff in the hearings will be studied.

Planning Guidance: The Regulatory Report Task Force has identified the issues to be addressed, and a senior Advisory Group within the NRC is advising the Chairman on appropriate recommendations to lay before the full Commission. A group of outside experts has also been formed to study the proposed reforms and advise the Commission. Legislative changes will be pursued early in 1983, and adminsitrative remedies will be published for comment at the same time.

Supporting New Initiatives. This policy theme comprises waste management in general and the Three Mile Island cleanup in particular.

The NRC will provide the necessary licensing and regulatory program for the Executive Branch's program for the permanent disposal of high-level radioactive waste. The NRC's work will not delay the implementation of the Executive Branch's program.

Planning Guidance: The Commission will conclude the "waste confidence" proceeding in early 1983 and will issue a proposed rule to implement its decision. Early in the year, the NRC will publish technical criteria for high-level waste repositories. During fiscal years 1983-1985, the NRC should plan to review three site characterization reports for such a repository and then be ready to review a license application to construct the facility, aiming to reach a licensing decision within three and one-half years of receipt of the application from the Department of Energy. (One characterization report was submitted before the end of 1982.) In the meantime, the NRC must be prepared to review industry or government proposals for away-from reactor or at-reactor independent spent fuel storage facilities.

Late in 1982, the Congress passed the Nuclear Waste Policy Act of 1982, which was signed by the President on January 7, 1983. The Act provides for the development of repositories for the disposal of high-level radioactive waste and spent fuel. Among its many provisions, the Act establishes schedules for repository development, defines the roles of the President, the Department of Energy, the NRC, the States and Indian tribes in site selection and repository development and provides funding mechanisms. The effects of the Act on the NRC's waste management plans and programs are under study.

With respect to the Three Mile Island cleanup, it is among the NRC's highest priorities that this be expeditiously completed. NRC will continue to provide oversight and support of the licensee's efforts and, if necessary, will direct the project of decontaminating Unit 2 and removing the radioactive products from the site. NRC should cooperate closely with the Department of Energy on the removal of wastes and reactor fuel and the analysis of any technical data deriving from the accident.

Planning Guidance: NRC monitoring will continue at TMI through a dedicated TMI Program Office. The licensee is directed to submit updated plans and schedules in early 1983, to be reviewed by NRC staff and submitted with their recommendations to the Commission within three months of receipt from the licensee. The latter's financial condition should be monitored as well.

Improving Related Regulatory Tools. This policy theme comprises five discrete subjects: safety goals, risk assessment, radioactive source term/ siting policy, quality assurance, and research. A capsulized treatment of each follows.

Safety Goals: These are covered earlier in this chapter under "Noteworthy Events of 1982." Planning guidance calls for a two-year trial period to test their utility and regulatory implications.

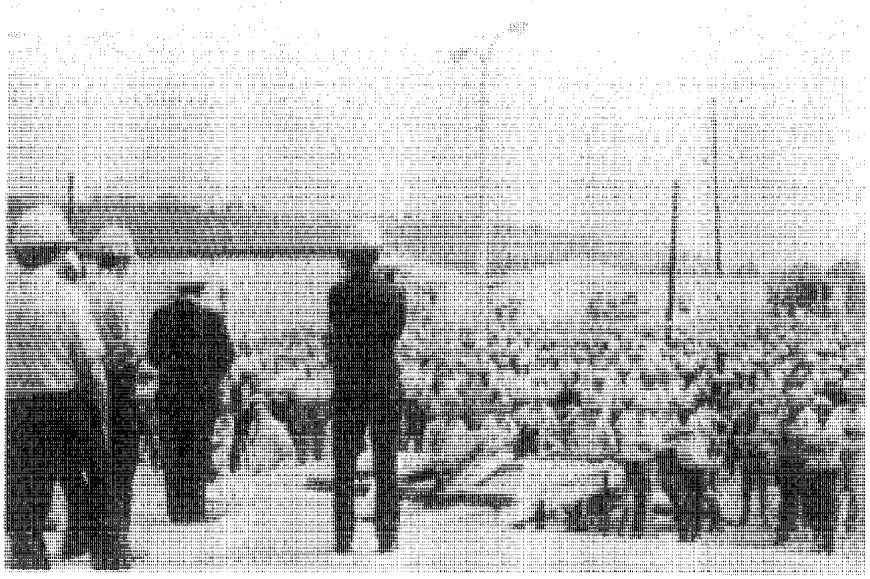
Risk Assessment: Probabilistic risk assessment techniques are to be used judiciously by NRC staff and licensing boards, as directed by the Commission, to help guage the relative importance of various potential accident sequences in nuclear power plants. Planning guidance calls for special attention to the uses of these techniques during the safety goals implementation trial period and in such applications as the resolution of generic safety issues, giving full consideration to uncertainties inherent in this methodology.

Radioactive Source Term/Siting Policy: The Commission has decided to seek a better definition of its safety objectives and a better characterization of the radioactive source term (inventory of potential radioactive releases resulting from a nuclear plant accident), before proceeding with new siting regulations. Planning guidance calls for an interim reassessment of the radioactive source term by February of 1983, and a more comprehensive one by the end of the year. A new siting rule may be propounded after the safety goals trial period, if the Commission deems it necessary in light of all information availabe then, including a newly defined source term.

Quality Assurance: The NRC and the industry must strengthen their Quality Assurance programs, especially implementation thereof, and programs for plants under construction and awaiting licensing review warrant priority attention if costly delays are to be avoided. Planning guidance calls for a study of the use of "designated representatives," similar to those employed by the Federal Aviation Administration, who would act as agents of the regulatory authority while employed by the regulated industry. The NRC should, in time, formalize its relationship with the industry's Institute for Nuclear Power Operations (INPO) with respect to confirming adequate quality assurance at nuclear facilities by means of INPO inspections.

Research: NRC research is carried out for the purpose of providing the technical basis for rulemaking and regulatory decision; to support licensing and inspection activities; to assess the feasibility and effectiveness of safety improvements; and to increase understanding of phenomena for which analytical methods are needed in the regulatory process. Plan-

As the NRC's 1982 reorganization and regionalization program got under way, Commission Chairman Palladino visited the regional offices on a number of occasions. He is shown here at the Region III Incident Response Center in Glen Ellen, Ill., taking a lesson on the use of a computer to calculate off-site radiation dose rates.

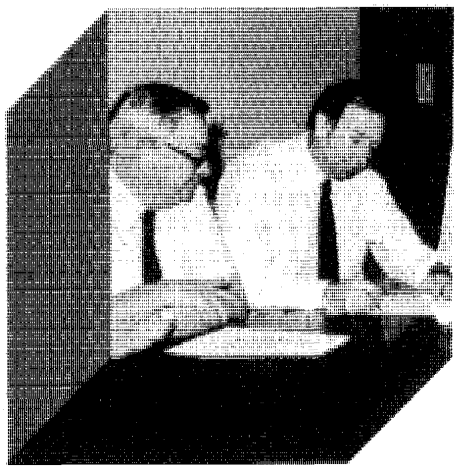


The need for emphasis on improved quality assurance during construction was addressed in a number of ways during 1982, and was programmed in the agency's planning guidance for additional emphasis in future years. At the Zimmer Nuclear Plant near Cincinnati, Ohio, instances of intimidation of NRC quality control inspectors led to the calling of a meeting of construction workers by NRC's Region III Administrator James G. Keppler, shown left addressing the assembled workers.

ning guidance calls for a balanced program of research supportive of regulatory needs, research to reinforce or revise the current regulatory base, and research to improve reactor safety. The highest priority research will go to light water reactor safety. Annual revisions of the long-range research plan will be submitted for agency-wide and Commission review, and a new report showing regulations likely to be significantly affected by specific research programs, with schedules for expected changes and identification of resources allocated to the relevant research program, is to be provided to the Commission in 1983 and annually thereafter.

Safeguards. Recognizing that the proliferation of nuclear explosive devices poses a threat to the security interests of the United States, the NRC will continue to ensure that effective controls are applied to the import and export of nuclear materials, equipment and facilities, and will continue to meet its commitments for implementation of safeguards requirements of the International Atomic Energy Agency (IAEA) at U.S. licensed facilities and work to improve safeguards worldwide. Domestically, safeguards regulations of the NRC should be formulated and enforced according to the same defense-in-depth philosophy that informs safety regulation.

Planning Guidance: Internationally, the NRC will continue to work with Executive Branch agencies to strengthen IAEA safeguards; the staff will keep the Commission apprised of further developments concerning U.S. participation in IAEA activities, which is undergoing reassessment by the Department of State. Domestically, emphasis should be given to performance requirements rather than prescriptive requirements, to allow licensees to select the most cost-effective ways to satisfy NRC requirements. The safety-safeguards relationship should be re-examined with a view to reducing the impact of safeguards on safety without relaxing the overall level of protection currently provided. The reform amendments related to nuclear materials control and accounting should be submitted to the Commission in early 1983.



2 Reactor Regulation

The Office of Nuclear Reactor Regulation (NRR) is responsible for reviewing applications for construction permits and operating licenses for nuclear reactors and for issuing such permits and licenses after consideration by the Advisory Committee on Reactor Safeguards, Atomic Safety and Licensing Boards and Appeal Boards, and the Commission. It is also responsible for regulation of operating reactors. These functions require resolution of generic and specific issues with regard to safety, the environment, and antitrust matters.

The chapter summarizes NRR activities during fiscal year 1982, under the following headings: Status of Licensing, Improving the Licensing Process, Human Factors, Unresolved Safety Issues, Safety Reviews, Protecting the Environment, and Antitrust Activities. Also included in this chapter is a section on the activities of the Advisory Committee on Reactor Safeguards.

Status of Licensing

Applications for Operating Licenses For Power Reactors

During fiscal year 1982, NRC reactor licensing activity was focused primarily on applications for operating licenses for those nuclear power plants to be completed in 1982 and 1983. Operating licenses were issued for five plants, listed in Table 1. A total of 45 Safety Evaluation Reports and Supplements were issued for 21 plants, and 10 Final Environmental Statements were completed for 17 plants. Review schedules for plants to be completed through 1985 were established to preclude any projected licensing delays.

There are several cases where special problems have arisen. Among them are the following:

Diablo Canyon (Cal.) Units 1 and 2 are being subjected to an independent design and construction verification program because of certain errors discovered there; the testing and low-power operating license for Unit 1 has been suspended since November 1981. The applicant for Zimmer (Ohio) Unit 1 is continuing work on a quality confirmation program to ensure that the plant was designed and constructed in accordance with the application; in November 1982, the Commission ordered that all safety-related work at Zimmer be suspended. With regard to the restart of Three Mile Island (Pa.), Unit 1, all hearing issues except that of possible psychological stress in the community (which is under litigation) are before the Commission to determine whether the NRC Order of August 9, 1979, suspending operattion should be lifted; the key concern affecting plant readiness is repair of the steam generator.

During fiscal year 1982, utilities announced cancellation of plant construction of the following units for which construction permits had been issued: Callaway (Mo.) Unit 2, Shearon Harris (N.C.) Units 3 and 4, Hope Creek (N.J.) Unit 2, WNP (Wash.) Units 4 and 5, Phipps Bend (Tenn.) Units 1 and 2, and Hartsville (Tenn.) Units B1 and B2.

Applications for Construction Permits Or Manufacturing Licenses

During fiscal year 1982, utilities announced the cancellation of the following plants for which construction permits had not yet been issued: Perkins (N.C.) Units 1, 2, and 3; Black Fox (Okla.) Units 1 and 2, Pebble Springs (Ore.) Units 1 and 2, and Al-

THE LICENSING PROCESS

Obtaining an NRC construction permit—or a limited work authorization, pending a decision on issuance of a construction permit—is the first objective of a utility or other company seeking to operate a nuclear power reactor or other nuclear facility under NRC license. The process is set in motion with the filing and acceptance of the application, generally comprising ten or more large volumes of material covering both safety and environmental factors, in accordance with NRC requirements and guidance. The second phase consists of safety, environmental, safeguards and antitrust reviews undertaken by the NRC staff. Third, a safety review is conducted by the independent Advisory Committee on Reactor Safeguards (ACRS); this review is required by law. Fourth, a mandatory public hearing is conducted by a three-member Atomic Safety and Licensing Board (ASLB), which then makes an initial decision as to whether the permit should be granted. This decision is subject to appeal to an Atomic Safety and Licensing Appeal Board (ASLAB) and could ultimately go to the Commissioners for final NRC decision. The law provides for appeal beyond the Commission in the Federal courts.

As soon as an initial application is accepted, or "docketed," by the NRC, a notice of that fact is published in the *Federal Register*, and copies of the application are furnished to appropriate State and local authorities and to a local public document room (LPDR) established in the vicinity of the proposed site, as well as to the NRC-PDR in Washington, D.C. At the same time, a notice of a public hearing is published in the *Federal Register* and local newspapers which provides 30 days for members of the public to petition to intervene in the proceeding. Such petitions are entertained and adjudicated by the ASLB appointed to the case, with rights of appeal by the petitioner to the ASLAB.

The NRC staff's safety, safeguards, environmental and antitrust reviews proceed in parallel. With the guidance of the Standard Format (Regulatory Guide 1.70), the applicant for a construction permit lays out the proposed nuclear plant design in a Preliminary Safety Analysis Report (PSAR). If and when this report has been made sufficiently complete to warrant review, the application is docketed and NRC staff evaluations begin. Even prior to submission of the report, NRC staff conducts a substantive review and inspection of the applicant's quality assurance program covering design and procurement. The safety review is performed by NRC staff in accordance with the Standard Review Plan for Light-Water-Cooled Reactors, initially published in September 1975 and updated periodically. This plan states the acceptance criteria used in evaluating the various systems, components and structures important to safety and in assessing the proposed site, and it describes the procedures used in performing the safety review.

The NRC staff examines the applicant's PSAR to determine whether the plant design is safe and consistent with NRC rules and regulations; whether valid methods of calculation were employed and accurately carried out; whether the applicant has conducted his analysis and evaluation in sufficient depth and breadth to support staff approval with respect to safety. When the staff is satisfied that the acceptance criteria of the Standard Review Plan have been met by the applicant's preliminary report, a Safety Evaluation Report is prepared by the staff summarizing the results of its review regarding the anticipated effects of the proposed facility on the public health and safety.

Following publication of the staff Safety Evaluation Report, the ACRS completes its review and meets with staff and applicant. The ACRS then prepares a letter report to the Chairman of the NRC presenting the results of its independent evaluation and recommending whether or not a construction permit should be issued. The staff issues a supplement to the Safety Evaluation Report incorporating any changes or actions adopted as a result of ACRS recommendations. A public hearing can then be held, generally in a community near the proposed site, on safety aspects of the licensing decision.

In appropriate cases, NRC may grant a Limited Work Authorization to an applicant in advance of the final decision on the construction permit in order to allow certain work to begin at the site, saving as much as seven months time. The authorization will not be given, however, until NRC staff has completed environmental impact and site suitability reviews and the appointed ASLB has conducted a public hearing on environmental impact and site suitability with a favorable finding. To realize the desired saving of time, the applicant must submit the environmental portion of the application early.

The environmental review begins with a review of the applicant's Environmental Report (ER) for acceptability. Assuming the ER is sufficiently complete to warrant review, it is docketed and an analysis of the consequences to the environment of the construction and operation of the proposed facility at the proposed site is begun. Upon completion of this analysis, a Draft Environmental Statement is published and distributed with specific requests for review and comment by Federal, State and local agencies, other interested parties and members of the public. All of their comments are then taken into account in the preparation of a Final Environmental Statement. Both the draft and the final statements are made available to the public at the time of respective publication. During this same time period NRC is conducting an analysis and preparing a report on site suitability aspects of the proposed licensing action. Upon completion of these activities, a public hearing, with the appointed ASLB presiding, may be conducted on environmental and site suitability aspects of the proposed licensing action (or a single hearing on both safety and environmental matters may be held, if that is indicated).

The antitrust reviews of license applications are carried out by the NRC and the Attorney General in advance of, or currently with, other licensing reviews. If an antitrust hearing is required, it is held separately from those on safety and environmental aspects.

About two or three years before construction of the plant is scheduled to complete, the applicant files an application for an operating license. A process similar to that for the construction permit is followed. The application is filed, NRC staff and the ACRS review it, a Safety Evaluation Report and an updated Environmental Statement are issued. A public hearing is not mandatory at this stage, but one may be held if requested by affected members of the public or at the initiative of the Commission. Each license for operation of a nuclear reactor contains technical specifications which set forth the particular safety and environmental protection measures to be imposed upon the facility and the conditions that must be met for the facility to operate.

Once licensed, a nuclear facility remains under NRC surveillance and undergoes periodic inspections throughout its operating life. In cases where the NRC finds that substantial, additional protection is necessary for the public health and safety or the common defense and security, the NRC may require "backfitting" of a licensed plant, that is, the addition, elimination or modification of structures, systems or components of the plant.

Table 1. Licenses Issued in 1982 for Operation of Nuclear Power Plants*

Applicant	*Facility*	*Low Power*	*Full Power*	*Location*
Southern California Edison Co.	San Onofre 2	2/16/82	9/7/82	San Diego Co., CA
	San Onofre 3	11/15/82	—	
Commonwealth Edison Co.	LaSalle 1	4/17/82	8/13/82	Seneca, IL
Mississippi Power & Light Co.	Grand Gulf 1	6/16/82	—	Vicksburg, MS
Pennsylvania Power & Light Co.	Susquehanna 1	7/17/82	11/12/82	Berwick, PA
South Carolina Electric & Gas Co.	Summer 1	8/6/82	11/12/82	Columbia, SC

*No Limited Work Authorizations or Construction Permits for nuclear power plants were issued during 1982. One Manufacturing License was issued, on December 17, 1982, permitting the manufacture of eight standardized floating nuclear power plants by Offshore Power Systems of Jacksonville, Fla., a subsidiary of the Water Reactor Division of Westinghouse Electric Corporation.

lens Creek (Tex.). No new applications for construction permits for nuclear power plants have been received since 1978. The status of current applications for construction permits and manufacturing licenses is discussed below.

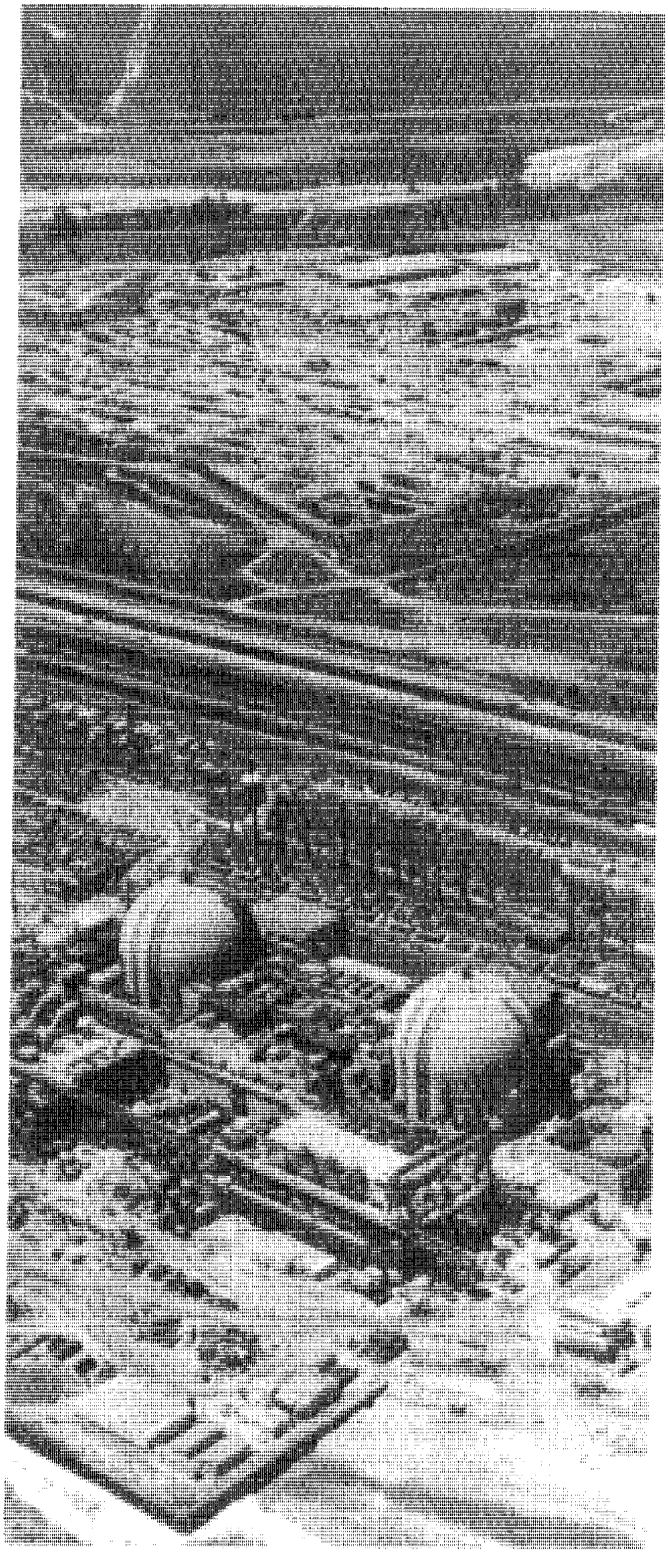
Clinch River Breeder Reactor. Under the direction of the newly established Clinch River Breeder Reactor (CRBR) Program Office, active review of the application for a construction permit for the CRBR plant was resumed in early fiscal year 1982. The previous review effort, suspended in early 1977, left many important technical issues unresolved, such as the kind and amount of energy released by a hypothetical core-disruptive accident and the effects on mechanical systems of high-temperature operation. Also requiring consideration are major new regulatory initiatives taken in the intervening years, especially the Three Mile Island Action Plan.

In December 1981, the applicants—the Department of Energy, the Project Management Corp., and the Tennessee Valley Authority—submitted a request to the Nuclear Regulatory Commission to be exempted from certain procedural requirements in order to begin site preparation before a public hearing was held. On March 5, 1982, the Commission denied this special request, and the applicants continued to pursue the more customary limited work authorization (LWA-1), which permits site-preparation work to commence after a public hearing but prior to issuance of a construction permit.

In June 1982, the NRC staff issued an update to the Site Suitability Report of March 1977 which reaffirmed the earlier conclusion that the Clinch River site is suitable for a reactor of the general size and type proposed, with respect to considerations of radiological health and safety. The Advisory Committee on Reactor Safeguards concurred in that conclusion by a letter of July 13, 1982. At the end of July 1982, a Draft Supplement to the Final Environmental Statement of February 1977 was issued for a 45-day period of public comment. The Draft Supplement stated that, although projected environmental impacts have changed in some instances from those reported in the Final Environmental Statement, the overall conclusion remains unchanged. It calls for the issuance of a construction permit, subject to certain limitations for the protection of the environment.

Having been petitioned a second time to permit site-preparation activities to begin, the Commission granted the applicants' request for exemption on August 5, 1982, and such activities commenced on September 22, 1982. A petition by the intervenors regarding the legality of the exemption granted by the Commission was pending before the U.S. Court of Appeals for the District of Columbia Circuit at the end of the fiscal year. The applicants have submitted a request for the type of limited work authorization (LWA-2) which permits certain safety-related construction to start after site preparation is completed but prior to the issuance of a construction permit. This request was under review by the NRC staff at the close of the report period.

The Atomic Safety and Licensing Board presiding in the Clinch River case has divided the LWA hearing into separate sessions on site suitability and environmental matters. The site suitability portion of the



NRC reduced its licensing backlog substantially in 1982, initiating some 800 new actions, but completing more than 2700 such actions. Included were both low power (February 16, 1982) and full power (September 7, 1982) licenses for Southern California Edison's San Onofre Unit 2, (dome on left) and a low power license for Unit 3, at right (November 15, 1982).

hearing was completed in late August 1982. Plans for fiscal year 1983 envision issuance of the Supplement to the Final Environmental Statement by November 1982, start of the environmental segment of the LWA hearing in mid-November, and issuance of the Safety Evaluation Report in March 1983. A decision on whether to grant a construction permit is anticipated in fiscal year 1984.

Skagit. A Draft Environmental Statement was issued in April 1982 with regard to an application for a construction permit for Skagit Units 1 and 2 to be located at Hanford, Wash. Petitions for leave to intervene have been granted. The Regional Power Council will publish a regional conservation and electric power plan in April 1983, pertaining to the need for the facility. The applicant has been requested to provide additional field data on a geologic feature near the proposed site to permit determination of whether it might constitute a hazard.

Floating Nuclear Plant. A decision of June 30, 1982, by an Atomic Safety and Licensing Board authorized the issuance of a manufacturing license to Offshore Power Systems for the manufacture of eight standardized floating nuclear power plants by the end of 1999. The decision is being reviewed by the Atomic Safety and Licensing Appeal Board.

Licensing Actions for Operating Power Reactors

At the end of fiscal year 1982, 77 power reactors were licensed to operate. There are generally four types of further licensing actions for such operating reactors: (1) license amendment requests, (2) public hearings, (3) orders for modification of a license or exemptions to the regulations, and (4) review of information supplied by a licensee for the resolution of technical issues. With the publication of the "Clarification of TMI Action Plan Requirements" (NUREG-0737) in fiscal year 1981, the backlog of required actions increased dramatically to approximately 5400 at the beginning of fiscal year 1982.

To reduce this backlog, the NRC established strong management controls over the issuance of new requirements and dedicated additional resources to the review of pending actions. As a result, in fiscal year 1982, only 800 new actions were initiated and over 2700 licensing actions were completed. The backlog at the end of fiscal year 1982 was therefore reduced to approximately 3500 actions, which is consistent with the goal of clearing the backlog by the end of fiscal year 1984.

Licensing Actions for Nonpower Reactors

At the start of fiscal year 1982, 66 nonpower reactors—those designed for test, research, and training purposes—held NRC operating licenses. The original licenses had expired for 25 of these. However, the licensees had made applications for renewal, and these were awaiting review. Three of the renewal actions involved contested proceedings.

During fiscal year 1982, renewals of operating licenses were issued for three nonpower reactors. A Safety Evaluation Report was issued for one of the renewals in contention. Draft and Final Environmental Statements were issued for a test reactor. Two reactors were authorized to be dismantled, and two possession-only licenses were terminated. Discovery proceedings continued for two of the contested renewals. About 35 operating license amendments were issued to incorporate physical security plans, changes to technical specifications, and other licensing conditions.

During the latter part of the fiscal year, NRC headquarters staff adjusted its schedules for reviewing license renewal applications in order to accomplish a smooth and gradual transfer of responsibilities for nonpower reactor licensing to the NRC Regions by fiscal year 1985, as currently projected.

Improving the Licensing Processing

Review of Applications

In order to deal with the increase in reviews needed for applications for operating licenses for nuclear power plants through fiscal year 1985, the NRC has implemented a broad range of improvements in its review process. Licensing reviews are scheduled to ensure that regulatory decisions can be made prior to an applicant's estimated date for completing construction, but the NRC has now developed updated independent estimates of construction completion and can use them to verify the applicant's projections. In addition, it has stressed the need for accurate construction estimates by applicants and requested quarterly updated schedules for each facility until issuance of the Safety Evaluation Report.

NRC undertook some redirection of resources from other programs to licensing review during the report period, in order to help eliminate licensing delays. And other steps were taken to streamline the review process, consistent with safety priorities—such as scheduling more comprehensive initial reviews, eliminating repetitive rounds of questions on details of proposed facilities, and issuing draft Safety Evaluation Reports earlier in the review process.

Conduct of Licensing Proceedings

Among the proposed regulatory reforms published in the *Federal Register* during fiscal year 1982 and intended to improve the conduct of licensing proceeding were the following:

- Allowing the greater use of oral rulings during pretrial discovery proceedings and expediting the service of pleadings (46 FR 58279 of December 1, 1981).
- Excepting from the adjudicatory process questions involving military or foreign affairs (47 FR 4490 of February 1, 1982).
- Foreclosing the examination of the need for power or alternative energy sources from operating license proceedings at a time when the construction of a facility is largely completed (47 FR 12940 of March 26, 1982).
- Removing questions of the financial qualifications of state-regulated public utilities in construction permit and operating license proceedings (47 FR 13750 of March 31, 1982).

Licensing Requirements

On January 15, 1982, the NRC published in the *Federal Register* (47 FR 2286) amendments to its safety regulations for power reactors, establishing a set of licensing requirements for then pending applications for construction permits and manufacturing licenses. These requirements stemmed from the ongoing effort to apply the lessons learned from the accident at Three Mile Island Unit 2 in 1979 in such areas as operational safety, siting and design, emergency preparations, and radiation effects.

The NRC has reviewed and revised its policy and procedures for establishing implementation schedules for new requirements. Emphasis is placed on involvement by licensees and owners groups in establishing realistic schedules that are consistent with the safety importance of the requirement and that allow sufficient time for in-depth engineering, evaluation and design, procurement, proper installation, and testing of high-quality equipment.

As an example, on July 16, 1982, the NRC approved the integration of requirements for emergency response capabilities at nuclear power plants— including the Emergency Operations Facility, the Technical Support Center, the Operations

Support Center, a Safety Parameter Display System, and other accident monitoring equipment. Also involved are reviews of control room design and upgrading of emergency operations procedures to enable plant operators to better diagnose and respond to accidents. In place of a specified single completion date for each of these items, NRC staff will develop plant-specific integrated implementation schedules based on inputs from the licensees.

Standardization

In fiscal year 1982, the NRC continued its reviews of the applications for final design approval of the Combustion Engineering CESSAR System 80, which is a standard design of a nuclear steam supply system, and the General Electric GESSAR-238, which is a standard design of the nuclear island in a nuclear power plant. Westinghouse Electric indicated its interest in applying for a final design approval of its nuclear power block design of an advanced pressurized water reactor. The Electric Power Research Institute has initiated discussions with the NRC concerning a program for the development of standard designs for light-water reactors.

On June 2, 1982, the NRC published in the *Federal Register* (47 FR 24044) a request for comments on a "Nuclear Standardization Act of 1982" proposed for submission to Congress for legislative consideration. The proposal provides for design approval and stability of design for standardized nuclear power plants, as well as one-step licensing and early site approval.

Committee to Review Generic Requirements

On June 16, 1982, the NRC approved the charter of the Committee to Review Generic Requirements (CRGR), which has the responsibility to review and recommend to the Executive Director for Operations approval or disapproval of requirements to be imposed by NRC staff on one or more classes of power reactors. The objective is to eliminate unnecessary burdens placed on licensees, reduce the exposure of workers to radiation in implementing some of the requirements, and conserve NRC resources without reducing the levels of protection to the public health and safety. For further discussion of CRGR, see Chapter 1.

Regionalization

During fiscal year 1982, responsibility for certain licensing actions was transferred to the five regions of the NRC. These actions included 365 technical reviews which the regions conduct, together with site visits, to prepare Safety Evaluation Reports for the Office of Nuclear Reactor Regulation, which then takes appropriate licensing action. Regional technical reviews deal with such matters as plant shielding, shift manning, training for mitigating core damage, inservice testing, licensed operator training, and selected plantspecific items. Most of the regional reviews will be completed during fiscal year 1983.

Responsibility for the conduct of reactor operator examinations was transferred to NRC Region III (Chicago) during fiscal year 1982. Preparations to effect a similar transfer to Region II (Atlanta) in early fiscal year 1983 were also completed.

Authority is to be transferred to Region IV (Dallas) for certain types of licensing functions related to the Fort St. Vrain power reactor in Colorado; this is the first case of regionalized reactor regulation. Preparations for the transfer include transmittal of documentation, training of regional personnel, and development of policy and guidance.

Consideration of Regulatory Reform

In November 1981, the Chairman of the NRC formed a Regulatory Reform Task Force to achieve the following:

- To create a more effective and efficient vehicle for raising and resolving legitimate public safety and environmental issues.
- To develop the means for more effective use of NRC resources in the licensing of new plants.
- To avoid placing unjustifiable economic burdens on utilities that may wish to build nuclear plants.
- To accomplish these objectives without impairing the protection of the public health and safety.

The task force is made up of senior staff members from the major NRC Offices concerned with licensing. Since November 1981, the task force has met on a regular basis to consider such major areas of regulatory reform as backfitting, the hearing process, the separation of functions between the Commission and its staff (ex parte rule), and the role of the staff as a party to licensing proceedings. A key issue is backfitting, which entails the modification of a licensed operating facility to meet new requirements derived from advances in reactor design and safety of operation. Before fiscal year 1982, decisions on backfitting were largely ad hoc, without a consistent set of criteria being promulgated. In fiscal year 1982, the NRC set forth the criteria that requirements imposed on the regulated industry are to have

a positive contribution to safety, both individually and when taken as a whole, and that requirements proposed to achieve incremental reductions in residual risk should be evaluated on a cost-benefit basis.

The task force developed a "Nuclear Standardization Act of 1982," published for public comment. Among the items considered in the proposed legislation are combining the construction permit and the operating license for all plants, abolishing the mandatory requirement for a hearing at the construction-permit stage, and permitting early site approval for all plants. The Commission was reviewing the legislation proposed by the task force at the end of the report period with a view toward submitting a legislative package to Congress in early 1983.

Human Factors

To ensure that the functions, capabilities, and limitations of nuclear power plant personnel are appropriately considered in plant design, construction, and operation—for the protection of the public health and safety—the NRC continued the following activities during fiscal year 1982:

- Reviews of plant staffing to ensure that the numbers, functions, and qualification of personnel are adequate.
- Audits of training programs for both licensed and non-licensed plant staff to ensure that personnel are able to meet job performance requirements.
- Administration of operator licensing examinations to ensure the adequacy of operator training and to license qualified candidates.
- Reviews of procedures and testing programs to ensure their adequacy and effectiveness.
- Reviews of nuclear power plant control rooms and remote shutdown panels to ensure that they facilitate rather than complicate the man-machine interface.
- Reviews of management procedures to ensure the adequacy of utility management and organization structure.

Developments in these areas during the fiscal year are discussed below.

The NRC developed its first Integrated Human Factors Program Plan in fiscal year 1982. This plan ensures that proper consideration is given to human factors in the design, operation, and maintenance of nuclear facilities. This initial plan addresses nuclear power plants and describes (1) the technical assistance and research activities planned to provide the technical bases for the resolution of the remaining human factors related tasks described in "The Action Plan Developed as a Result of the TMI-2 Accident," NUREG-0660, and in "Clarification of TMI Action Plan Requirements," NUREG-0737, and (2) the additional human factors efforts identified during implementation of the Action Plan that should receive NRC attention. The plan represents a systematic and comprehensive approach for addressing human factors concerns important to nuclear power plant safety in the fiscal year 1982-85 time frame and will result in the development of the technical basis for establishing human performance criteria to support regulatory decisions.

Personnel Qualifications

A Peer Advisory Panel was established late in fiscal year 1981 to consider alternative requirements for education, training, and experience of licensed operators. In May 1982, this panel recommended that (1) a bachelor's degree should not be required for the positions of reactor operator, senior reactor operator, or shift supervisor; (2) a shift technical advisor should not be required if assurance of appropriate engineering expertise is provided by creating the position of shift engineer; (3) the NRC should be involved in the accreditation of utility training programs and their training staffs, as well as individuals successfully completing such programs; and (4) the required experience for a senior reactor operator with a degree of Bachelor of Science should be less stringent than for one without that degree. These recommendations are under consideration, as are the results of a job/task analysis performed by the Institute of Nuclear Power Operations.

A study initiated in fiscal year 1981 on the feasibility and value of licensing managers and senior licensee officers of nuclear power plants, undertaken in compliance with Section 307(b) of Public Law 96-295, has been completed. On the basis of that study, NRC staff has recommended against seeking to license such personnel.

Training

NRC staff has developed a long-range Training Program Plan that comprises (1) the development of guidelines and criteria for the assessment of training programs in the nuclear power industry; (2) the assessment of training needs; (3) the promotion of awareness in the industry of the variety of instructional methods, with practical applications for nuclear training programs; and (4) the development and implementation of data gathering processes that will help to determine the effectiveness of training.

Preliminary guidelines and criteria have been developed for testing that will eventually be used in auditing training programs in the nuclear power industry. The Instructional Systems Development (ISD) process was used as a model for the development of these criteria, both because Institute of Nuclear Power Operations (INPO) has elected to use this model for their own training guidelines and because the ISD process has been used with great success in both military and civilian settings. The guidelines and criteria have been pilot-tested in vendor training centers and will be tested in selected power plants. The audit criteria will be revised based on this pilot testing.

NRC staff is monitoring INPO's plan for accreditation of industry training programs, while working toward a goal of establishing a regulatory position with respect to accreditation.

Training of personnel to handle pressurized thermal shock was audited at seven key plants (see earlier discussion under Unresolved Safety Issues). Recommendations were made for improving such training.

Pre-operational and startup test programs for 10 operating license applications during fiscal year 1982 included special low-power natural-circulation tests for pressurized water reactors to provide additional operator training. These tests were performed in accordance with the TMI Action Plan and have been completed on all lead units at nuclear power plant sites. The same training is required for follow-on units at the same site but use of a suitable simulator in place of the in-plant test is permitted for that purpose.

Operator Licensing

During fiscal year 1982, the NRC issued 483 new licenses, 177 renewals, and 23 amendments for reactor operators. Similarly, 389 new licenses, 563 renewals, and 23 amendments were issued for senior reactor operators. In comparison with fiscal year 1981, the number of new licenses for reactor operators increased by 59 percent and for senior reactor operators by 24 percent, even though 1981 was an above-average year. Licenses were issued to operators for the first units at the Zimmer (Ohio), Grand Gulf (Miss.), Susquehanna (Pa.), Diablo Canyon (Cal.), and Summer plants (S.C.) and for San Onofre Unit 2 (Cal.). Four new NRC examiners and 32 new contractor examiners either completed their training and started administering examinations or will do so in early fiscal year 1983.

In August 1982, the NRC approved: (1) continuation of requirements for administering simulator examinations to candidates for licenses at power reactors that have plant-specific simulators, (2) discontinuation of simulator examinations at other plants, and (3) development of an oral examination that would be equivalent to a simulator examination and administered to candidates for licenses at power reactor facilities that do not have plant-specific simulators. Starting in fiscal year 1983, one site visit per plant will be scheduled for NRC to administer requalification examinations. The goal will be to examine at least 20 percent of the licensed individuals at each facility on an annual basis.

Fiscal year 1982 was the first full year of operation of the Operator Licensing Section in NRC Region III (Chicago), which is responsible for all

NRC training personnel worked closely with INPO and other industry organizations in developing or improving training techniques and programs for reactor personnel. Here, NRC auditors observe licensee personnel at work in a simulated reactor control room.

phases of examining and licensing operators for facilities located in the region. A similar section became operational in Region II (Atlanta) in September 1982 and another is planned to become operational in Region I (Philadelphia) in fiscal year 1983.

With the assistance of the Oak Ridge National Laboratory, the Pacific Northwest Laboratories, and the Idaho National Engineering Laboratory, the NRC is developing a master data bank of examination questions and answers for use in preparing written examinations. The computerized data base will be available through remote terminals to all examiners, including those at regional offices and national laboratories. Additional data-bank questions have been requested from training organizations at operating plants and vendors in order to make the examinations more plant specific.

A program to validate the current licensing examinations for operators was initiated in August 1982 under contract with the Pacific Northwest Laboratories. This program in the short term is designed to improve licensing examinations and to provide more standardized examinations for greater consistency and efficiency. In the long term, a more reliable and valid new examination and examination process will be developed and validated against objective measures of operator performance.

Procedures

Monitoring of emergency operating procedures was completed in a pilot program for new operating license applications of seven boiling water reactors and 10 pressurized water reactors. A report entitled "Guidelines for the Preparation of Emergency Operating Procedures" (NUREG-0899) was published in August 1982. Implementation of improved emergency operating procedures is expected at all operating plants within the next three years, and the NRC will audit the revised procedures.

A plan for a long-term program has been developed that encompasses a systematic and comprehensive evaluation of existing procedural deficiencies and needs, from both technical and "human-factors" standpoints. Where necessary, guidance will be provided for preparing, using and controlling plant procedures which have potential impact on public health and safety. Development of this guidance will be coordinated closely with the nuclear industry to minimize duplication of effort and maximize the exchange of information.

The NRC reviewed and evaluated the procedures used by licensee personnel in dealing with the rupture of a tube in the steam generator at the Ginna (N.Y.) nuclear power plant on January 25, 1982. The emergency procedures employed were based on interim technical guidelines which were keyed to symptoms and events. Some problems were encountered that made it necessary for the operators to deviate somewhat from the procedures, but overall the procedures were judged to be adequate. Important generic lessons were learned and are being addressed by the NRC staff.

Man-Machine Interfaces

The NRC evaluates the human factors aspects of man-machine interfaces to minimize design-induced human errors in nuclear power plants. The NRC has continued to audit preliminary assessments of control room designs submitted by applicants for operating licenses. During fiscal year 1982, on-site reviews of control room design were conducted at Waterford Unit 3 (La.), Byron Unit 1 (Ill.), Clinton Unit 1 (Ill.), and Perry Unit 1 (Ohio). Followup on site audits were performed at Grand Gulf Unit 1 (Miss.), Summer Unit 1 (S.C.), Three Mile Island Unit 1 (Pa.), and Susquehanna Unit 1 (Pa.).

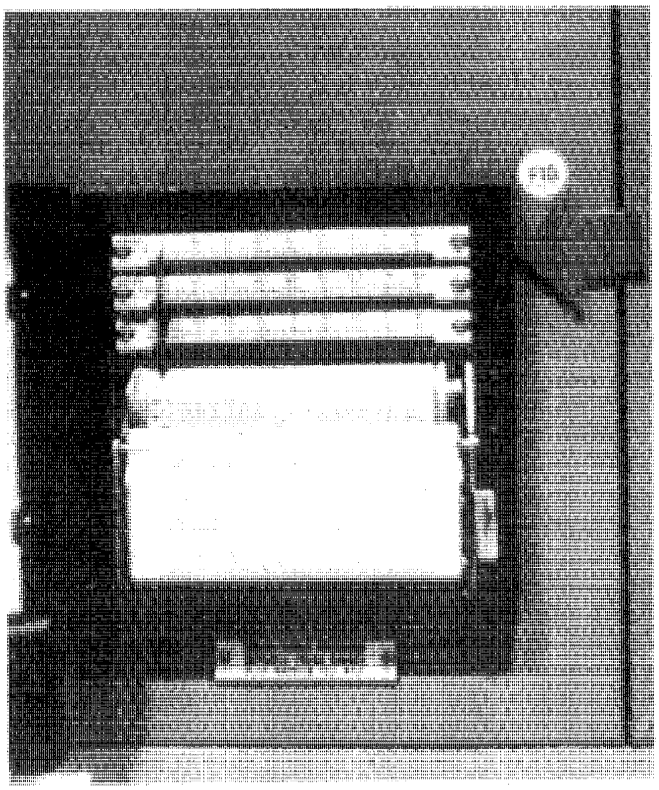
During fiscal year 1982, program plans for review of control room designs were received from Midland Units 1 and 2 (Mich.), Palisades (Mich.), LaCrosse (Wis.), Seabrook Units 1 and 2 (N.H.), Susquehanna Units 1 and 2 (Pa.), WNP Unit 2 (Wash.), Perry Units 1 and 2 (Ohio), and Maine Yankee. The NRC staff, with the assistance of technical consultants, is developing criteria to be used in evaluating these plans and will publish guidance in NUREG-0801.

Each operating reactor is to be provided with a Safety Parameter Display System (SPDS) that is located convenient to the control room operators. The NRC staff, with the assistance of technical consultants, is finalizing criteria to be used in evaluating SPDS designs.

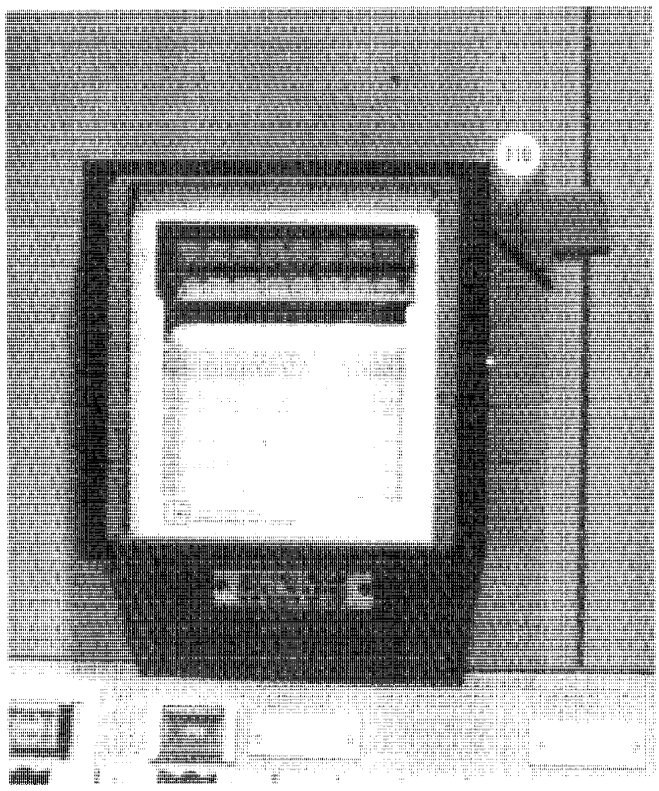
In the area of maintenance, a comprehensive program plan is being prepared for publication early in fiscal year 1983. This plan will address activities associated with design for maintainability, maintenance procedures and documentation, maintenance personnel selection and training, preventive maintenance, authorization and control of maintenance work, outage planning and management, and inventory control and management.

Management and Organization

New guidelines are being developed that emphasize the responsibility of the utilities to develop and justify management and organization plans that are adequate for safe nuclear power plant operations. This work seeks to accomplish the following: (1) ensure acceptable management and organizational practices during plant design, construction, and operation; and (2) develop and implement reliable, objective performance-evaluation procedures for use by the NRC staff in assessing the effectiveness of man-



Typical of the problems addressed in NRC's human factors studies is the one posed by this control-room pressure recorder. Photo at top shows three scales at top of instrument. When door to the recorder is closed (bottom), upper scale is masked.



agement and organizational functions—such as operations, security, technical support, and safety review committees—and characteristics such as communication and attitutes toward safety. The earlier guidelines contained in draft NUREG-0731, "Guidelines for Utility Management Structure and Technical Resources," were determined to be too prescriptive.

Management audits of the following 10 plants under construction were conducted during the year by the Office of Inspection and Enforcement, the Office of Nuclear Reactor Regulation, and the NRC Regional Offices: WNP Unit 2 (Wash.), Midland Units 1 and 2 (Mich.), Seabrook Units 1 and 2 (N.H.), Clinton Unit 1, (Ill.), Perry Unit 1 (Ohio), River Bend Units 1 and 2 (La.), and Catawba Unit 1 (S.C.). A management audit was also conducted of Pebble Springs Units 1 and 2 (Ore.), which do not yet have a construction permit. Changes in technical specifications involving changes in organizations of licensees were processed for 35 operating plants.

Unresolved Safety Issues

Section 210 of the Energy Reorganization Act of 1974, as amended, requires that the annual report of the Commission to the President and the Congress shall include progress reports on those items previously identified as "Unresolved Safety Issues" (USIs). The initial identification of these issues is described in the NRC report to Congress entitled, "NRC Program for the Resolution of Generic Issues Related to Nuclear Power Plants" (NUREG-0410, January 1978). Subsequently, 22 of these issues were selected by the Commission specifically because of their importance to the public health and safety in the NRC report to Congress entitled, "Identification of Unresolved Safety Issues Relating to Nuclear Power Plants" (NUREG-0510, January 1979). As the result of the TMI accident and considerable additional operating experience, the Commission identified four additional Unresolved Safety Issues in a report to Congress entitled, "Identification of New Unresolved Safety Issues Relating to Nuclear Power Plants" (NUREG-0705, March 1981). As a consequence of operating experience with severe overcooling transients and results from additional NRC-sponsored research on thermal shock in reactor pressure vessels, the Commission designated Pressurized Thermal Shock as a new Unresolved Safety Issue on December 28, 1981.

SUMMARY OF STATUS

Thirteen of the tasks associated with previously identified issues have now been reported as com-

plete. These are listed at the end of this section, in Table 3, along with their implementation status.

The Unresolved Safety Issues which continue under active consideration are listed in Table 2, together with the present schedule for the completion of work. Important elements in the implementation of these tasks are: (1) the provision of a public comment period after the issuance of the staff's technical resolution, followed by discussion and disposition of the comments received in a final report; (2) provision for the incorporation of the technical resolution into the NRC's Regulations, Standard Review Plan, Regulatory Guides or other official guidance; and (3) provision for application of the final technical resolution to operating plants.

A summary of the status of Unresolved Safety Issues is published quarterly in NUREG-0606. Other generic safety and environmental issues are covered in the Generic Issues Tracking Systems, except that TMI Action Plan items are treated separately in an Action Plan Tracking System.

PROGRESS REPORTS

The following are progress reports on each of the Unresolved Safety Issues under active consideration. For background on earlier phases of some of these issues, see the *1981 NRC Annual Report*, pp. 13-26.

Water Hammer

Water hammer can occur for a number of reasons, such as steam void collapse, steam-driven slugs of water, pump startup into voided lines or inadvertent valve closures resulting in large hydraulic pressure loads. Since 1969, approximately 150 water hammer events have been reported in nuclear power plants. There were 81 such occurrences in boiling water reactors (BWRs) and 67 in pressurized water reactors (PWRs). Approximately half of the reported water hammers occurred during pre-operational testing or during the plant's first year of commercial operation. Approximately half of operating plants have reported a water hammer occurrence, and the damage has been principally confined to pipe supports. Underlying causes are about equally divided between design deficiencies and operator actions.

The brief summary above reflects the results of water hammer evaluations carried out in recent years. In retrospect, this safety issue does not present as severe a concern as was postulated in the mid-1970's, when most of the water hammers occurred and the number of operating plants was increasing. Corrective design changes (e.g., use of J-tubes in top feedring steam generators, "keep-full" systems and vacuum breakers in BWR systems) have been incorporated into the newer plants. Operating experience has also led to a minimizing or avoiding of the incidence of water hammer.

As a result of Task A-1 evaluations and previous generic studies, the following conclusions have been reached: (a) total elimination of water hammer is not feasible in view of the possible coexistence of steam, water and voids in nuclear power plants (particularly BWRs); (b) it is not feasible to predict water hammer in advance because of the complexity of plant systems, the variety of operating conditions, and current analysis limitations; (c) the frequency of water hammer is low and damage has been limited to piping supports; (d) operator training and awareness help reduce frequency of occurrence; (e) plant design modifications help eliminate water hammer; and (f) use of void detection systems would further reduce frequency of occurrences. Water hammer studies have been completed and proposed remedial measures have been prepared for review by the NRC Committee for the Review of Generic Requirements.

PWR Steam Generator Tube Integrity

The problem of steam generator tube integrity was designated an Unresolved Safety Issue in 1978 and Task Action Plans A-3, A-4, and A-5 were established to evaluate the safety significance of degradation in Westinghouse, Combustion Engineering, and Babcock and Wilcox steam generators. These studies were later combined into one effort because of to the similarity of many aspects of the problem among the various vendors. The staff prepared a draft report, NUREG-0844, "Resolution of Unresolved Safety Issues A-3, A-4, and A-5 Regarding Steam Generator Tube Integrity," setting forth a proposed resolution of this issue. This report primarily considers corrosion-related failure mechanisms— such as wastage, stress corrosion cracking, and denting. Recent steam generator experience has indicated that loose parts in the secondary system and flowinduced vibration in a new steam generator design can also be significant contributors to tube degradation.

A steam generator tube failure occurred at the Ginna reactor on January 25, 1982. This failure resulted from a loose part in the secondary system and was extensively investigated by the NRC. Following the NRC investigation of the Ginna tube failure, the Commission requested that an overall set of recommendations be developed concerning steam generator tube integrity (including those from the draft NUREG-0844). Thus, the NRC's proposed requirements for protecting steam generator tube integrity from all significant sources of degradation are to be provided in a single document, "NRC Recommendations Concerning Steam Generator Tube Degradation and Rupture Events." Unresolved Safety Issues A-3, A-4, and A-5 will be considered technically resolved when this report has been approved and issued. (See discussion under "Steam Generators," later in this chapter.)

Reactor Vessel Material Toughness

The principal goal of Task A-11, "Reactor Vessel Materials Toughness," was to develop an acceptable way of performing the safety analysis required by NRC regulations if and when the nuclear reactor pressure vessel (RPV) steel fails to meet the toughness requirements (10 CFR 50, Appendix G, Section V.C). The RPV steel will undergo a loss in toughness during service because of neutron irradiation. (To ensure an adequate margin against failure at high temperatures, it is required that the "Charpy V-notch" impact energy of the RPV steel be no less than 50 ft.-lb. at the "upper shelf"), which is the high-temperature portion of the curve of fracture toughness versus temperature.)

Some older RPV welds were produced under conditions which led to relatively low initial upper-shelf toughness and relatively high sensitivity to neutron radiation (e.g., because of high copper content). In such cases the upper-shelf toughness could be reduced to the level requiring a safety analysis. Because the engineering methodology available for safety analyses involved linear elastic fracture mechanics, the NRC established Task A-11 to provide an elasticplastic fracture mechanics methodology, which would be applicable to the beltline region of a pressurized water reactor vessel and with which an acceptable safety analysis could be performed. The goal was achieved with the help of a team of experts.

The NRC position with respect to the required RPV safety analysis was set forth in NUREG-0744, "Resolution of the Reactor Vessel Materials Toughness Safety Issue." The "For Comment" version of NUREG-0744 was issued in September 1981. The extensive responses received reflect the great interest in the subject. Comments from the public and the NRC staff were considered in the revision of the document. That revision, NUREG-0744 Rev. 1, represents resolution of the Unresolved Safety Issue A-11. Application of the elastic-plastic method described in the document to the analysis of a pressure vessel can be done in a relatively easy, straightforward manner. The useful results of these calculations are the predicted failure stress and amount of crack extension for a given set of steel properties and a postulated initial flaw. The method of analysis in NUREG-0744 Rev. 1 is recommended as an acceptable way to carry out the required safety analysis.

(This safety issue is a major factor in another Unresolved Safety Issue, "Pressurized Thermal Shock," discussed below, at the end of this section.)

Fracture Toughness of Support Materials

During the NRC licensing review for the pressurized water reactors (PWRs) of North Anna Units 1 and 2 (Va.), questions were raised regarding the potential for low temperature fracture of the steam generator and reactor coolant pump supports. Lamellar tearing of the support materials also was of concern. Because other PWRs use similar materials and designs and may face similar problems, these issues were incorporated into the NRC Unresolved Safety Issue A-12.

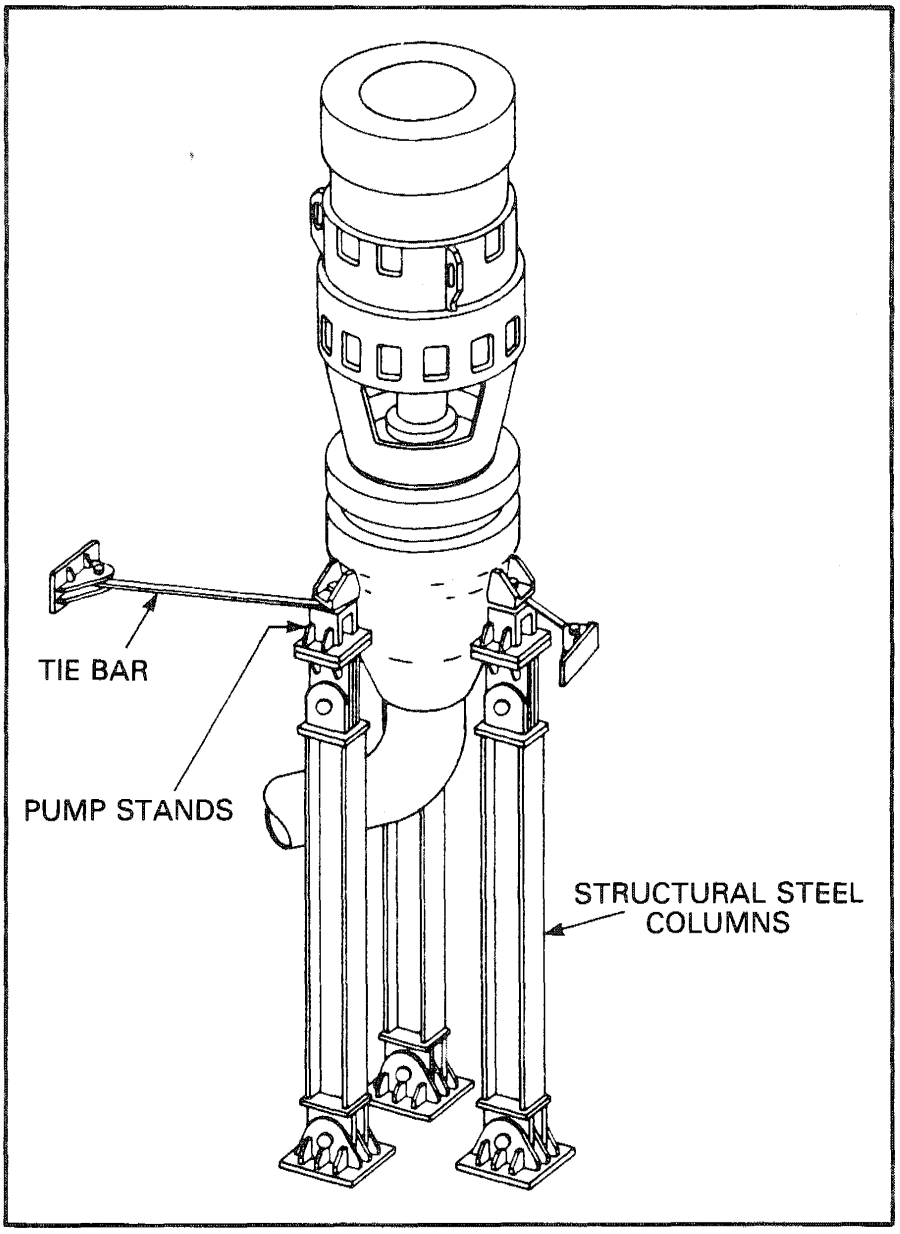
The staff's specific concerns were that inadequate attention might have been paid to the selection of materials for, and fabrication of, the steam generator and reactor coolant pump supports. Adverse consequences included relatively low fracture toughness and possible loss of structural integrity during a design basis accident. The combination of insufficient toughness, low temperature, a flaw, and nonredundancy of critical support members could result in a structural failure. The likelihood of a support system failure is low because it requires the coincidence of many factors, such as these just named, and the occurrence of an initiating event.

A report presenting a technical resolution of the issue, NUREG-0577, was issued for comment in October 1979. It summarized work performed on Task A-12 by the NRC staff and its contractor, Sandia Laboratories. The report described the technical issues, the studies performed by Sandia Laboratories, the resulting NRC staff technical positions and the staff's plan for implementing its technical positions. It also provided recommendations for further work.

Subsequently the scope of Task A-12 was widened to include PWR pressurizer and reactor vessel supports, boiling water reactor pressure vessel and recirculation pump supports, and the very-high-strength bolting materials used in some support structures. Guidance was given to reactor licensees and applicants for compliance with the revised scope.

A significant difference between the "For Comment" NUREG-0577 and the revised guidance was omission of the option of using linear elastic fracture mechanics (LEFM) analyses to demonstrate adequate structural integrity. The LEFM option was replaced in the guidance by prescriptive Charpy V-notch (CVN) and nil-ductility transition (NDT) temperature criteria and a failure consequence analysis. Industry responses included a recommendation to retain the LEFM option and an objection to the high-strength materials criteria.

Because of written responses and meetings with industry representatives, the scope of Task A-12 was again restricted to PWR steam generator and reactor coolant pump supports, and NUREG-0577 is again being revised. The current NUREG-0577 shows how plants can be ranked according to the relative susceptibility of the structural support materials to low fracture toughness. Some materials were judged to have adequate fracture toughness, and no action would be required for plants in which they were



The NRC staff continued its work in 1982 on the questions raised earlier regarding the potential for low temperature fractures in reactor coolant pump supports, among other components. The schematic shown here depicts a typical support structure.

used. Plants with supports made of steel with a relatively high susceptibility to a lessened fracture toughness require additional study. Rankings published in the current NUREG-0577 were considered tentative because it was expected that some plants would be reclassified on the basis of analyses performed by the licensees.

In response to industry requests to specifically permit the use of linear elastic fracture mechanics in structural fracture analyses, the staff has provided guidance in NUREG-0577 as to where such analyses would be applicable.

Because reactor pressure vessel supports were excluded from the scope of Task A-12, the issue of support material embrittlement by neutron irradiation was also excluded. Steam generator and reactor coolant pump supports are exposed to such a low level of neutron radiation that this is not a factor.

The issue of stress corrosion cracking in high-strength bolting materials also was separated from Task A-12. Bolting problems will be considered by the staff as a separate generic issue. Removal of stress corrosion cracking considerations in bolting does not affect the resolution of Task A-12. The materials evaluated in Task A-12 require no stress corrosion cracking criteria. Fracture toughness criteria for bolting materials are available in the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers.

Systems Interactions

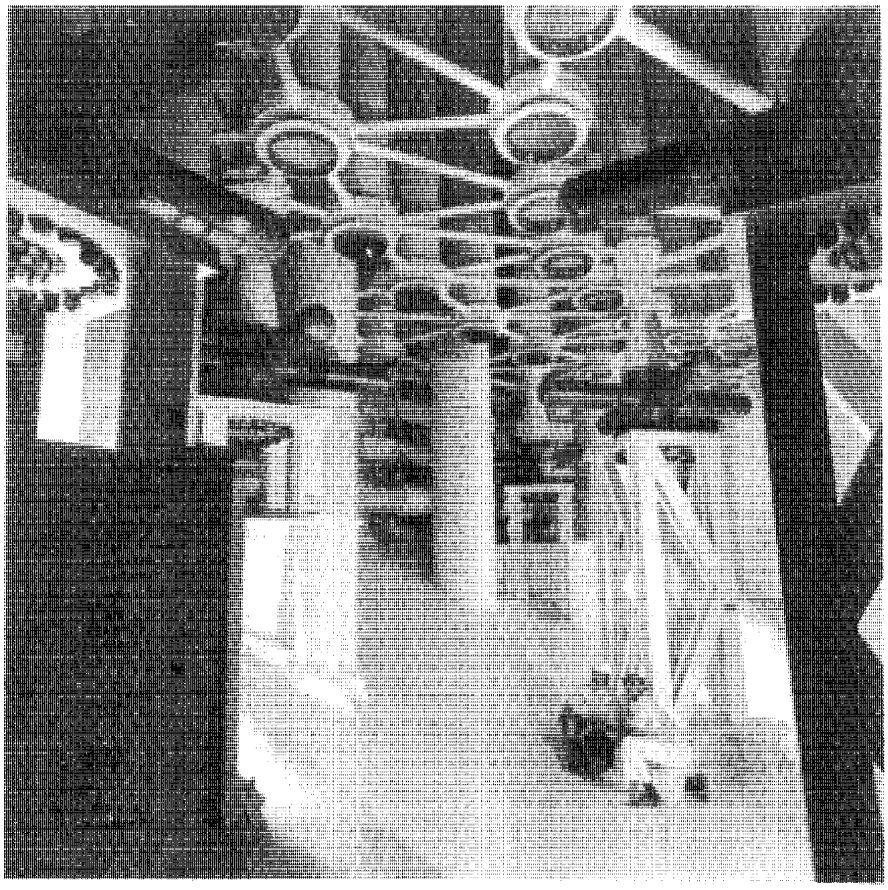
A program to study systems interactions was initiated by NRC staff in May 1978 with the definition of Task A-17, which was reinforced later under Item II.C.3 of the Three Mile Island Action Plan. Systems interactions may jeopardize the independent functioning of safety-related systems. Concern arises because the design, analysis, and installation of systems are frequently the responsibility of teams of engineers with functional specialities, such as civil, electrical, mechanical, or nuclear engineering. Experience at operating plants raises a question as to whether the work of these functional specialists is sufficiently integrated to minimize adverse interactions among systems.

Staff efforts on systems interactions during fiscal year 1982 were directed principally toward completing preliminary guidance for the performance of a comprehensive analysis at light-water reactors and monitoring the performance of the owner's study on Indian Point (N.Y.) Unit 3. During fiscal year 1983, the staff plans to complete development of preliminary guidance, initiate its review of the results of the Indian Point study, and review an analysis of the Midland (Mich.) nuclear power plant.

SRV Pool Dynamic Loads

Task A-39 is a generic program for Mark I, II and III containment designs for BWRs and deals with suppression pool dynamic loads resulting from actuation of safety/relief valves (SRVs). It is also concerned with establishing suppression pool temperature limits to ensure that the BWR plants will operate safely without reaching instability in the suppression pools during steam condensation. (For background, see *1981 NRC Annual Report*, pp. 17-18.) As a result of staff review and evaluation of industry experiments and analytical programs, acceptance criteria for the SRV-related safety issues were established.

Recently, the staff has completed the technical resolution of this issue. NUREG-0661 provides the acceptance criteria for the Mark I containments. For the Mark II containments, interim acceptance criteria were presented in NUREG-0487. However, the staff has evaluated additional data and now recommends more realistic acceptance criteria for the Mark II plants, to be provided in NUREG-0802, which is being issued. The acceptance criteria related to the Mark III plants were also incorporated in NUREG-0802. In addition, NUREG-0763 was is-



NRC's generic study program for certain BWR containment designs addresses suppression pool dynamic loads caused when safety/relief valves are actuated. The wetwell shown here (in the containment of Unit 2, Washington Public Power Supply System) would, during reactor operation, be filled with water to condense escaping steam from the reactor. The perforated pipe ends (on supports) are crossquenchers which disperse steam from safety/relief valves.

sued to provide guidance for SRV in-plant tests with respect to suppression pool temperature limits, and acceptance criteria for pool temperature limits were presented in NUREG-0783.

In summary, the issues related to the BWR pool dynamic loads have been evaluated under Task A-7, A-8, and A-39. Technical resolution has been achieved and presented in the various NUREG reports cited above.

Seismic Design Criteria

It is a regulatory requirement that structures, systems and components important to the safety of nuclear power plants be able to withstand the effects of natural phenomena such as earthquakes. (Regulations regarding earthquake resistance are set forth in Title 10 of the Code of Federal Regulations Parts 50 and 100.) Detailed guidance on acceptable ways of meeting the requirement are presented in various regulatory guides.

Early nuclear power plants were designed without specific seismic design requirements. In the early 1970s, the requirement for seismic resistance was added to the regulations, and rapid advancement in seismic design has taken place since then. As a result, there are generations of nuclear power plants with differing levels of seismic design requirements.

Seismic Design Criteria, Task A-40, comprises short-term efforts to re-evaluate the seismic design of operating reactors and to review seismic provisions of license applications. Technical findings of Task A-40 are documented in NUREG/CR-1161 in the form of specific recommendations for changes to the Standard Review Plan. Recommendations proposed by the NRC staff will be reviewed by the NRC Committee for the Review of Generic Requirements and issued for public comment prior to incorporation into future revisions of the Standard Review Plan.

Containment Emergency Sump Performance

This unresolved safety issue, the subject of Task A-43, deals with safety concerns related to containment emergency sump performance during the period following a loss-of-coolant accident (LOCA). It is essential at such a time that long-term recirculation be provided to prevent core melt. These concerns fall mainly into three areas:

(1) Sump hydraulic performance under adverse conditions such as air ingestion, elevated temperatures and break flow.

(2) LOCA-generated debris resulting from the destruction of large quantities of insulation and its migration to the sump screen(s), resulting in screen blockage sufficient to reduce the net positive suction head for recirculation pumps significantly below what is required to maintain adequate pumping.

(3) The capability of residual heat removal (RHR) pumps and containment spray system (CSS) pumps to continue pumping when subjected to air ingestion, debris ingestion and the effects of particulates.

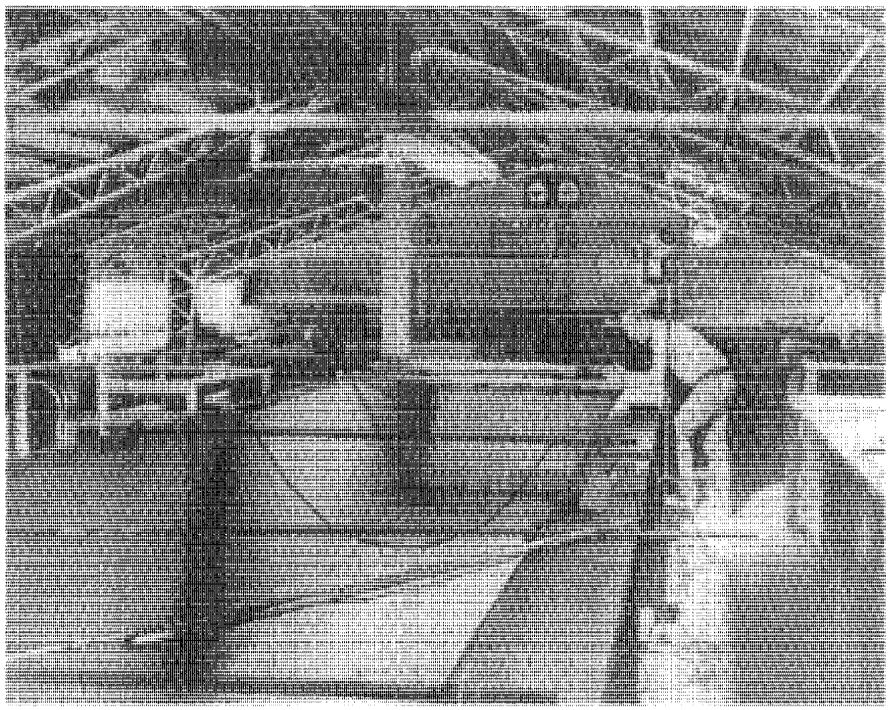
These concerns have been investigated through extensive full-scale sump hydraulic experiments and generic plant studies. The findings can be summarized as follows:

(1) Measurements in extensive, full-scale sump hydraulic tests have shown low levels of air ingestion (1 to 2 percent) and demonstrated that vortex observations cannot be used to quantify sump performance. These experimental results have been used to develop sump hydraulic design guidelines and acceptance criteria based on easily measured parameters.

(2) Generic plant insulation surveys and development of debris calculational methods have shown that debris effects are dependent on the type and quantities of insulation employed and on the plant layout. The results also show that the guidance of 50 percent screen blockage provided in the current Regulatory Guide (RG) 1.82, "Sumps for Emergency Core Cooling and Containment Spray Systems," should be replaced with a comprehensive requirement to assess debris effects on a plant-specific basis.

(3) Reviews of available data on pump air ingestion effects and discussions with the U. S. manufacturers of RHR and CSS pumps show that low levels of air ingestion (up to 2 percent) will not significantly degrade pumping performance and that the types of pumps employed will tolerate ingestion of insulation debris and other types of post-LOCA particulates, which can pass through sump screens.

These results reveal a significantly smaller safety concern with respect to vortex formation and sump hydraulic effects than previously hypothesized, but a greater concern for loss of recirculation cooling capability from debris effects. As a result, resolution of the A-43 safety issue is being proposed through modifications to RG 1.82, "Sump for Emergency Core Cooling and Containment Spray Systems" and NRC's Standard Review Plan, Section 6.2.2, "Containment Heat Removal Systems."



This large flume is a test installation used in evaluating the migration of insulation debris following a LOCA, and the problems it causes by blocking a containment sump screen. A test screen (rear of photo) is similar to those used in containment sumps.

Station Blackout

The loss of all alternating current (a.c.) electric power (from both off-site and on-site sources) is referred to as a station blackout. In the event of a station blackout, the capability to cool the reactor core would be dependent on the availability of systems which do not require a.c. power supplies and on the ability to restore a.c. power in a timely manner. The concern is that the occurrence of a station blackout may be a relatively high probability event that could result in unacceptable consequences (e.g., severe core damage).

The technical studies performed for this issue, under Task A-44, by means of technical assistance contracts with the Oak Ridge National Laboratory and Sandia National Laboratories have been completed. These studies examined the following key elements of the program:

- Loss of off-site power at nuclear power plants.
- Reliability of emergency a.c. power systems at nuclear power plants.
- Station blackout accident sequence probabilities and consequences.

The studies performed by the contractors covered a broad spectrum of nuclear power plant designs. Contractor reports have been prepared for each of these items and have been reviewed by the staff. Issuance of these reports was expected in late 1982.

The plan to integrate these studies into the final proposed resolution of this issue was being developed at the close of the report period. This effort will include the determination of the current likelihood and level of risk represented by station blackout for a spectrum of nuclear plant designs. These results will be compared with other nuclear plant accident risks and the proposed Commission safety goals. The dominant factors affecting risk will be identified, together with recommendations for cost effective improvements. New or revised licensing requirements will be proposed consistent with these findings.

Shutdown Decay Heat Removal Requirements

Although many improvements to the steam generator auxiliary feedwater system were required by the NRC following the Three Mile Island accident, the NRC staff believes that providing an alternative means of decay heat removal could substantially increase the plant's capability to deal with a broad spectrum of transients and accidents, thereby reducing overall risk to the public. (For background, see the *1981 NRC Annual Report*, p. 23.) Under Task A-45, the staff is investigating alternative means of decay heat removal, using existing equipment or devising new methods for pressurized water reactor plants, and is also investigating the need for and possible design requirements for improving the reliability of decay heat removal systems in boilingwater-reactor plants.

The overall purpose of Task A-45 is to evaluate the adequacy of current licensing design require-

Table 2. Schedule for Resolution of Current Unresolved Safety Issues

Task No.	*Unresolved Safety Issue*	*Schedule for Issuing Staff Report "For Comment" as of Sept. 30 1982*	*Schedule for Issuing Final Staff Report as of Sept. 30, 1982*
A-1	Water Hammer	March 1983	Nov. 1983
A-3	PWR Steam Generator Tube Integrity	.....	Dec. 1982
A-4	PWR Steam Generator Tube Integrity	.....	Dec. 1982
A-5	PWR Steam Generator Tube Integrity	.....	Dec. 1982
A-12	Steam Generator and Reactor Vessel Supports	Complete Nov. 1979	April 1983
A-17	Systems Interactions	March 1984	Oct. 1984
A-40	Seismic Design Criteria	July 1983	March 1984
A-43	Containment Emergency Sump	Dec. 1982	July 1983
A-44	Station Blackout	May 1983	Dec. 1983
A-45	Shutdown Decay Heat Removal Requirements	March 1985	Oct. 1985
A-46	Seismic Qualification of Equipment in Operating Plants	Sept. 1983	April 1984
A-47	Safety Implications of Control Systems	March 1984	Oct. 1984
A-48	Hydrogen Control Measures and Effects of Hydrogen Burns	.....	June 1985
A-49	Pressurized Thermal Shock	Sept. 1983	April 1984

ments in order to ensure that light water reactors (LWRs) do not pose an unacceptable risk involving failure to remove decay heat following reactor shutdown. The objective is to develop a comprehensive and consistent set of safe shutdown cooling requirements for existing and future LWRs, including the study of alternative means of shutdown decay heat removal and of diverse systems dedicated exclusively to this purpose.

The program for resolving this issue comprises the following main elements:

(1) Development of criteria to judge acceptability of decay heat removal (DHR) systems in existing and future plants.

(2) Development of means for improvement of DHR systems.

(3) Assessment of existing plants to identify those in which DHR systems require improvement.

(4) Development of a plan for implementing new requirements, if any, for DHR systems required to meet the acceptance criteria above.

Sandia Laboratories was selected as the prime contractor for the program in May 1982. Sandia will provide overall project management, technical direction, and integration for the entire Task A-45 program, including selection and management of subcontractors.

Seismic Qualification of Equipment in Operating Plants

The General Design Criteria for Nuclear Power Plants require that structures, systems and components important to safety shall be designed to withstand the effects of natural phenomena, such as earthquakes, without loss of their capability to perform their intended safety function (10 CFR Part 50, Appendix A, Criterion 2). Guidance for compliance with this requirement is contained in the Standard Review Plan, Section 3.10.

Significant changes in seismic qualification criteria have evolved since commercial nuclear power plants were first introduced. (See "Seismic Design Criteria," above.) Also, analytical and experimental methods used to qualify equipment have changed over the years. Therefore, the seismic resistance of installed equipment may vary considerably. To ensure its operation during and after a seismic event, operating equipment may have to be reassessed.

The objective of Task A-46 is to develop seismic and dynamic qualification methods and acceptance criteria that can be used to assess the capability of mechanical and electrical equipment in operating nuclear power plants to perform their intended safety function during and after a seismic event.

Technical work in support of Task A-46 was initiated in fiscal year 1982 and is progressing on schedule.

Safety Implications of Control Systems

Although the safety systems at nuclear power plants are designed to provide protection regardless of the failure of control systems, there is a recognized potential for accidents or transients being made more severe as a result of certain control system failures or malfunctions. These kinds of failures may occur independently or as a result of the accident or transient taking place. Although it is generally believed that control system failures are not likely to cause transients or accidents which could lead to serious events or conditions that safety systems are not able to deal with, in-depth studies have not been performed to support this belief.

This Unresolved Safety Issue, under Task A-47, calls for in-depth evaluations of control systems that are typically used only during normal startup, shutdown, and load varying plant operations in order to (1) verify the adequacy of current licensing design requirements or, if necessary, to (2) propose additional guidelines and criteria to assure that nuclear plants do not pose an unacceptable risk due to inadvertent non-safety-grade control system failures.

The activities to be performed under Task A-47 were developed and approved in the fall of 1982.

Plant designs of the manual and/or automatic control systems by each of the four nuclear system suppliers (Babcock and Wilcox, Combustion Engineering, General Electric and Westinghouse) will be evaluated. The review will also include the balance-of-plant control systems that interface with the nuclear system designs or dynamically interact with the primary reactor fluid system and the secondary steam system.

To evaluate control system actions that have safety implications, the work effort will focus on the following activities:

(1) Evaluate control system failures that could lead to a steam generator or a reactor vessel overfill transient.

(2) Evaluate control system failures that could lead to a reactor overcooling transient.

(3) Evaluate all other non-safety-grade control systems that have safety implications.

(4) Evaluate the effect of loss of power supplies to the control systems.

The evaluation of these activities will be conducted under contract with the national laboratories. Two PWR plant designs are currently being evaluated by Oak Ridge National Laboratory and a BWR plant design is being evaluated by Idaho National Engineering Laboratory.

Hydrogen Control Measures and Effects Of Hydrogen Burns on Safety Equipment

The accident at TMI-2 on March 29, 1979 resulted in a metal-water reaction of the Zircaloy fuel cladding with the primary coolant which produced hydrogen inside the containment building well in excess of the amounts allowed in the regulations (10 CFR Section 50.44). As a result, the NRC determined that additional hydrogen control measures would have to be considered for nuclear power plants with small and intermediate containment volumes (i.e., Mark I, II and III containments for boiling water reactors and "ice-condenser" containments for pressurized water reactors). As a part of these considerations, the NRC initiated rulemaking proceedings to define the manner and extent to which hydrogen evaluation and other effects of a degraded core must be taken into account in these containment designs. (For background, see 1981 NRC *Annual Report*, pp. 24-26.)

In parallel with the rulemaking efforts and in the course of its licensing review of the first Mark III and ice-condenser plants, the staff imposed licensing conditions on these plants requiring that a hydrogen

control system be installed that will provide adequate safety margins. In addition, the licensees were required to perform research on hydrogen control measures sufficient to confirm the adequacy of the hydrogen control systems.

This Unresolved Safety Issue, Task A-48, is related to the small and intermediate volume containments and the NRC implementation review of the hydrogen control systems installed in the above-mentioned plants to the point that the current licensing conditions for containment hydrogen-control are satisfied. The near-term rulemaking proceedings are the inerting rule for the Mark I and II containments and the hydrogen-control rule for the Mark III and ice-condenser containments. The inerting rule was published on December 2, 1981, in the *Federal Register* as a final rule and requires that all Mark I and II containments be inerted. The hydrogen-control rule was issued for comment on December 23, 1981 (46 FR 62281). The comment period expired April 8, 1982. Publication of a final rule is projected for the first quarter of 1983. This rule would require that all Mark III and ice-condenser plants install a hydrogen control system capable of controlling degraded-core hydrogen releases corresponding to the metal-water reaction of 75 percent of the active fuel cladding.

All nuclear power plants utilizing ice-condenser or Mark III containments in operation or undergoing licensing review have either installed or are committed to the installation of a hydrogen-control system that utilizes glowplug igniters placed throughout the containment volume in a manner to safely consume the hydrogen in multiple burns as it is formed and before it reaches dangerous concentrations in the containment.

The staff provided interim approval in 1980 of the distributed ignition system for the lead ice-condenser plants: Sequoyah (Tenn.), D. C. Cook (Mich.), and McGuire (N.C.). A substantial confirmatory research program was conducted by the owners of the plants to address the issues of ignition qualification, phenomena of hydrogen combustion, equipment qualification and containment structured loading. This owner-funded program has been completed and is currently under review by the NRC staff. The staff's review is scheduled for completion by the end of 1982. During 1982 the staff provided interim approval of the hydrogen-ignition system for the first of the Mark III plants, Grand Gulf (Miss.). The owners of Mark III containment have formed a group, designated the Hydrogen Control Owners Group, to jointly fund a research program to confirm the acceptability of the ignition hydrogen-control system for the Mark III containment. The staff's current schedule for final review of the Grand Gulf hydrogen-control system is the last quarter of 1983.

Pressurized Thermal Shock

Pressurized Thermal Shock (PTS) transients are characterized by an overcooling of the reactor vessel, concurrent with or followed by repressurization. The transients may result from a variety of causes, including instrumentation and control system malfunction, small break loss-of-coolant accident, main steam line break, feedwater systems pipe breaks, and stuck open safety valves in either the primary or secondary coolant systems. Boiling water reactors are not subject to severe PTS transients since their normal operation at saturated conditions makes it extremely difficult to rapidly cool and simultaneously pressurize the primary system. Cold temperature and high pressure must exist simultaneously to cause a PTS concern.

The "fracture toughness" of the plate and weld materials in the beltline region of the reactor vessel are decreased by neutron irradiation. The sensitivity of these materials to irradiation damage and loss of fracture toughness is related to their chemical composition. The specific content of copper, nickel, and phosphorus in the plate and weld materials increases the sensitivity to irradiation and results in a more rapid loss of the fracture toughness properties.

As long as the fracture toughness of the ferritic materials of the reactor vessel remain relatively high, the PTS transients are not expected to challenge the structural integrity of the reactor vessel. However, after the fracture toughness of the materials is substantially reduced by neutron irradiation, PTS transients of sufficient severity may cause reactor vessel failure and subsequent loss of core cooling capability. For that reason, Pressurized Thermal Shock was designated an Unresolved Safety Issue, Task A-49, by the Commission in December 1981.

The NRC staff has held numerous meetings during the report period with the licensees, reactor manufacturers, and reactor owners groups to discuss PTS concerns and exchange technical information related to transient initiation and termination, and potential damage. The licensees of eight plants, representative of the older reactor vessels, were requested to provide detailed information on the present and projected fracture toughness properties of the pressure vessels, the probability of occurrence and severity of the transients, and the efficacy and feasibility of the potential corrective actions. As a result of the review of the detailed information provided by industry and of the independent studies and analyses performed by the staff and their consultants—particularly Oak Ridge National Laboratory and Battelle Pacific Northwest Laboratories—the staff reaffirmed the previous assessment that no immediate plant modifications were needed to protect against PTS transients. Operator training and improvements in plant

Table 3. Formerly Unresolved Safety Issues for Which a Final Technical Resolution Has Been Achieved

Title		*Report Number*	*Date*	*Implementation Status*
A-2	Asymmetric Blowdown Loads	NUREG-0609	Nov. 1980	Additional criteria are being considered for resolution of the issue on remaining operating plants.
A-6	Mark I Short Term Program	NUREG-0408	Dec. 1977	Complete
A-7	Mark I Long Term Program	NUREG-0661	July 1980	Licensees are performing analyses and installing modifications in accordance with Commission order.
A-8	Mark II Containment Pool Dynamic Loads	NUREG-0808	Aug. 1981	Implemented as a part of the OL review of each Mark II containment.
A-9	Anticipated Transients	NUREG-0460	Sept. 1980	A revised proposed rule is being written in light of public comments.[2]
A-10	Boiling Water Reactor	NUREG-0619	Nov. 1980	Thirteen plants have approved implementation plans. Nine plants have proposed plans under review.
A-24	Qualification of Class IE Safety Related Equipment	NUREG-0588 Rev. 1	July 1981	Implementation included in rule-making on environmental qualification in progress.[2]
A-26	Reactor Vessel Pressure Transient Protection	NUREG-0224	Sept. 1978	Complete
A-31	Residual Heat Removal	No Formal Report SRP 5.4.7[1] Rev. 2	1978	Implemented as part of the review for each operating license application.
A-36	Control of Heavy Loads Near Spent Fuel	NUREG-0612	July 1980	Detailed implementation for each licensee in progress.
A-39	SRV Dynamic Loads	NUREG-0802	Sept. 1982	Implemented as a part of the OL review of each Mark II and Mark III containment.
A-42	Pipe Cracks in Boiling	NUREG-0313	July 1980	Licensee responses under review.

[1]SRP denotes Standard Review Plan (see NUREG-0800, Section 5.4.7, July 1981)
[2]The final rule will determine the licensing requirements.

procedures were indicated, and corrective measures have already been initiated, by the licensees on plant-specific basis. However, the staff concluded that hardware and procedural modifications may be required on some facilities in the near future and that the need for, nature of, and timing of such modifications must be determined by plant-specific analyses, rather than requiring modifications on a generic basis.

Among the short-term actions presently under consideration by the staff is the selection of a screening criterion that characterizes the present and projected state of embrittlement of the reactor vessel as a function of neutron flow. The licensees with reactor vessels projected to exceed the screening criterion within three calendar years would be required to submit detailed, plant-specific evaluations to identify any unacceptable risk of PTS and to find ways to reduce

that risk. In particular, the analyses would indicate the following: the extent to which the fracture toughness of the reactor vessel has decreased as a result of neutron irradiation; the expected frequency, course, and consequences of both actual and postulated overcooling events; plant procedures and operator training related to the prevention and/or mitigation of the PTS transients; identification of proposed modifications of plant equipment, systems, and procedures that could reduce the probability and/or severity of PTS; re-evaluation of the inservice inspection requirements to detect flaws and imperfections in critical areas of the pressure vessel; and potential modifications to decrease the rate of neutron damage and/or recovery of the fracture toughness properties of the reactor vessel. The licensees would be called upon to justify on a technical basis the continued operation of such plants, taking into consideration the risk of pressure vessel failure from PTS based on the plant-specific evaluations and the proposed remedial actions.

Long-term actions will be recommended after completion of current research and development programs by industry and NRC. The research is intended (a) to improve procedures and operator training to prevent and mitigate the consequences of PTS transients, (b) to decrease the uncertainty of current PTS analyses, (c) to improve the staff's capability for independent audits and assessments and to confirm probabilistic calculational methods and assumptions, (d) to maximize the benefits of periodic reactor vessel inservice inspection procedures, and (e) to minimize the rate of decrease of the fracture toughness of reactor vessels containing critical impurities in the metal.

Safety Reviews

The review of significant safety concerns in nuclear power plant operation is discussed below, both those general programs that involve a number of reactor systems in numerous plants and specific concerns that involve a particular system, safety feature, or plant.

GENERAL PROGRAMS

Safety Goals

In February 1982, the Commission published for public comment a proposed policy statement concerning safety goals for nuclear power plants (NUREG-0880). The policy focuses on a matter of special public concern at the present time: nuclear power accidents which may result in a release of radioactive materials to the environment. (See discussion in Chapter 1.)

Priorities of Generic Safety Issues

The NRC document on Policy and Planning Guidance for 1982 (NUREG-0885, Issue 1) called for all generic safety issues to be integrated in an agency-wide program. As a first step, NRC staff is considering the priority of each issue, based on its potential safety significance and cost of implementation. Safety importance is gauged by means of an estimated rate of occurrence of events releasing radioactivity, and the resulting public exposure, over the life-time of affected plants. Estimates are also being made of the cost of implementing a resolution of a given safety issue—including the one-time cost of plant modification, the continuing cost of maintenance, and the costs to the NRC of assessing the issue, developing new requirements, and monitoring compliance. Where appropriate, exposures to radiation of workers involved in installing and maintaining a proposed plant modification are also considered. Of 156 generic safety issues studied in fiscal year 1982, 15 were found to be of high priority, 30 of medium priority, and 14 of low priority. Another 18 were recommended to be dropped; 36 were found to be already resolved; 32 were covered in other issues; and 11 were not related to plant safety. Work on setting priorities on generic issues will continue in fiscal year 1983.

TMI Action Plan

The accident at Three Mile Island Unit 2 in 1979 led to a thorough review of NRC regulatory and licensing requirements for facilities with an operating license and for those under application for an operating license. Approximately 70 percent of the requirements for operating reactors that were approved for implementation have been acted upon, and 50 percent have been confirmed by NRC staff review. The remaining issues to be resolved are behind schedule because of difficulty in obtaining hardware or from the inability of the utilities to implement modifications during normal operation.

The NRC staff is now moving to consolidate the remaining activities into a "final-resolution package" to be developed for all licensees and to reflect implementation dates consistent with the priorities established by both the NRC and the licensee for all plant modifications. A number of items in the TMI Action Plan are still under development by the NRC; work on some of the lower priority items was delayed during fiscal year 1982. The status of all the items in the Action Plan is monitored in an Action Plan Tracking System, which is updated quarterly.

TMI-related licensing requirements for applicants for construction permits and manufacturing licenses have been established and are discussed in this chapter under "Improving the Licensing Process."

Quality Assurance

Quality assurance (QA) programs are intended to provide the necessary managerial and programmatic control to assure that nuclear power plants are designed, constructed, and operated safely, in conformance with NRC regulations. Through a QA program, all organizations performing work that is ultimately related to the safety of plant operation are required to conduct the work in a preplanned and documented manner, to independently verify the adequacy of completed work, to provide records that will confirm the acceptability of work and of manufactured items, and to assure that all individuals performing the work are properly trained and qualified. The NRC is responsible for developing criteria and guides for QA programs, for reviewing the programs of each licensee and its principal contractors, for inspecting selected activities, and for requiring the upgrading of deficient programs.

Despite these licensing activities, serious construction problems attributed to inadequate QA program implementation have been identified at several plants. As a result, the NRC is developing other initiatives directed toward improving the implementation effectiveness of QA programs conducted by utilities, establishing clearer guidance to the nuclear industry, and improving the NRC inspection process. Specific instances of construction problems are described below.

Diablo Canyon. In late September 1981, the licensee for the Diablo Canyon (Cal.) nuclear power plant notified the NRC that an error had been detected in the seismic design of supports for equipment and piping located in the containment annulus. Subsequent investigations by the NRC and the licensee revealed the existence of additional errors. On November 19, 1981, the Commission ordered the suspension of the license for testing and low-power operation, which had not yet taken place. The utility was requested to arrange for an independent verification of QA conformance in their design and construction activities. An extensive design and construction verification program is currently under way by both the licensee and an independent auditor. This program must be completed and the results must be accepted by the NRC prior to reinstatement of the license.

Zimmer. Investigations have identified a large number of QA-related problems at the Zimmer (Ohio) nuclear power plant under construction and have, in turn, led to a Commission order of November 12, 1982, to stop all safety-related work until these problems are resolved. The utility is involved in a comprehensive quality confirmation program to determine the extent to which "as-built" hardware meets design and specification requirements, and the NRC is performing independent evaluations and inspections. A revised QA program for the remaining

NRC officials met in February 1982 with representatives of California Governor Edmund G. Brown and intervenor groups to discuss intervenor concerns on seismic design reverification program for the Diablo Canyon nuclear plant near San Luis Obispo, Calif. Earlier, NRC had suspended the low power and testing license because of errors in seismic designs.

design and construction activities will be submitted to the NRC for review.

South Texas. A new architect-engineer has been selected by the utility building the South Texas nuclear power station in order to improve the implementation of the overall design program. A revised QA program was submitted to the NRC and found acceptable. The acceptability of work previously performed is being investigated. The NRC has closely monitored this activity and the remaining design and construction activities to assure that they are being implemented properly and effectively.

Midland. Excessive settlement of safety-related structures at the Midland (Mich.) nuclear power station was mainly attributed to lack of compliance with design and specification requirements and the lack of management supervision with regard to the compaction of earth fill placed under those structures. Remedial actions are being taken. The Midland QA organization will take a more active and responsible role in the future. Corrective actions are under close review and surveillance by the NRC staff.

Systematic Evaluation Program

The Systematic Evaluation Program (SEP) is an ongoing program to assess the adequacy of design and operation of older operating reactors, to compare them with current safety criteria, and to provide the basis for integrated and balanced decisions on backfitting equipment. The review of the ten oldest operating reactors in the nation (Phase II) is on schedule; 852 safety-evaluation topical reports have been completed, and the remaining 23 topic evaluations will be completed in the first quarter of fiscal year 1983. Three Integrated Plant Safety Assessment Reports were issued in fiscal year 1982, involving a review of all discrepancies from current licensing criteria identified during the topic reviews. The integrated assessments of the remaining seven plants of Phase II are scheduled to be completed in 1983.

The systematic evaluation of these plants has improved overall plant safety and has provided a documented perspective of the extent to which the plants conform to current licensing requirements. Some modifications have been made, and some have been identified for implementation. Other areas require further analysis or evaluation to define any necessary modifications. While a number of safety improvements remain to be implemented, the NRC staff has concluded that an adequate basis for continued operation exists at these plants.

Examples of the more significant safety improvements evolving from Phase II include:

- Upgraded seismic resistance, including anchorage of safety-related electrical and mechanical equipment and systems.
- Improved DC power-system availability, including battery testing, DC system monitoring and alarms, and operating procedures to reduce unnecessary DC loads.
- Revision of plant operating procedures for safe shutdown to incorporate use of both safety and nonsafety equipment and alternate water sources for a large variety of event types.
- A structural upgrade program to address several issues from different topic reviews related to structural design at the Ginna (N.Y.) nuclear plant.
- Modification of protective relaying to assure that electrical buses for engineered safety features are not loaded with faulted equipment at the Oyster Creek (N.J.) nuclear plant.

Another objective of the SEP review is the early identification and resolution of any significant deficiences. The results of the SEP seismic re-evaluation of mechanical equipment and piping at Unit 1 of the San Onofre (Cal.) nuclear plant by the licensee showed high stress values for certain equipment piping and supports. These high stress values caused the NRC staff to raise a concern whether existing piping, pipe supports, and mechanical equipment, including anchorage, met the original seismic design basis for San Onofre Unit 1. The licensee proposed to complete the SEP reanalysis and make modifications to the facility to meet a design-basis earthquake of 0.67 g (the acceleration due to gravity), rather than to demonstrate that the facility meets its original design basis of 0.5 g. The licensee committed itself to complete all modifications prior to plant startup, and this commitment was confirmed by a Commission order of August 11, 1982.

The NRC staff is considering a program that continues SEP (Phase III) for additional operating reactors on a reduced number of topics, based on analysis of Phase II.

Probabilistic Risk Assessments

Important analytical tools for the safety evaluation of nuclear power plants are provided by techniques of probabilistic risk assessment (PRA). These techniques include the systematic identification of initiating events that could lead to plant system malfunctions and estimation of the frequency of these events, evaluation of the response of the plant systems and operators to each event, analysis of the likelihood of releases of radioactive material, and evaluation of the consequences of such releases. Application of such techniques—which involve statistical studies of cause-to-effect sequences—has provided useful information on accident sequences, identified strengths and weaknesses in the design and operation of the plants, provided insights into the importance of ac-

cident contributors, and supplied rough estimates of the likelihood of serious accidents.

PRAs have been submitted to the NRC by the licensees for the Zion (Ill.) and Indian Point (N.Y.) nuclear power plants, which are located in high population areas. The Zion PRA was submitted on September 8, 1981, and has been reviewed by the Brookhaven National Laboratory, the Sandia National Laboratories, the Advisory Committee on Reactor Safeguards, and several offices in the NRC. Questions based on these reviews were sent to the licensee on May 18, 1982, and answers were provided on September 6, 1982. The Indian Point PRA was submitted on March 5, 1982, and is being reviewed by the Sandia National Laboratories. A preliminary report from Sandia was finished on August 25, 1982. Evaluations of the Zion and Indian Point PRAs are expected to be completed in late 1982 or early 1983.

Risk estimates by the licensee for the Big Rock Point (Mich.) nuclear power plant have been reviewed by the NRC staff and found credible. The staff is currently reviewing a PRA performed by the licensee for the Limerick (Pa.) nuclear power plant. This review is scheduled for completion in fiscal year 1983. The General Electric Company has submitted a PRA in support of final design approval of the GESSAR-II standardized design of a boiling water reactor (BWR/6 with Mark III containment); review by NRC staff is in process and is scheduled for completion in fiscal year 1984.

Limited PRAs are being performed in support of the Systematic Evaluation Program (SEP) discussed earlier in this chapter. In making decisions on the backfitting of older operating reactors, risk assessment of the specific issues amenable to probabilistic treatment provides useful insight. This has been done for the Palisades (Mich.), Ginna (N.Y.), Oyster Creek (N.J.), and Dresden (Ill.) plants and is scheduled for completion for another six plants by the end of May 1983. Since these analyses involve considerable uncertainties, they are used as only one of several decision tools in SEP.

An Interim Reliability Evaluation Program (IREP) applies PRA techniques to analyze the reliability of the following nuclear power plants: Crystal River Unit 3 (Fla.) with results given in NUREG/CR-2515 of December 1981, Browns Ferry Unit 1 (Ala.) with results given in NUREG/CR-2802 of July 1982, Arkansas Unit 1, Calvert Cliffs Unit 1 (Md.), and Millstone Unit 1 (Conn.). NRR staff is currently developing a proposal for a National Reliability Evaluation Program (NREP) with the goal of providing a plant-specific risk profile to identify strengths and weaknesses in design and operations. The program would be employed in implementing an effective risk management program for operating reactors. A procedures guide for NREP has been prepared.

Equipment Qualification

The NRC requires that equipment important to safety be qualified to operate under seismic, dynamic, and environmental conditions such as may be associated with an earthquake or an accident. To date, most effort in this area has been addressed to the environmental qualification of electrical equipment. The NRC staff, with the assistance of a contractor, is currently evaluating that aspect of reactor operations. As of the end of fiscal year 1982, Technical Evaluation Reports have been issued by the contractor for 33 operating reactors. For the remaining 38 operating reactors, Technical Evaluation Reports are to be completed by March 1983. Safety Evaluation Reports will be prepared after completion of the Technical Evaluation Reports. Licensees will be requested to provide their plans for qualification or replacement of unqualified equipment and schedules for carrying out corrective action. Discussions will then take place among licensees and NRC staff to resolve deficiencies identified in the Safety Evaluation Reports. With regard to applications for operating licenses, 10 Safety Evaluation Reports were issued during the report period and two more were projected to be completed by November 1982, leaving 25 in various stages of review.

The qualification of mechanical and electrical equipment important to safety for operation during and after a seismic event has been designated an Unresolved Safety Issue (see "Seismic Qualification of Equipment," earlier in this chapter). As part of this task, a cost-benefit analysis is being conducted to assess the reduction in risk derived from upgrading safety equipment to meet seismic and dynamic qualifications.

Fire Protection

The NRC fire-protection rule for nuclear power plants became effective on February 17, 1981. It required all licensees of plants licensed prior to January 1, 1979, to submit, by March 19, 1981, plans and schedules for meeting the applicable requirements, a design description of any modifications proposed to provide alternative safe-shutdown capability, and any requests for exemption.

Of the exemption requests received for 57 units, technical reviews for 15 units were completed by the NRC staff during the report period, and the remainder are in process. Shutdown capability modifications were proposed for 46 units, of which NRC reviews have been completed for eight units and are expected for three units. Modifications were not proposed for 20 units. All NRC reviews have been completed on eight units, and all exemption requests for those units have been resolved.

NRC reviews of exemption requests and shutdown-capability modifications for all but a few of the other operating units are planned for completion by the end of calendar year 1982. After NRC reviews are completed and modifications have been implemented, regional offices will inspect the facilities for conformance with regulatory requirements.

Occupational Radiation Doses

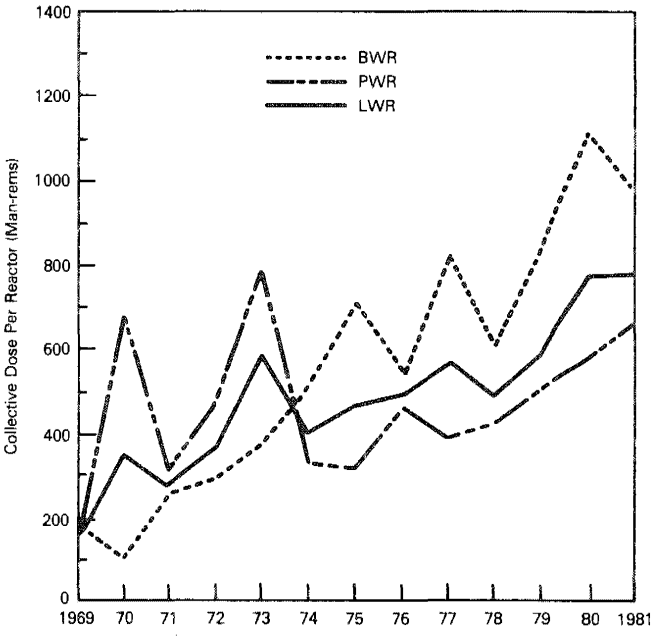
An analysis of occupational radiation doses at the two types of operating light-water reactors (LWRs) for 1981 reveals an increase in the collective dose for presurized-water reactors (PWRs) and a comparable decrease for boilingwater reactors (BWRs), the net effect being a leveling off from the increases recorded in the previous two years. Specific dose data for the 44 PWRs and the 26 BWRs in 1981 are as follows:

- PWRs averaged 652 man-rems per reactor, a 13 percent increase from the 1980 average of 578 man-rems.
- BWRs averaged 980 man-rems per reactor, a 14 percent decrease from the 1980 average of 1136 man-rems.
- The overall LWR average was 773 man-rems per reactor, slightly lower than the 1980 average of 791 man-rems.
- The total collective dose for LWRs was 54,142 man-rems, a 0.6 percent increase over the 1980 figure of 53,796 man-rems.

The Radiation Protection Managers at those plants with substantially increased total doses in 1981 indicated that significant contributors were additional in-service inspection and plant modifications, such as those involving pipe hangers, snubbers, fire-protection systems, and post-accident sampling systems. The staff at PWRs also indicated that an increased amount of steam generator work contributed to the exposure increase.

The NRC staff is continuing its efforts to reduce occupational radiation doses. Because substantial doses have resulted from plant modifications required by regulatory actions, the staff now includes in cost-benefit analyses of proposed new safety requirements a consideration of the doses that might result and additional measures that can be taken to minimize them. The staff is currently encouraging licensees to establish programs to assure that occupational doses are kept as low as is reasonably achievable, and the NRC is developing a rule to make that a requirement. Several utilities have already initiated such programs. The staff is also developing plans for cooperation with the Institute of Nuclear Power Operations in efforts by the nuclear industry to establish and maintain effective programs for radiation protection.

COMMERCIAL LIGHT WATER COOLED REACTORS
1969 - 1981
OCCUPATIONAL RADIATION DOSES AT NUCLEAR POWER PLANTS
AVERAGE ANNUAL COLLECTIVE DOSES



Occupational Exposure Data Collected

Beginning in 1978, all NRC licensees have been required to report radiation exposures incurred by their employees to the NRC on a calendar year basis. (Prior to 1978, only certain types of licensees had to report.) About a third of the individuals monitored for exposures are employed in nuclear power facilities, and they account for about 60 percent of the collective dose received by all monitored persons; the 50 other types of licensees now required to report account for the balance.

All of the occupational exposure data sent to the NRC are collected and organized under an NRC computer system called REIRS, for radiation exposure information reporting system. The system provides a permanent record and facilitates analysis of exposure histories of terminated licensee employees in the areas of licensed activity which are likely to involve the greatest potential exposure of workers to radiation.

Summaries of the occupational exposure data are published yearly by the NRC. The 12th annual report of Occupational Radiation Exposures (NUREG-0714, vol. 1) covers calendar year 1979, the latest year for which all data are available in codified form. That report shows that 51 percent of the 327,000 persons monitored during the year received

measurable doses of radiation, averaging .4 rem per dose detected (or .2 rem as an average for all persons monitored). These averages are the same as those found in 1978, as is the fact that about one in 10 persons monitored received a dose of more than .5 rem in 1979. In most cases, the regulatory limit on whole body doses received by licensee employees is 1.25 rem per calender quarter; under certain conditions, an employee may receive three rem per quarter without a violation of regulation.

SPECIFIC CONCERNS

Instrumentation to Detect Inadequate Core Cooling

The need for additional instrumentation to detect inadequate core cooling (ICC) derives from studies of the accident at Three Mile Island Unit 2 in 1979, resulting in TMI Action Plan Item II.F.2 (NUREG-0660). The nuclear industry formally proposed three types of measurement of reactor water levels, and these were evaluated by the NRC with the assistance of the Oak Ridge National Laboratory in reports NUREG/CR-2626, 2627, and 2628, published in March 1982. After discussions of the staff with the Commission and with the industry, it became clear that most of the questions dealing with adequacy of the proposed instrumentation related to its capability to provide an accurate and unambiguous indication of the water level in the reactor vessel. This is probably not possible, only a void indication or inventory tracking system is needed to guide the operators in the period between saturation and core dryout.

The principal safety benefit of ICC instrumentation is expected to be an improvement in the reliability of plant operators in diagnosing the approach of ICC and in assessing the adequacy of response taken to restore core cooling. The benefit would be preventive in nature in that the instrumentation would assist the operator in avoidance of a degraded or melted core when voids in the reactor coolant system and saturation conditons result from overcooling events, steam generator tube ruptures, and small-break, loss-of-coolant (LOCA) events. The incremental gains in operator performance may be larger for the more frequent overcooling and depressurization transients than for the more frequent overcooling and depressurization transients than for the more rapid, but less probable, small-to-intermedite size LOCA events.

At the end of fiscal year 1982, the status of implementation of ICC instrumentation systems is that 16 units of the Westinghouse system are installed, one is partially installed, and 15 are to be installed; 21 units of the Combustion Engineering system are about to be installed. The NRC staff has completed its review of the issues involved and its cost-benefit assessment of design requirements and has prepared recommendations for consideration by the Commission for implementation of the requirements.

Steam Generators

Degradation of the heat-exchanger tubes in steam generators manufactured by the vendors of pressurized water reactors has been a concern for several years. Tube degradation results from a combination of problems related to mechanical design, materials selection, fabrication techniques, and secondarysystem design and operation. (A discussion of operating experiences with steam-generator tubes is contained in NUREG-0886 of February 1982.)

An integrated program to consider the need for further NRC requirements related to steam generators was initiated in May 1982, and findings are expected to be published in early 1983. Significant developments for specific plants during fiscal year 1982 are discussed below.

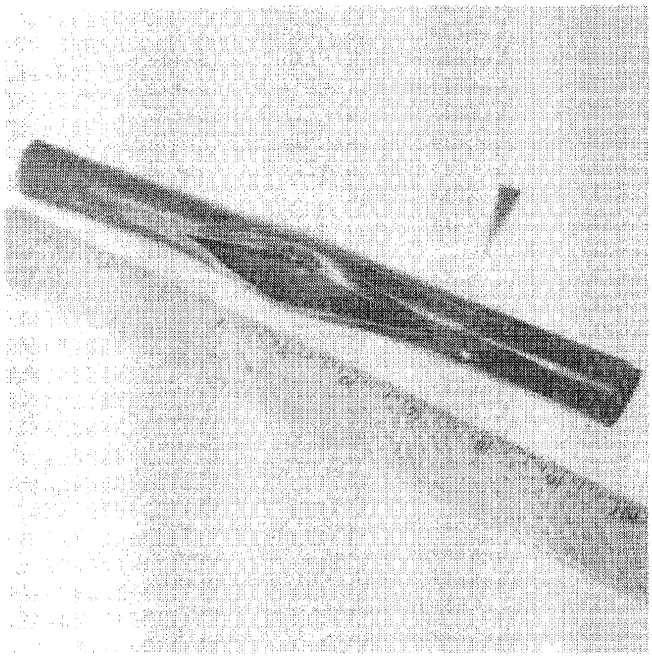
Three Mile Island Unit 1. On November 21, 1981, it was determined that leakage from primary to the secondary side had occurred in both of the TMI-1 steam generators. The tube degradation in the steam generator was found to be due to intergranular stress corrosion from the primary side. It was most probably caused by sulfur in thiosulfate from the reactor-building spray system, which inadvetently was permitted to enter the primary system at various times in 1981. Most of the defects were in the upper six inches of the tubes within the upper tube sheet.

The licensee decided to perform an explosive expansion of the repairable tubes within the upper tubesheet, therby closing the annular crevice areas between the tube sheet and the tube and thus establishing a seal between primary and secondary fluid. The NRC staff, with the aid of consultants has reviewed each of the major areas of the repair program. The physical repairs begain in November 1982 and are scheduled to continue through early 1983. Tubes that cannot be repaired will be plugged and thus removed from service. The NRC staff will issue a Safety Evaluation addressing issues related to steam generators prior to plant startup.

Ginna. On January 25, 1982, the Ginna (N.Y.) nucler power plant experienced a rupture of a steam-generator tube. (Details of the event have been reported in NUREG-0909 and NUREG-0916.) Some radioactive material was released during the first three hours of the event. Snow and moist cold air caused a large fraction of the released radioiodine and particulates to deposit on the site. Licensees are required to have operational plans to

cope with such events. In this case, the licensee acted on the basis of these plans to mitigate the consequences of the event so that the radioactive releases resulted in doses significantly lower than the limit allowed in the guidelines in NRC regulations (10 CFR 100).

The ruptured tube was found to have a fishmouth opening about four inches long and 0.7 inches wide at its maximum point. A number of foreign objects were found on the secondary side of the steam generator. The licensee performed an extensive investigation and has taken action to remove all foreign objects and sections of previously plugged tubes that were sufficiently degraded to be a potential cause of degradation of adjacent tubes. For activities by the NRC staff, see "PWR steam Generator Tube Integrity" earlier in this chapter and "Operational Safety Assessments" below.



This section of a ruptured steam-generator tube was removed from the R.E. Ginna nuclear plant in New York following an incident on January 25, 1982. Additional discussion is in Chapter 4.

Indian Point Unit 3. On March 27, 1982, while Unit 3 of the Indian Point (N.Y.) nuclear power station was shut down for refueling, a leak was observed in the girth weld between the upper shell and the transition cone of one of the steam generators. Inspection showed an oval-shaped hole, approximately 5/8-inch by 1/8-inch. Subsequent ultrasonic examinations of the corresponding weld in all four steam generators revealed that each had extensive cracking, with about 40 percent of the cracks in weld metal. Preliminary information indicates that the cracks may have been caused by corrosion fatigue, probably accelerated by aggressive water chemistry and/or existing flaws in fabrication. Determining the exact interrelationships among those potential causes will require continued evaluation by the licensee and the NRC staff.

Davis-Besse Unit 1. On April 13, 1982, it was reported that inspections of the steam generator tubes of Unit 1 of the Davis-Besse (Ohio) nuclear power plant showed that some of the peripheral tubes had interacted with the internal auxiliary feedwater header and its supporting pins and brackets. Inspection of the header revealed that its support pins and brackets were damaged and that it was deformed. The cause of the damage is believed to be the collapse of steam inside the header during occasional injection of relatively cold auxiliary feedwater. The same internal design was utilized at Oconee Unit 3 (S.C.) and Rancho Seco (Cal.), and inspections at those plants showed similar header damage. Extensive repairs and modifications were made to incorporate an external header similar to that at other plants designed by Babcock & Wilcox. The problem and corrective actions were reviewed in detail by the NRC staff prior to the return to operation of these plants.

McGuire Unit 1. The new Westinghouse Model D-2/D-3 steam generators are used in McGuire Unit 1 (N.C) and in Summer Unit 1 (S.C.) and in Ringhals Unit 3 in Sweden and Almaraz Unit 1 in Spain. Leakage in the steam generators at Ringhals Unit 3 caused its shutdown in October 1981. Significant reductions of tube-wall thickness in the preheater section of that plant and of Almaraz Unit 1 have been indicated by eddy-current testing. This was caused by wearing down of tube walls from vibrational rubbing against the baffle plates. This vibration phenomenon is generally operative at greater than 50 percent of rated power for the Model D-2/D-3 steam generators. McGuire Unit 1 has been operated with a cautious power escalation and a test program with frequent shutdowns for inspection to determine the susceptibility to this vibration phenomenon. Summer Unit 1 received a license for full-power operation in November 1982, but will be restricted to 50 percent of full power until appropriate remedial measures have been implemented with respect to tube vibration. Also affected are other plants still under construction that plan to use Westinghouse Model D-2/D-3 steam generators. Possible modifications are being actively pursued and/or reviewed by foreign governments, Westinghouse, the utilities, and the NRC.

Control Systems

In parallel with the effort on the Unresolved Safety Issue concerning the safety implications of control systems (Task A-47), the NRC staff has, since early 1981, requested that applicants for operating licenses identify those control systems whose failure or malfunction could seriously affect plant safety; identify any power sources, sensors, or sensor impulse lines that provide power or signals to two or more of those control systems; and demonstrate that failures of these components will not result in consequences more severe than those previously analyzed. From the review of the few responses received, the staff has found no significant design problems. The staff has also requested that applicants for near-term operating licenses perform reviews to demonstrate that the harsh environments associated with high-energy line breaks will not cause control-system malfunctions resulting in consequences more severe than those for currently analyzed accidents. Such reviews had previously been completed by licensees of operating plants.

Two activities begun in 1979 to reduce the possibility of control systems adversely impacting plant safety were completed in 1982. Licensees with reactors designed by Babcock and Wilcox (B&W) were requested to evaluate recommendations for control-system improvements made by B&W in 1979 and report their follow-up actions to the NRC staff. Reviews by staff have identified no control-system failures or actions that would lead to unacceptable consequences. In response to a Bulletin issued by the Office of Inspection and Enforcement in 1979, licensees have indicated that corrective action has been taken to assure that the loss of any single electrical bus supplying power for instruments and controls would not result in the loss of instrumentation required to accomplish shutdown of the reactor.

Performance Testing of Valves

As discussed in the *1981 NRC Annual Report*, pp. 32-33, generic test programs for safety and relief valves were established by utility owners groups in response to NRC requirements in NUREG-0578 and NUREG-0737. The program for pressurized water reactors (PWRs) was conducted by the Electric Power Research Institute, and actual valve testing was completed by December 31, 1981. On April 1, 1982, the PWR owners group formally transmitted to the NRC reports containing all of the test results, which the NRC staff is reviewing. Utilities owning PWRs are referencing various portions of these reports in plant-specific submittals. Because of the large amount of information and the number of plants involved, it is expected that the detailed review of these submittals will extend for some time.

The generic test program for safety and relief valves of boiling water reactors (BWRs) was conducted by the General Electric Co., and the final results were transmitted to the NRC in September 1981. On the basis of a detailed review of the generic report, the NRC staff has tentatively concluded that all valves tested were qualified for the low-pressure test conditions. Review of plant-specific applications of the test results is continuing and is expected to be completed for all operating BWRs during calendar year 1983.

Core-Melt Accident Assessment for Zion and Indian Point

As a result of the accident at Three Mile Island Unit 2 in 1979, the NRC has been re-examining the capabilities of nuclear power plants to accommodate the effects of accidents involving degradation or melting of the reactor core and has been considering potential design changes to mitigate such effects. The Zion (Ill.) and Indian Point (N.Y.) plants were chosen to initiate this activity because of the large populations in their vicinity.

Besides providing for an analysis of the need for severe accident mitigation features, the Zion and Indian Point studies also helped develop probabilistic risk assessment methods which have potential application in other NRC and industry severe accident assessments. The Zion and Indian Point findings were published in the staff report, "Preliminary Assessment of Core Melt Accidents at the Zion and Indian Point Nuclear Power Plants and Strategies for Mitigating Their Effect" (NUREG-0850, November 1981).

All operating units at Zion and Indian Point have large, dry containment buildings. The basic threats to the integrity of such structures are (1) burning of hydrogen and carbon monoxide, (2) gradual over-pressurization from steam and noncondensible gases, and (3) core-melt penetrations of the basemat if cooling is not provided in the reactor cavity. To control the threat from combustible gases, inert gases may be introduced into the containment-building atmosphere, or it may be controlled by a gas-ignition system. To control over-pressurization, systems may be installed to remove heat from the containment building, to permit filtered venting of the building, or to provide independent auxiliary sprays. To prevent basemat penetration, a system may be installed to flood the cavity after initiation of a severe accident.

There were several potentially important conclusions drawn from the Zion and Indian Point studies regarding severe accident risk assessment for largedry containments. Among them were:

- The staff conclusion that certain failure modes previously considered important can now be considered much less probable than before. For example, the staff estimates that containment building failure because of penetration by missiles generated by steam explosions is less probable by two orders of magnitude than was reported in the Reactor Safety Study (WASH-1400). It is also thought that early "steam spike" over-pressurization failures—which could occur shortly after reactor vessel failure—are less likely than reported from studies done at Sandia National Laboratories for the NRC.

- With the exception of the potential for early failures resulting from the burning or detonation of combustible gases, the staff estimates that the most likely failures would occur relatively late after accident initiation. The consequences of these failures would be considerably reduced relative to the consequences of early failure, especially when the results of forthcoming reassessments of fission product behavior are taken into account.

The findings of the mitigation program, when combined with insights gained from probabilistic risk assessments of Zion and Indian Point, will form the technical basis for recommendations to the Commission on whether to require changes in design features for these facilities. The licensees have participated in both programs and have submitted safety studies; these are being reviewed by the NRC staff.

Operational Safety Assessments

Assessment of unanticipated events at operating reactors involves both NRC Regional and Headquarters offices. Prompt reviews and technical support are provided on issues and events of immediate safety concern. In addition, the NRC staff has been called on frequently to review event sequences against licensing analyses, evaluate plant and operator performance during events, identify generic safety implications, review licensee analyses, and evaluate corrective actions prior to plant restart.

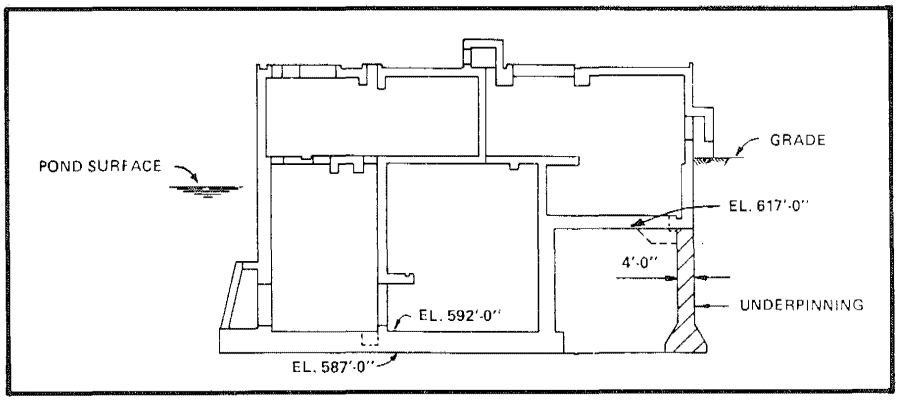
An example is the failure of safety injection valves at San Onofre Unit 1 (Cal.). Both trains of the safety injection system were found to be inoperable when challenged under actual operating conditions on September 3, 1981. After a manual trip (shutdown) of the reactor, low primary-system pressure resulted in a signal for safety injection. Neither of the safety injection valves opened as required. There were no adverse consequences in this particular event since there was no loss of coolant. However, had reactor pressure decreased and actual injection been required, injection flow would not have been automatically available, as intended in the design of the system. After the incident, the licensee met with the NRC staff to discuss the short-term and long-term actions necessary prior to plant restart. The NRC staff performed a detailed review of the changes proposed by the licensee, witnessed the disassembly of the valves, recommended improvements in the program for valve surveillance testing, and wrote a Safety Evaluation Report prior to restart of the reactor in November 1981.

Another important event was the failure of one of the steam-generator tubes at the Ginna nuclear power plant on January 25, 1982, discussed earlier under "Steam Generators." Shortly after the incident, NRC Chairman Nunzio J. Palladino requested that an NRC task force be established to report the circumstances surrounding the tube failure. (The task force documented its findings in NUREG-0909.) The licensee and the NRC staff performed comprehensive investigations of the extent of tube degradation and the potential failure mechanism. A Safety Evaluation Report (NUREG-0916) was prepared. Based on meetings and discussion with the licensee and its consultants and based on the repairs, modifications, and changes made to the facility and procedures, along with commitments made for future actions, the NRC staff concluded that the facility could be safely operated with no undue risk to the public health and safety.

Foundations

Several safety-related structures under construction at the Midland (Mich.) nuclear power plant have undergone more settlement than expected because of improper compaction of the earth fill beneath them. Remedial measures have been and continue to be taken, such as the underpinning of portions of the foundations. The NRC staff and its consultants have approved the technical aspects of the design for the underpinning and the construction sequence and procedures. It is necessary to limit movements of and stresses in the completed structures to avoid damage as the earth fill is sequentially excavated and replaced by concrete piers extending to the deeper and more competent natural soils. The time for completing the underpinning is estimated to be in excess of 18 months. Authorization to begin underpinning construction is awaiting improvements in quality control at the plant.

The foundation beneath two of the buildings was found to contain zones of sand which, if saturated by groundwater during a severe earthquake, could lead to liquefaction. To reduce this potential, the utility has proposed a permanent de-watering system consisting of interceptor wells to collect water that



The NRC staff approved the technical aspects of underpinning required at the Midland (Mich.) nuclear plant to compensate for settling not provided for during construction. Shown here is a cross section of the service water pump structure at Midland, with underpinning (crosshatched) concrete piers supporting overhanging portion of the structure.

seeps in from the cooling pond of the plant. The water collected is then conveyed back to the pond.

Public hearings before the Atomic Safety and Licensing Board on the adequacy of the remedial measures were scheduled to resume after the close of the report period.

Structural Engineering

The ultimate durability of the containment of a nuclear power plant is a very important factor in probabilistic risk assessment, since the containment structure is the last line of defense in the system of protections against the effects of serious accidents. Through a contract with the Ames National laboratory, the steel containments of the St. Lucie (Fla.), Cherokee (S.C.), Perry (Ohio), WNP-2 (Wash.), and Browns Ferry (Ala.) plants have been evaluated to determine their ultimate strength capacities on a probabilistic basis. Also, with the help of the Brookhaven National Laboratory, the NRC staff has made an independent check of the ultimate capacity of the concrete containment of the Grand Gulf (Miss.) nuclear power plant. And the staff has review the analysis of the ultimate capacity of the concrete containment of the Clinton (Ill.) nuclear power plant by the architect/engineer.

During the review of the Trojan (Ore.) nuclear power plant, structural deficiencies were found in some masonry walls. As a result, licensees for all operating plants were advised to undertake evaluation of masonry walls. In fiscal year 1982, Safety Evaluation Reports were issued for Point Beach (Wis.) Units 1 and 2, Hatch (Ga.) Units 1 and 2, Arkansas Units 1 and 2, Beaver Valley (Pa.), and Cooper (Neb.). In several instances, additional bracing or other modifications were specified to correct deficiencies.

During fiscal year 1982, the NRC staff performed structural design audits of the following nuclear power plants: Bellefonte (Ala.), River Bend (La.), St. Lucie (Fla.) Unit 2, Harris, Summer (S.C.), WNP-2 (Wash.), Perry (Ohio), Catawba (S.C.), Callaway (Mo.), Byron/Braidwood (Ill.), LaSalle (Ill.), and Clinch River (Tenn.). Audits for Diablo Canyon (Cal.) Unit 1 and Midland (Mich.) were continued from fiscal year 1981. The audits included reviews of most of the safety-related structures.

Geosciences

In the last two years, intensive geologic investigation associated with the construction of a nuclear power plant (WNP-2) at the Hanford Reservation in south-central Washington has led to the discovery of several features that could have had an adverse impact on the geologic and seismic safety of the area generally and of the plant specifically. The examination of geologic features of unknown origin, structures of uncertain extent, and faults of questionable ages involved the cutting of deep trenches into mountain sides; deep drilling of rock cores; aeromagnetic, gravity, and seismic-reflection surveys; and paleo-magnetic studies of rocks. Evaluation of the results was done independently by the licensee and its consultants and by the NRC staff, with the advice of the U.S. Geological Survey. The unanimous conclusion is that the site will not be subjected to any hazards that would affect the integrity of the plant.

The Connecticut Yankee nuclear power plant (also called Haddam Neck), which has been operating since 1967, is located in the Connecticut River Valley adjacent to Moodus, Conn., an area that has been seismically active since before European colonization. The NRC began funding geological and seismological research in the area several years ago, including geologic mapping and installation of a micro-earthquake monitoring network. The area has been found to be of very complex geology in which at least four major geologic features intersect. There is no evidence of recent displacement on the numerous faults in the area, and the earthquakes that have occurred at Moodus were determined to be very shallow and therefore probably not associated with a fundamental fault. Consequently, the NRC staff has found no reason to change its original conclusion that the seismic design bases for the Connecticut Yankee plant are adequate.

Hydrology

This trench was excavated on the northeast flank of Rattlesnake Mountain at the Hanford (Wash.) reservation to ascertain whether a line of scarps (steep slopes) reportedly seen from an airplane could have been a faultline. The project indicated that it was not.

The NRC staff, with the assistance of Pacific Northwest Laboratories, has published a collection of some of the manual procedures and simple computer programs used for computing the fate of routinely or accidentally released radionuclides in surface water and groundwater (NUREG-0868), and made the programs available to users outside of NRC. An interim report was issued in May 1982 by the Argonne National Laboratory on the feasibility of using slurrywall or similar techniques to isolate contaminated groundwater in the event of an accident at a nuclear plant.

The NRC staff has also compared models of cooling ponds and spray ponds for dissipation of waste heat with field data on experimental ponds collected by Pacific Northwest Laboratories (NUREG-0683 and 0733). Agreement between the models and the field data was generally excellent, both from the standpoint of heat transfer and water loss.

A scale model (1-to-45) of the offshore region near the breakwater at the Diablo Canyon (Cal.) nuclear power plant has been constructed by the utility and used for testing the effects of waves on the intake structures of the cooling system. The utility is proposing to add air intake tubes as extensions above the air intake plenums of the auxiliary saltwater pumps to prevent potential inundation during severe wave conditions.

At sites of nuclear power plants, the NRC is concerned with dams whose failure could result in a radiological risk to the public health and safety. In addition, on-site dams are reviewed for environmental impacts. The NRC, being one of nine Federal agencies concerned with dams, participates in the Interagency Committee on Dam Safety.

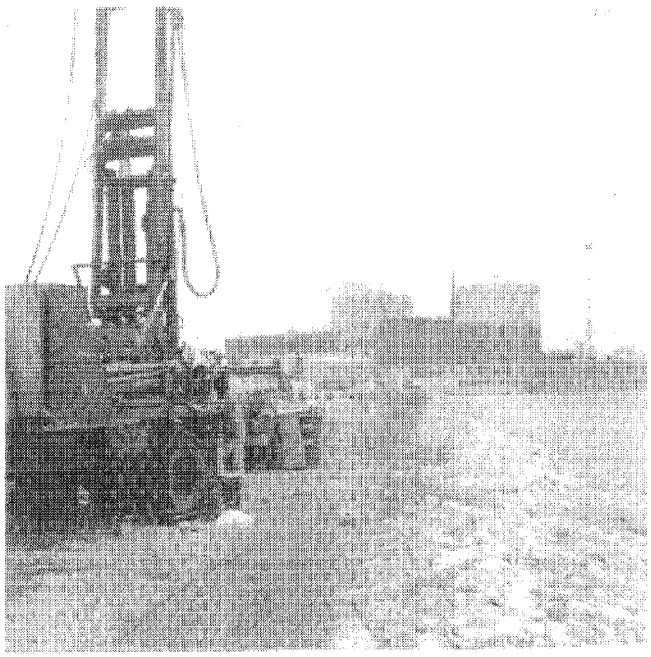
The NRC staff has completed an inventory of all dams that impound cooling water for nuclear power plants, whether on-site or off-site, and other dams that are off-site but upstream from a nuclear power plant. The effort was aimed at finding out if dam failure and resultant plant flooding could result in a radiological risk to the public health and safety. The inventory comprises 51 dams associated with impoundment of cooling water from nuclear power plants. Some of these dams do not come under the Federal Guidelines for Dam Safety, because, for example, they are submerged to isolate an arm of a principal reservoir to provide an emergency water source and therefore do not pose a flooding hazard. Some of the dams are regulated by another Federal agency, with whom NRC must coordinate safety activities. The Federal dam safety program includes planning to identify conditions that could lead to failure and to initiate emergency preventive or mitigative measures.

Protecting the Environment

Socioeconomic Impacts of Nuclear Power Plants

Research conducted by Mountain West Research, Inc., of Tempe, Ariz., using 12 case studies to assess the full range of socioeconomic impacts from nuclear power plant construction and operation, was completed and published in July 1982 in 12 volumes (NUREG/CR-2749), with a summary report (NUREG/CR-2750). The study generally concluded that the effects of the plants were modest; what few adverse effects occurred could have been foreseen and avoided. The findings and recommendations of this study will be used to develop improved guidance to socioeconomic reviewers.

The Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce completed initial modification of its Regional Input-Output Modeling System (RIMS) for use in simulating the impacts of severe nuclear plant accidents on a regional economy. The methodology and three case studies were published in April 1982 (NUREG/CR-2591), and the staff is applying the accident analysis methodology in environmental impact statements. A related study examining the broader scope of potential socioeconomic consequences of nuclear power accidents was continued by Pacific Northwest Laboratories from fiscal year 1981.



NRC participates with nine other Federal agencies in an interagency committee on dam safety out of concern for the safety and effectiveness of cooling pond dams at or near nuclear power sites. This photo shows men and equipment at work near a nuclear plant site sampling and testing soils in a cooling pond dam.

A study to evaluate the feasibility of combining customary labor- demandand-immigration estimating techniques with the analytical capabilities of the Department of Labor's system for projecting construction labor demand was published in December 1981: "Projecting Labor Demand and Worker Immigration at Nuclear Power Plant Construction Sites" (NUREG/CR-2421).

The NRC has been considering the restart of Unit 1 of the nuclear power plant at Three Mile Island (Pa.), which has not been permitted to operate since the accident at Unit 2 in 1979. A judgment by a U.S. Court of Appeals on January 7, 1982, amended on April 2, 1982, ordered the Commission to determine "...whether, since the preparation of the original environmental impact statement for the nuclear facility at Three Mile Island, Unit 1 (TMI-1), significant new circumstances or information have arisen with respect to the potential psychological health effects of operating the TMI-1 facility." The Commission has filed an appeal from this order with the U.S. Supreme Court.

On February 4 and 5, 1982, the NRC sponsored a workshop of experts to explore what is known about psychological stress that may be relevant to assessing the psychological impacts of TMI-1 restart. Of particular interest was the extent to which existing concepts and studies might be used to extrapolate or infer the range of stress responses likely to result. The proceedings of the workshop were published as NUREG/CR-0026.

Population Data

The NRC has initiated an effort to update earlier population data based on the 1970 census (see NUREG-0348) for the area around each operating nuclear power plant and each plant under construction. This information is needed for such determinations as radiation dose potential from routine releases of radioactivity, emergency planning, and risk assessments. For the population within 10 miles of a plant, information has been evaluated from a number of sources—such as computerized files of 1980 census data, data provided by the licensee, and remotely sensed data (for example, from aerial photography). At distances beyond 10 miles from a plant, census data has been found to be more reliable and is being used to provide current-year population estimates as well as projections to the middle or the end of plant life.

Effects of a Nuclear Plant on Fisheries

The Nuclear Regulatory Commission has published a technical report entitled "Power Plant Siting and Design: Intake and Discharge Effects at Point Beach Nuclear Plant on Lake Michigan Biota and Fisheries" (NUREG-0816). The assessment utilizes five years of data on power plant operation collected by the licensee; data and studies from the State of Wisconsin; and studies conducted at Point Beach by Argonne National Laboratory under the sponsorship of the Atomic Energy Commission, the Nuclear Regulatory Commission, and the Department of Energy.

Significant adverse impacts were not detected in these evaluations; however, certain localized effects were observed that are attributable to thermal discharges and to the interactions between the large thermal plume and the offshore cooling-water intake crib. These station design features apparently brought about more pronounced effects than was anticipated in pre-operational environmental assessments. The operation of Point Beach primarily affects the exotic lake fishes, that is, the introduced species (alewife and smelt) and stocked species (trout and salmon), rather than the native fishes. However, it is the exotic fishes that now constitute either a significant portion of recreational and commercial fishery harvests or of the food resources for important predator and economic species. Assessment of the acceptability of impact on the alewife (the species most affected by operation) was complicated because of its status as both a nuisance species and, at the same time, an important economic resource. A solution to this ambiguity could aid in judging acceptability of the impact of nuclear plants on lake biota and could help find a balance between the losses of Great Lakes fishes (especially the alewife) by water withdrawals at once-through cooling power plants and the costs and disadvantages of instituting alternative cooling system designs.

The thermal discharge plumes at once-through cooling power plants have become favorite sport fishing locations on Lake Michigan, because of the attraction of prey and predator species to the warm effluents. At Point Beach, construction of fishing facilities at the power plant has increased fishing opportunities, and the thermal effluents have contributed to a near-shore availability of desirable fish species. As a result, fishing success there is much better than in ambient-temperature areas. Catches have averaged more than 10,000 trout and salmon per year. In the absence of any significant adverse impacts on fishes, the enchancement of the recreational fishery at Point Beach is a benefit of station operation. The plant also contributes to the success of the State trout/salmon stocking program because fishing success at the power plant increases the harvest-to-stocking ratio.

Antitrust Activities

As required by law since December 1970, the NRC has conducted prelicensing antitrust reviews of all construction permit applications for nuclear power plants and certain other commercial nuclear facilities. In addition, applications for amendments to construction permits that transfer an ownership interest in a nuclear facility to one or more additional applicants are subjects to antitrust review. These reviews assure that the issuance of a particular license will neither create nor maintain a situation inconsistent with the antitrust laws. The NRC holds a hearing whenever one is recommended by the Attorney General and also considers whether antitrust issues raised by the NRC staff or by intervenors should be subjected to a hearing. Remedies to antitrust problems usually take the form of conditions attached to licenses, resulting either from hearing or from non-hearing negotiated settlements.

During fiscal year 1982, the NRC reviewed seven applications for amendments to construction permits involving transfers of ownership interest in six nuclear plants. No antitrust hearings or license conditions resulted from these reviews.

A settlement was reached between Florida Power and Light Co. and a group of Florida cities intervening in the antitrust proceeding occasioned by an application for a construction permit for Unit 2 of the St. Lucie nuclear power station. This followed a previous settlement among Florida Power and Light Co., the NRC staff, and the Department of Justice, which resulted in a comprehensive set of procompetitive license conditions for St. Lucie Unit 2. After the settlement by all parties, the Atomic Safety and Licensing Board terminated the proceeding by an Order of March 24, 1982.

By a petition of December 4, 1981, and supplements in March, May, and August of 1982, the Northern California Power Agency requested the NRC to enforce and amend certain of the "Stanislaus Antitrust Commitments" now incorporated in the licenses for the Diablo Canyon plant. The NRC staff was continuing its investigation of these antitrust complaints at the end of fiscal year 1982.

Applications for operating licenses are not subject to formal antitrust review unless the NRC first determines that "significant changes" in the application's activities have occurred since the review of the application for a construction permit. During the review in 1981 of the application for an operating license for the Summer (S.C.) nuclear power plant, the Commission set forth the following criteria to be used by the staff in evaluating whether significant changes has occurred: (1) the changes had occurred subsequent to the construction permit antitrust review; (2) the changes were related to the activities of

the licensee; and (3) the changes had antitrust implications that would likely warrant some NRC remedy. On March 9, 1982, a final rule regarding the procedures to be used was published in the *Federal Register* (47 FR 9983). During fiscal year 1982, five analyses were completed for determination of significant changes. In each instance, the finding was that the changes that had occurred were not significant in an antitrust contest.

By an Order of May 6, 1982, an Administrative Law Judge closed the antitrust proceeding resulting from significant-change determination for the South Texas and Comanche Peak (Tex.) nuclear power plants. This followed a settlement among all the parties regarding appropriate antitrust license conditions for these plants.

Advisory Committee on Reactor Safeguards

The Advisory Committee on Reactor Safeguards (ACRS), established in 1957 by statute, provides the Commission advice on potential hazards of proposed or existing reactor facilities and the adequacy of proposed safety standards. The Atomic Energy Act of 1954 also requires that the ACRS advise the Commission with respect to the safety of operating reactors and perform such other duties as the Commission may request. In accordance with Public Law 94-209, the ACRS is required to prepare an annual report to the U.S. Congress on the NRC Safety Research Program.

The ACRS reviews requests for preapplication site and standard plant approvals, each application for a construction permit or an operating license for power reactors, applications for licenses to construct or operate test reactors, spent fuel reprocessing plants, waste disposal facilities, and any matter related to nuclear facilities specifically requested by the Department of Energy.

Because the ACRS is a statutory body of advisors to the Commission, its input and advice relate directly to statutory responsibilities of the NRC for the public's health and safety. The ACRS membership, appointed from the scientific and engineering disciplines, includes individuals experienced in chemical engineering, electrical engineering, mechanical engineering, structural engineering, reactor operations, reactor physics and environmental health.

During fiscal year 1982, the Committee completed its annual report to Congress on the NRC Safety Research Program for fiscal year 1983 (NUREG-0864). Members of the Committee also provided testimony on the proposed NRC Safety Research Program and the application of program results to resolution of regulatory safety concerns.

Members appeared and presented testimony to the Subcommittee on Energy Conservation and Power of the House Committee on Energy and Commerce, the Subcommittee on Energy and the Environment of the House Committee on Interior and Insular Affairs, and the Subcommittee on Energy Research and Production of the House Committee on Science and technology.

In June 1982, members of an ACRS subcommittee reviewing the license application for Perry Nuclear Station in Ohio, visited the plant prior to holding a meeting on Perry at Cleveland. Jeremiah J. Ray, Vice Chairman of the ACRS, is shown here during a guided tour of the control room.

The Committee also provided special topical reports to the NRC, individual Commissioners, and other on a variety of issues, including:

- Comments on the selection of a contractor and the nature of the program to investigate the long-term performance of materials used for waste packaging.
- A report on the NRC's Long-Range Research Plan for fiscal year 1984-88 (NUREG-0784).
- Comments on requirements for instrumentation to monitor reactor pressure vessel water level or inventory in pressurized water reactors.
- Comments on pressurized thermal shock to reactor pressure vessels.
- Observations on the need for control of occupational exposures.
- A response to suggestions directed to the Committee's attention by Commissioner Gilinsky concerning nuclear power plant seismic design methods.
- Comments on the proposed safety research program and budget for FY 84-85.

The Committee prepared major reports on the following subjects:

- Safety Goals for Nuclear Power Plants: A Discussion Paper (NUREG-0880).
- The NRC Draft Action Plan for Implementing the Commission's Proposed Safety Goals.

The Committee's activities during the report period reflected the continuing licensing activity within the Commission and include 11 reports on requests for operating licenses, two reviews of operating plants evaluated as part of the Systematic Evaluation Program, and a review of the suitability of the site proposed for the Clinch River (Tenn.) Breeder Reactor.

In addition to its reports on licensed reactors and operating license applications, the Committee provided advice to NRC on 14 proposed rules, criteria, or regultory guides, including:

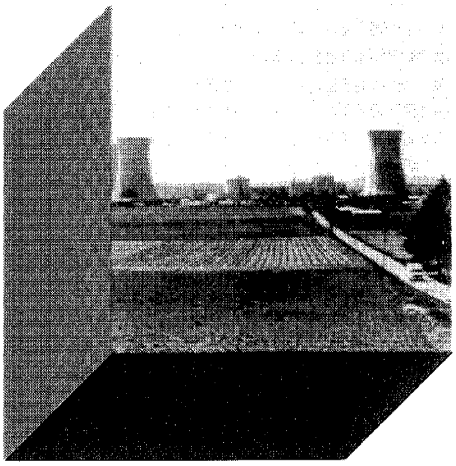
- The proposed rulemaking on Licensee Event Reports.
- Environmental Qualification of Electrical Equipment Used in Nuclear Power Plants.
- The Severe Accident Research Plan.
- A proposed Commission Policy Statement on Severe Accidents and Related

Views on Nuclear Reactor Regulation.

- A Proposed Rule and Policy Statement on Backfitting of Changes in Nuclear Power Plants.

Under the provision of Public Law 96-567, "Nuclear Safety Research, Development and Demonstration Act of 1980," the Committee provided a report to the Department of Energy on that agency's final draft in response to P.L. 96-567.

On December 9, 1981, the ACRS held a meeting with the Advisory Committee on Nuclear Safety (ACNS) of the Canadian Atomic Energy Control Board to discuss safety-related issues of mutual interest. During the meeting, held in Washington, D.C., items discussed include Quantitative Risk Criteria and the Use of Probabilistic Risk Assessment, Emergency Core Cooling Criteria, Human Factors in the Design and Operation of Nuclear Facilities, and Basic Criteria and Facilities for Radioactive Waste Management and Disposal.



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Cleanup at Three Mile Island Unit 2

At the close of the report period, i.e., the end of September 1982, conditions at the Three Mile Island Nuclear Power Station (TMI) near Harrisburg Pa., were stable and the cleanup of the damaged Unit 2 was proceeding. The pace of progress in decontaminating the plant and removing the damaged reactor fuel was less than hoped for during 1982. NRC Chairman Nunzio J. Palladino made repeated allusion to the situation at TMI in various public statements during the year. The Chairman deplored the "disturbingly slow pace of the project" and the "prospect that funds may run down or run out before the job is done." Some aspects of the future of the cleanup campaign became clearer during the period, such as the agreement by the Department of Energy to take custody of the entire core of TMI-2 when that becomes possible. But other uncertainties persist, both fiscal and technical, and costs continue to mount. (See Chapter 9 for discussion of cleanup costs.)

Meanwhile the Commission set forth explicit positions and intentions regarding TMI in its annual policy and planning guidance for the NRC staff. In this document, the Commission affirms that the "expeditious cleanup" of the Unit 2 containment and reactor is "one of the NRC's highest safety priorities." The NRC's TMI Program Office will continue to monitor cleanup activities from the actual TMI site, and the NRC will generally provide oversight, support and, if necessary, direction to ensure the prompt decontamination of the facility and the safe removal of radioactive materials from the site. The licensee will be directed to submit updated plans and schedules for cleanup activities in 1983 and these will be reviewed by NRC staff, who will report on them, with recommendations, to the Commission within three months of licensee submittal.

Memorandum of Understanding

In July 1981, the Nuclear Regulatory Commission and the Department of Energy (DOE) signed a Memorandum of Understanding (MOU) that formalized the working relationship between the two agencies with respect to removal and disposal of solid nuclear waste from Three Mile Island Unit 2 (TMI-2), which was damaged in the accident of March 1979. This was a significant step towards ensuring that the TMI site would not be permitted to become a long-term waste disposal facility.

Besides working closely with the NRC, the DOE agreed to carry out research and development and to conduct tests on solid wastes taken from the plant whenever DOE determines that they may have generic information value. With costs reimbursable by General Public Utilities Nuclear, the operator of TMI-2, the DOE may also assume responsibility for removal, storage, and disposal of other wastes that are too highly radioactive for disposal in commercial facilities. Low specific- activity wastes associated with decontamination (such as some ion-exchange media, boots, gloves, and trash) will be disposed of by the utility in licensed commercial low-level burial facilities.

In March 1982, the NRC and the DOE agreed to a revision of the MOU. Instead of taking only samples of the damaged fuel of TMI-2, the DOE agreed to accept the entire core for research and development and for storage at a DOE facility. The terms of ultimate disposal of the core will be negotiated between DOE and the utility operating the TMI facility. The DOE also agreed to take possession of highly radioactive resins from the purification system, again on the basis of future reimbursement by the utility.

The DOE also plans to take possession of zeolite wastes from the submerged demineralizer system and

The five NRC Commissioners participated in an all-day public hearing in Harrisburg, Pa. on November 9, 1982, at which residents and community groups in the Three Mile Island area were invited to express their views and concerns regarding the future of the TMI unit involved in the accident of 1979. Shown at table, left to right, Commissioners Roberts and Ahearne, Chairman Palladino, and Commissioners Gilinsky and Asselstine.

retain them for research and testing with regard to waste immobilization. Experiments are being conducted by DOE on several of the 49 high-specific-activity resin liners from the EPICOR-II system for decontaminating water, and this program may be extended to include other liners as well. An alternative approach being investigated by DOE is the development of a high-integrity container, which may allow these liners to be acceptable for commercial burial. Waste contaminated with transuranic elements at levels of radioactivity comparable with those acceptable for commercial disposal will be considered by the DOE on a case-by-case basis for possible use in research, archiving, temporary on-site storage, or disposal in a permanent repository off-site.

Status of Cooperative Efforts

On May 21, 1982, the first waste vessel from the submerged demineralizer system was shipped from TMI to DOE facilities at Hanford, Wash., for disposal. This vessel was used to process waste water from the reactor-coolant bleed tanks and contained approximately 12,000 curies of radioactive material on zeolite ion-exchange media. Subsequent shipments will include liners containing more than 50,000 curies of radioactive material removed from reactor-building sump water. The DOE will be conducting research on glass vitrification (solidification) of this type of solid waste at Hanford.

On July 27, 1982, one of the 49 high specific-activity EPICOR-II liners stored on-site was sampled for gas composition at TMI and was shipped on August 17 to the Battelle Columbus Laboratories in West Jefferson, Ohio, for radiation and chemical characterization tests. The liner contained approximately 1,800 curies of radioactive material and was shipped in a special cask designed to withstand severe transportation accidents. On August 25, a second liner was shipped from TMI to the Idaho National Engineering Laboratory in Scoville, Ida., for characterization tests. Eleven more shipments of these liners from TMI by the end of calendar year 1982 have been tentatively scheduled by the utility.

Cleanup of Cooling Water

The reactor coolant system of TMI-2 remained in the loss-to-ambient cooling mode during fiscal year 1982, and this mode was found to be reliable and adequate for the present level of decay heat, which is approximately 30 kilowatts. On May 17, 1982, the first "feed-and-bleed" cycle for the cleanup of the reactor coolant system began, and the cycle was re-

peated for several batches. Water processing was interrupted on July 11 to allow for preparatory activities in support of the core inspection program. Through fiscal year 1982, the submerged demineralizer system has processed approximately 708,000 gallons of water from the reactor building sump (including 50,000 gallons of flush water), 277,000 gallons of water from the reactor-coolant bleed tanks, and 250,000 gallons of water from the reactor coolant system.

Groundwater Monitoring Program

On January 13, 1982, a leak was discovered in a 3/8-inch instrument line connected to the borated water storage tank. In February, the groundwater monitoring program found that samples of several test borings indicated increased tritium levels, but they were still below the maximum permissible concentration for unrestricted areas. Increased surveillance indicated that the source of radioactivity in the groundwater on the TMI-2 site was probably from the borated water storage tank. Staff of the NRC located at the site and utility staff have continued to follow the results of the groundwater monitoring program

Reactor Building Entries

During fiscal year 1982, workers entered the TMI-2 reactor building 73 times. Their activities continued to focus on gathering post-accident data, decontamination efforts, and equipment refurbishment.

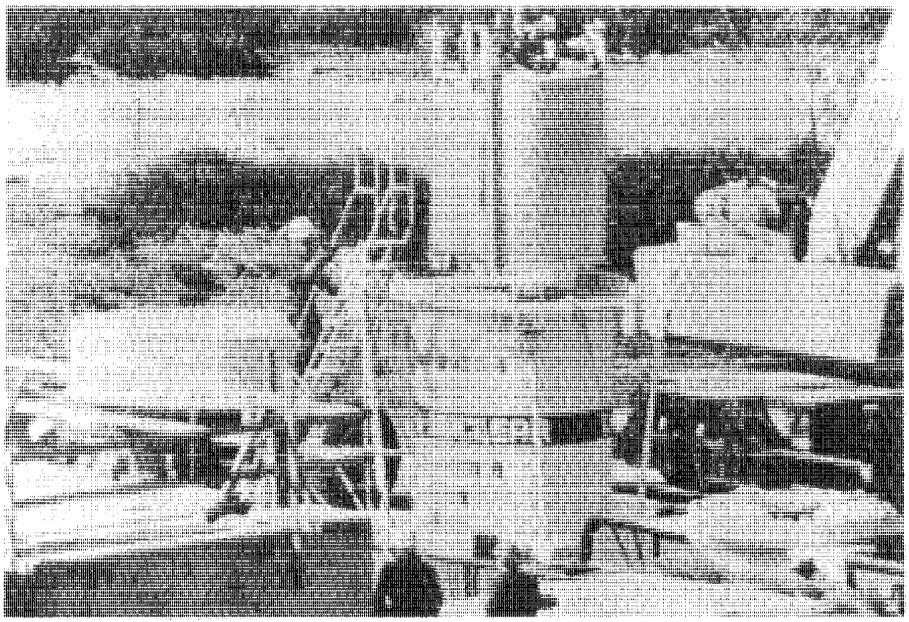
In March 1982, a large-scale decontamination experiment was initiated. One objective was to evaluate the safety, effectiveness,and efficiency of various methods and equipment for performing large-scale decontamination of extensive, complex, contaminated surfaces within the reactor building. The other objective was to reduce the contamination present on selected surfaces within the reactor building. Post-experiment surveys indicated that decontamination of loose material could be achieved by using both low-pressure and high-pressure water sprays and various mechanical and chemical techniques. But fixed sources of radiation, which are the apparent cause of exposure to gamma rays, were evidently not decontaminated by methods tried. Further efforts will be required to decontaminate the reactor building.

The polar crane in the reactor building, which will be needed to remove the reactor vessel head and plenum, was inspected during the report period. No structural damage of the crane was observed, but it is anticipated that replacement of all electrical cables, control components, and brake shoes — and the addition of a pendant control — will be required.

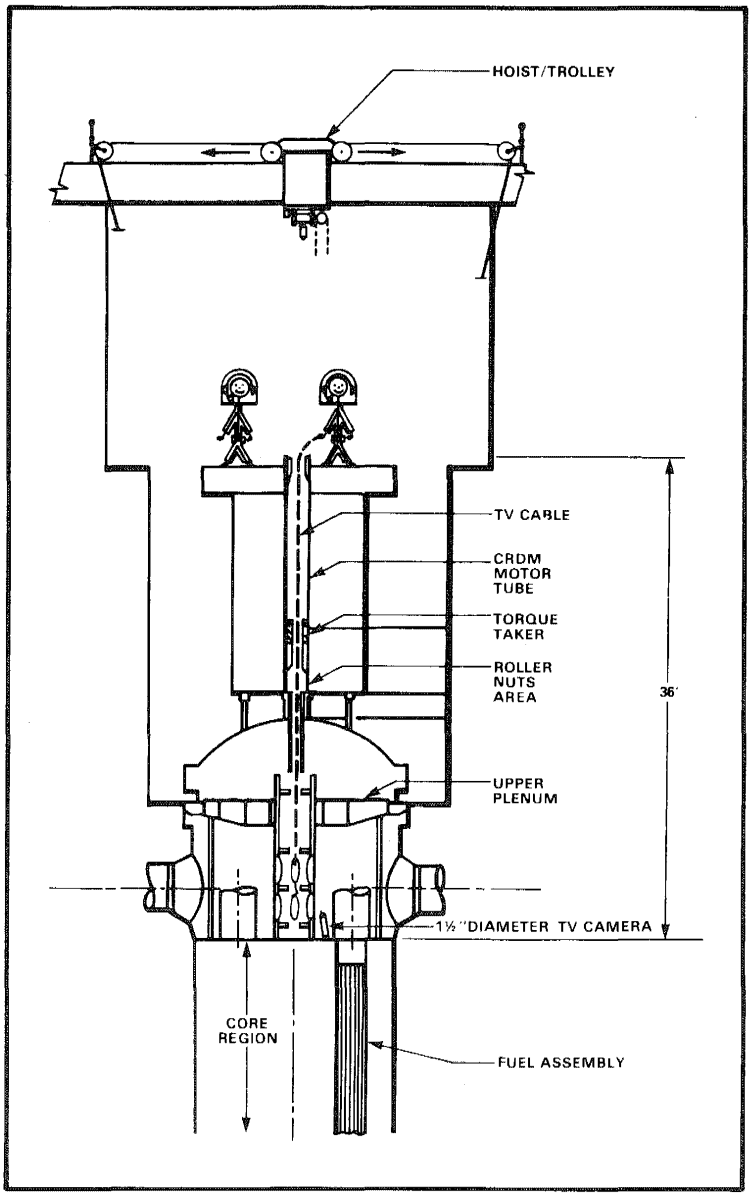
During reactor-building entries in August 1982, attempts were made to uncouple the leadscrews from all 61 control rods and the eight axial powershaping rods. Uncoupling of the leadscrews is a prerequisite to removal of the reactor vessel head. The uncoupling was successful in all but three cases, where the leadscrews will probably have to be cut to disconnect them from the reactor vessel head.

Inspection of the Reactor Core

The first closed-circuit television inspection of the reactor core was performed on July 21, 1982. A



EPICOR-II liners at TMI-2 are transferred from site storage areas in the cask shown at top, and lowered into shipping casks beneath to maintain shielding of radioactive material. During 1982, several shipments of the casks were made to various laboratories for study and tests.

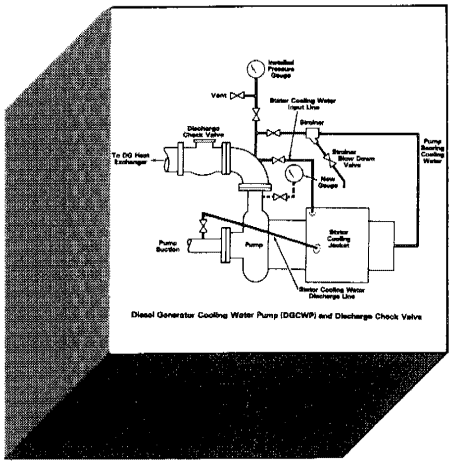


Schematic showing the technique by which a tiny TV camera was lowered into the reactor at TMI-2 for inspection of the damaged core. The first such inspection took place on July 21, 1982.

camera 1-1/2 inches in diameter and 12 inches long was inserted through the central control-rod guide tube As the camera was lowered into the core region, it revealed a bed of rubble approximately five feet below the normal location of the top of the fuel assembly. It is believed that the rubble bed contains oxidized Zircaloy cladding, fuel fragments and/or pellets, poison material, and core structural components. No evidence of melted uranium-oxide fuel pellets was found. Another inspection, on August 4, midway between the periphery and the center of the core also revealed a rubble bed approximately five feet below the top of the core region. Intact pellets, which may be fuel or poison material, were visible on the top of the rubble. During a third inspection, which took place on August 12, a probe was poked through the rubble and it penetrated approximately one foot below the surface, indicating that the rubble in this region is composed of loose material.

Advisory Panel on TMI Cleanup

An Advisory Panel for the Decontamination of Three Mile Island Unit 2 was formed by the NRC in October 1980 to provide advice on major stages of the cleanup. The 12 members of the panel include local citizens, local and state government officials, and scientists (see Appendix Two for list of members). The Panel held several open meetings during fiscal year 1982 and members of the general public were invited to express their views. The NRC has asked the panel to address the issue of final disposition of treated water from the accident.



4 Operational Experience

ANALYSIS AND EVALUATION OF OPERATIONAL DATA

NRC's Office for Analysis and Evaluation of Operational Data (AEOD) was established several months after the accident at TMI-2 to identify and feed back significant safety lessons of operational experience to NRC, its licensees, the nuclear industry as a whole, and the public. These responsibilities include managing the NRC Licensee Event Report (LER) system (see box) and analyzing operational experience in engineering evaluations and case studies. In addition, AEOD publishes the NRC's *Licensee Event Report (LER) Compilation*, which contains abstracts of LERs processed during a one-month period, *Power Reactor Events* report, a bi-monthly publication which contains abstracts of events of significance and interest to plant operators, and the quarterly *Report to Congress on Abnormal Occurrences.* (For a description of NRC's requirements, under law, to report abnormal occurrences, see the 1980 NRC *Annual Report*, p. 82.)

During fiscal year 1982, many of these documents were revised to improve feedback, and standard distribution lists were developed to ensure that operational experience feedback gets directly to licensee personnel who can best use it, i.e., plant managers and plant training coordinators, as well as to corporate licensing contacts.

Exchanging Information with Industry

Within the last three years, two industry organizations, the Institute of Nuclear Power Operations (INPO) in Atlanta, Georgia, and the Nuclear Safety Analysis Center (NSAC) (a part of the Electric Power Research Institute in Palo Alto, California) have been formed to study operational experience, among other subjects. In early April 1982, the NRC memorandum of agreement with INPO for the exchange and feedback of operational experience and safety information on nuclear power plants was revised and signed. A similar agreement was signed with NSAC in late April.

The Institute of Electrical and Electronics Engineers also continued to work closely with the NRC in developing the Energy Industry Identification System (EIIS). This will standardize the nomenclature for systems, structures, and components throughout the nuclear industry, and may provide a common language for reporting information about specific components or generic classes of components in LERs.

NRC Handling of Operational Data Reports

Domestic. About 4,000 LERs were received in fiscal year 1982, covering a wide variety of events; however, some problems continued to occur with the existing reporting system. In May 1982, the NRC published in the *Federal Register* a proposed LER rule designed to revise the scope, content, and method of reporting. The proposed reporting criteria will focus on events most likely to have potential safety significance, and will require a more detailed narrative report for each such event. The NRC staff has received more than 40 letters commenting on the proposal, and, at the end of the year, was considering the comments and framing a final LER rule.

The Sequence Coding and Search System (SCSS), an improved computerized data storage and retrieval system was in the late stages of development at the end of the fiscal year. SCSS will facilitate trend and pattern analyses, allow for statistical assessment of data, and bring a greater range of past experience to

LICENSEE EVENT REPORTS

NRC licensees must report unplanned operational events which have safety implications. Some events must be reported within one hour via dedicated direct phone lines, and many are reported on in writing within a few weeks. These are called Licensee Event Reports (LERs). The NRC staff reviews each event report to determine such things as the adequacy of short-term corrective actions and the need for possible action at other plants, or to identify potential generic problems and significant safety concerns warranting further study. Assessment of the causes and consequences of these events assists in developing preventive and mitigative measures, and in understanding unforseen cause-effect relationships between events. The more serious events may merit treatment of "abnormal occurrences." Frequent or widespread problems may be identified as "unresolved safety issues." Both categorizations are described in this chapter.

For many safety-related operational events, NRC resident inspectors perform the initial NRC investigations, and the appropriate NRC regional office conducts reviews. In addition, the technical aspects of potentially significant operational events are studied by a number of separate organizations within the NRC, including the Office for Analysis and Evaluation of Operational Data and the Offices of NRC Reactor Regulation, Inspection and Enforcement, and Nuclear Regulatory Research.

NRC routinely disseminates information on operational events to power plant licensees and the public.

bear on cases under consideration. Simultaneously, the NRC consolidated its computerized LER data files at the Nuclear Safety Information Center (NSIC) in Oak Ridge, Tenn., and the system located at the National Institutes of Health in Bethesda, Md., was terminated. An expanded LER file will become operational at Oak Ridge using the SCSS as well as the RECON on-line data search and retrieval system. The NRC also established a program to monitor the component failure information reported to INPO's Nuclear Plant Reliability Data System (NPRDS), a reporting system for failure data on safety components. And, finally, in 1982, the NRC implemented a system to gather and store non-reactor operational data on nuclear materials and fuel cycle operational events and on personnel radiation exposure events. It also may be useful in identifying trends in events that signal a need for remedial action. At years's end, the data base contained information on 1981 and 1982 operational events.

Foreign. In fiscal year 1982, the NRC's efforts helped to increase the number of foreign experience reports that are assessed by its offices and contractors. The agency also participated in the development of International Atomic Energy Agency guidelines to be used to improve incident reporting systems. Simultaneously, an NRC program at the NSIC was expanded to systematically screen and assess selected foreign information, and to abstract it for computerized data filing.

TECHNICAL STUDIES — SELECT CASES

AEOD conducts engineering evaluations and case studies of events and potential generic problems, and performs selected trend and pattern analyses. Significant individual events and small groups of events that demonstrate a potential generic problem may be assessed in a detailed study. Events of less safety significance which appear as a group to exhibit a prevailing tendency of significance are usually assessed by trend and pattern techniques.

During the 1982 report period, six case studies were issued and more than 45 engineering evaluations were completed. (See listing, page .) Among the subjects examined in engineering evaluations were a preoperational test precursor of the TMI-2 accident, an Indian Point Unit 2 flooding event, the inadvertent loss-of-coolant events at Sequoyah Nuclear Power Plants, and a loss of residual heat removal service water at the Brunswick Steam Electric Plant.

Other events evaluated involved water hammer, diesel generators, power distribution systems, instrumentation and control systems, support service systems, and safety-related pumps and valves. A sampling of case studies issued during 1982 is presented below.

BWR Water-Level Instrumentation

An NRC review of operating reactor events involving water-level instrumentation in BWR vessels found several cases of interaction betweenplant control systems and protection systems caused by a fluid coupling and sharing of instrument-sensing lines by the sensors that monitor the water levels and provide input to the protection and control systems.

The initial review by AEOD identified the level instrumentation system as one that involves such problems; however, the case study notes that the effect of interaction between feedwater control, reactor protection, primary containment isolation, and emergency core cooling systems may vary depending on the details of the installation of the instrumentation. The study also observes that such fluid coupling problems could exist between control and protection system instrumentation that monitors other

parameters such as steam flow, water flow and liquid levels at both BWRs and PWRs.

The safety concern lies in the possibility of a single failure causing a condition requiring protective action while preventing the actuation of the system designed to protect against just such a condition. In some cases, the installation of instrumentation may not be adequate. An evaluation of modifications in the level instrumentation system is planned for issuance early in 1983.

Events Involving Valve Operation During 1978–1980

A survey of the LER files for 1978-80 identified events for all types of valve-operator mechanisms (motor, air, hydraulic, etc.), and indicated that motor-operated valves comprise the largest category of valve-operator-related events. These events, in turn, are grouped into three categories: torque switches, limit switches, and motors; torque switches are involved in nearly 25 percent of all motor-operator events. More importantly, the survey notes that torque switch problems (which frequently involve adjustment as the corrective action) may actually indicate changes in valve operability characteristics, rather than some extraneous cause of valve inoperability. Another problem was that of relatively frequent motor burnout in high pressure coolant injection and core isolation cooling systems, and this appears related to bypassing thermal protective devices, bypassing torque switches, or improper motor usage.

Finally, the report indicates that repetitive problems occur with valve operators, either on the same valve or a valve in similar service. However, whether the problems are isolated or repeated, plant staff actions appear directed toward returning inoperable equipment to operational status, rather than correcting the root causes of inoperability.

Proposals for better methods and procedures for the adjustment of torque switches and other protective devices to assure valve operability were in staff review at the end of 1982.

ABNORMAL OCCURRENCES— UPDATE FROM FISCAL YEAR 1981

The NRC quarterly reports to the Congress on abnormal occurrences for the periods April-June and July-September 1981 were published too late for inclusion in the *1981 NRC Annual Report*. No new occurrences were identified in the April-June 1981 issue. A summary of the new abnormal occurrences included in the July-September 1981 issue follows.

Misalignment of Isolation Valve

At Beaver Valley (Penna.) Unit 1 on June 6, 1981, with the reactor at 99 percent power, an operator making a morning inspection found that a manually-operated suction isolation valve in the emergency core cooling system was closed and the chain and padlock that were supposed to secure the valve in the open position were missing. The valve, which is to be checked once each shift, was immediately reopened, chained, and locked into position. The licensee was also aware of a similar event the previous day.

The safety implications of the events are associated with the loss of the automatic high-head safety injection (HHSI) capability. With the valve shut, core cooling water from the refueling water storage tank is not available to the high pressure pumps for automatic injection into the core under emergency conditions. Manual action would be required for the system to work. Also, with the suction valve shut, injection pumps could possibly be damaged when operated.

Both the NRC and FBI initiated investigations, and available information has led the NRC to suspect possible acts of sabotage, rather than operator errors. The NRC issued a notice of violation identifying four violations of the licensee's safety-related commitments. The NRC investigations also identified two generic procedural concerns which may have contributed to the June 5 and 6 events: (1) procedures did not assure timely withdrawal of access authorizations of individuals being terminated under adverse circumstances, and (2) criteria for authorizing unescorted access to vital areas were not sufficiently selective.

Failure of High Pressure Safety Injection System

At San Onofre (Cal.) Unit 1 on September 3, 1981, with the reactor at 88 percent power, one of the regulated power supplies serving one of the two redundant paths of the reactor protection system and a portion of the control and indication system failed. As a result, the feedwater and steam flow and steam generator water level indications for the steam generator served by this power supply were lost, and oscillations were observed in similar indications for the other two generators. The operators placed the water level controls under manual control and then manually tripped the reactor. During this period, the high water levels in the steam generators increased the cooling of the reactor coolant system, consequently reducing system pressure. This triggered an automatic safety injection actuation signal (SIAS) (at 1735 psig) in accordance with system design; how-

Engineering Evaluations Issued During Fiscal Year 1982

REACTOR ENGINEERING EVALUATIONS

Designation	*Subject*	*Issued*
E125	Engineering Evaluation Report on Shutdown Cooling System Heat Exchange Failures at Oyster Creek, August 1981	10/15/81
E126	Event Sequences Not Considered in the Design of Emergency Bus Control Logic	10/16/81
E127	Pressure Boundary Degradation Due to Pump Seal Failure at Arkansas Nuclear One	10/28/81
E128	Inoperable Teledyne Solenoid Valves	11/10/81
E129	Brunswick Unit 2 Diesel Generator Jacket Water Temperature Control Valve and Manual Bypass Valve	12/07/81
E130	Davis Besse LER 79-062 on Auxiliary Feedwater System Pressure Switches	12/07/81
E131	High Circulating Current Associated with Inverter Output Due to Lack of Circuit Tuning	12/10/81
E132	Abnormal Wear Encountered on Aloyco Swing Check Valves Installed in the Low Pressure Safety Injection System at Palisades	12/23/81
E201	Methodology for Vital Area Determination	01/12/82
E202	Loss of High Pressure Injection Lube Oil Cooling at Rancho Seco	01/13/82
E203	Inadvertent Isolation of Containment Fan Units at Salem Unit 1	01/21/82
E204	Effects of Fire Protection System Actuation on Safety-Related Equipment	01/28/82
E205	Potential Consequences of Heavy Load Drop Accidents in Light-Water Reactors	02/16/82
E206	Load Reduction Transient on January 14, 1982 at Salem Unit 2	02/22/82
E207	LER 50-336/81-26: Investigation of the Relative Frequency of Valve Overtravel Abnormalies that Could Result in a Potential Centrifugal Pump Runout Exceeding Net Positive Suction Head	
E208	An Observed Difference in Lift Setpoint for Steam Generator and Pressurizer Safety Valves	02/22/82
E209	Generator Rotor Retaining Ring as a Potential Missile (Incident at Barseback Unit 1 on 04/13/79)	02/23/82
E210	Inadequate Switchgear Cooling at Beaver Valley Valves at Arkansas Unit 2 Because of Valve Operator Hydraulic Problems	02/23/82
E212	Spurious Trip of the Generator Lockout Relay Associated with a Diesel Generator Unit	02/24/82
E213	Trip of Two Inservice Auxiliary Feedwater Pumps from Low Suction at Zion Unit 2 on 12/11/81	02/24/82

E214	Duane Arnold Loss of River Water System Loop	03/01/82
E215	Engineering Evaluation of the Salt Service Water System Flow Blockage (Blue Mussels) at the Pilgrim Nuclear Power Station	03/18/82
E216	A Recently Evaluated Preoperational Test Precursor of the TMI-2 Accident	03/28/83
E217	Scram Pilot Solenoid Valve Failures Due to Low Voltage - Grand Gulf Unit 1	03/31/82
E218	Potential for Air Binding or Degraded Performance of Boiling Water Reactor Residual Heat Removal System Pumps During the Recirculation Phase of a Loss-of-Coolant Accident	03/31/82
E219	Containment of Air Serving Safety-Related Equipment	04/01/82
E220	Water in the Fuel Oil Tank at Surry Power Station Unit 2	04/06/82
E221	Indian Point Unit 2 Flooding Event	04/22/82
E222	Loss of Reserve Station Service Transformer "B" on January 18, 1982 at Surry Unit 2	05/10/82
E223	Inadvertent Loss of Coolant Events at Sequoyah Nuclear Power Plant, Units 1 and 2	05/11/82
E224	Generic Concerns Associated with the Ginna Steam Generator Tube Rupture Event	05/21/82
E225	Degradation of BWR Scram Pilot Solenoid Valves Due to Abnormal Power Supply Voltage	06/01/82
E226	Inoperability of Instrumentation Due to Extreme Cold Weather	06/18/82
E227	Failure of Engineered Safety Features Manual Initiation Pushbutton Switches	06/24/82
E228	Repetitive Overspeed Trips of the Steam Driven Emergency Feedwater Pumps on Initial Start at Arkansas Nuclear One, Unit 2	06/25/82
E229	Potential for Flooding in Control Room at San Onofre Units 2 and 3	06/29/82
E230	Water in the Fuel Oil Tank at Surry Power Station, Unit 2 - Additional Information	07/07/82
E231	Millstone Unit 2 Loss of Shutdown Cooling Due to Trip of Low Pressure Safety Injection Pump	07/19/81
E232	Potential Difficiency in the Sigma Lumigraph Indicators Model Number 9270	07/19/82
E233	Carbon Dioxide Systems Used for Fire Protection in or Adjacent to Critical Areas	07/28/82
E234	Failure in a Section of 4kV Bus Cable Manufactured by Okonite	08/11/82
E235	Wiring Error in Handswitch for Solenoid Control Valves Associated with High Pressure Coolant Injection System Steam Condensing Mode Pressure Control Valve at Duane Arnold	08/11/82
E236	Brunswick Steam Electric Plant Unit 2 Loss of Residual Heat Removal Service Water on January 16, 1982	08/25/82
E237	Power-Operated Relief Valve Block Valve Failure at Robinson	08/25/82
E238	Water in the Lube Oil in Safety Injection Pump 1A-A at Sequoyah - LER 81-076	08/25/82
E239	Main Steam Isolation Valve Closures and Pressurizer Safety Valve Actuations at St. Lucie Unit 1 on December 19, 1981	09/24/82
E240	Preliminary Account of Events Associated with a Reactor Trip at Hatch Unit 2 on August 25, 1982	

NON-REACTOR ENGINEERING EVALUATIONS

Designation	*Subject*	*Issued*
N107	Engineering Evaluation of Fire Protection at Non-reactor Facilities	12/10/81
N108	Notes on AEOD Review of Emissions from Tritium Manufacturing and Distribution Licensees	12/16/81
N201	Report on Medical Misadministrations for the Period November 10, 1980 - September 30, 1981	01/82
N202	Buildup of Uranium-Bearing Sludge in Waste Retention Tanks	01/21/82
N203	Lost Plutonium-238 Source	02/18/82
N204	Report on Medical Misadministrations for the Year 1981	03/82
N205	Preliminary AEOD Review of Iodine-125 Sealed Source Leakage Incidents	04/27/82
N206	Eberline Instrument Corporation - Part 21 Report	05/06/82
N207	AEOD Review of Iodine-125 Sealed Source Leakage Incidents	05/25/82
N208	Potentially Leaking Plutonium-Beryllium Neutron Sources	08/02/82
N209	A Summary of the Nonreactor Event Database for 1981	08/02/82

ever, two safety injection valves did not open. Although their failure to open did not result in plant damage or radiological release, had a loss of coolant or steamline break occurred, a key safety system may not have performed as intended.

Three valve design deficiencies were identified and the license has been amended to provide for surveillance tests of the valve. The licensee scheduled the procurement and installation of eight replacement valves to be completed in the first half of 1985. This extended schedule provides time for inspection and testing of the valves (14 months after completion of fabrication). The licensee is also studying an alternative system which would utilize dedicated safety injection pumps and eliminate some complexities in the present design.

The NRC is evaluating the generic implications of the event; i.e., testing the valves under operating pressure differentials. In addition, an Inspection and Enforcement Information Notice was issued on October 7, 1981, informing licensees of this event.

Occupational Overexposures

Exposures Exceeding NRC Limits. On May 5, 1981, the Eveleth Expansion Company of Eveleth, Minnesota, reported that between April 3 and 7, 1981, personnel working inside an iron ore pellet cooler had been exposed to radiation from a 10-curie cesium-137 sealed source contained in a level control gauge. When the gauge source holder was removed from its mounting, the licensee found that the lead shielding in the shutter had melted and drained away, thereby rendering the shielding integrity of the shutter useless.

Investigation showed that 31 people had entered the cooler, where radiation levels were in excess of 100 mR/hr, and received calculated radiation exposures ranging from 0.14 rem to 3 rem. No adverse health effects were observed or expected.

To prevent a recurrence, the gauge source holder was adequately shielded, placed in properly posted storage, and subsequently shipped to the supplier for repair or disposal. The licensee established new procedures to be followed, and, while the source holder was being repaired, installed an alternate gauge in place of the inoperable one. During its investigation, the NRC identified two items of noncompliance: (1) individuals received exposures in excess of regulatory limits, and (2) radiation levels were created in an unrestricted area in excess of regulatory limits. At the end of the period the event was also being studied for generic implications.

Overexposure in an Unrestricted Area. An NRC investigation of a lost 1.5-curie cesium-137 source reported on June 26, 1981 found that a member of the

general public may have received a radiation exposure in excess of NRC regulatory limits a few days earlier in Norman, Oklahoma. The Mustang Services Company, an NRC licensee, had closed its Oklahoma City facility and sold a trailer containing a mounted gauge that contained a radioactive source. However, the new owner of the trailer did not have a license to possess the source, and the licensee therefore arranged for a contract employee to remove the gauge.

During its removal, however, the small sealed radioactive source apparently fell undetected into a pan beneath the floor of the trailer. On June 23, the trailer was towed to the new owner's facility in Houston, Texas, and a day later, when the licensee discovered the source missing, he had a consultant perform radiation surveys of the gauge, the trailer, and the facilities and grounds of both the licensee and the new owner of the trailer. The consultant notified NRC of the loss on June 26, stating that the health departments of Texas and Oklahoma were assisting in the search for the source. That evening, using radiation detection equipment, a Texas Department of Health Resources representative found the source on a bridge near Lewisville, Texas. It had fallen onto a structural member of the bridge several feet below the surface of the roadway. The dose rate at the bridge surface was about 5 millirem/hour; thus, it is unlikely that anyone received an appreciable exposure from the source while it was on the bridge support.

Even though there was a potential for serious exposures while the source was not within the licensee's control, an NRC investigation led to a conclusion that only two individuals received appreciable exposure. One was a contract employee who may have received a calculated whole-body exposure of less than 600 millirems, less than the NRC regulatory limit for a worker in a restricted area in a calendar quarter. The other, a representative of the trailer's new owner, may have received a whole-body exposure of about 1.4 rem (an average of 350 millirem/hour) standing near the trailer while the truck was being repaired at Norman, Oklahoma while enroute to Houston, Texas. Neither exposure is expected to result in any detectable effects.

The licensee, having closed its Oklahoma City facility, requested termination of its license, and this was granted by the NRC on September 14, 1981. The NRC later imposed civil penalties in the amount of $4,000. On December 15, 1981, the NRC issued an Inspection and Enforcement Information Notice to appropriate licensees to inform them of this event.

Agreement State Licensees

In 1977 procedures were developed under which Agreement States screen unscheduled incidents or events using the same criteria as the NRC and report the events to the NRC for inclusion in the quarterly abnormal occurrence reports to Congress. No incidents or events were identified in the April-June 1981 issue. The July-September 1981 issue described the following events.

Radiation Doses to Hospital Patients. On December 1, 1980, the Radiation Safety Officer of St. Joseph's Hospital of Albuquerque, New Mexico reported to the State by telephone that a number of patients with prostate cancer may have received excessive radiation doses over a time span of about 22 months.

The hospital conducted an investigation into the causes of the incidents and cooperated with the State agency in its investigations. Upon request for an independent review by the State agency, the NRC made available the services of a medical-physical consultant.

It was determined that use of an incorrect dose-conversion factor misled two radiotherapists, who had little experience in use of iodine-125 seed implants, to conclude that an inadequate dose had been delivered by the seeds, and that the radiotherapists then administered unnecessary external radiation to some patients, resulting in an excessive dose and complications in several cases. The investigators could not determine the source of the incorrect dose-conversion factor, but believe that faulty implant techniques may have contributed to the complications in two cases where external radiation was not used.

The two radiotherapists resigned from the hospital. In addition to investigating the situation, the hospital ordered a new therapy treatment planning system, hired a new director of radiotherapy, and upgraded its documentation and administrative procedures. Iodine-125 seed implant therapy ceased pending approval of a license amendment requiring improved procedures.

Overexposures Aboard a Barge. The State of Louisiana's Nuclear Energy Division (NED) reported that on July 14, 1981, a radiographer for a State licensee, Analytic Inspection, Inc. of Lafayette, Louisiana, and two other persons received overexposures while working on a barge in the Gulf of Mexico near Intracoastal City, Louisiana. On July 14, the barge tilted, and an exposure device, which had been secured to a railing by a rope, broke loose. It then rolled and struck a pump assembly on the opposite side of the barge. This resulted in partial disassembly of the exposure device, and unshielding of the source. The captain, his helper, and the radiographer received exposure when they were in the vicinity of the source, but the exposures were undetected since a survey meter showed a zero reading. (The meter apparently had "saturated" from a high reading and the needle returned to zero.) Later, both the

captain and the radiographer handled parts of the broken exposure device, not realizing the source was among the parts. The unshielded source was not detected until the barge returned to port and the broken exposure device was returned to the manufacturer for repair. There were several occasions when the radiographer may have actually touched the source capsule.

Reenactment of this incident failed to provide sufficient information to establish an accurate whole-body dose (the radiographer was not wearing a film badge since radiography was not being performed at the time). However, it was estimated that the whole-body dose to the radiographer and captain was less than 10 rem, and less than 2 rem to the helper. From the clinical indications, the dose to the fingers of the radiographer was estimated to be 3,000 to 5,000 rads. He is receiving medical treatment.

Citations have been made by the State of Louisiana for the excessive exposure to individuals and for the radiographer not following prescribed emergency procedures. In addition, the State NED independently studied the survey meter and advised the licensee of its finding that the meter had indeed saturated and returned to zero. All licensee radiographers have since been cautioned concerning this pitfall, and have been reinstructed in emergency procedures.

ABNORMAL OCCURRENCES — FISCAL YEAR 1982

(Reports for April-June and July-September 1982 were not available for coverage in this report.) A summary of the abnormal occurrences included in the October-December 1981 and January-March 1982 issues follows.

Blockage of Coolant Flow

In a nuclear power plant, heat generated by the reactor and safety systems must be dissipated, a process usually performed by transferring the heat to heat-exchanger cooling systems, and then to a "heat sink," such as a river, lake, or cooling tower. Failure to provide such cooling can result in severe damage to the safety components or systems designed to shut down the plant and/ or to mitigate the consequences of an accident.

The NRC received notifications from several nuclear power plant licensees during the reporting period indicating that the heat transfer capabilities in some cooling systems were being degraded by flow blockages, many of them due to buildups of biological organisms. The licensees submitting such reports were those operating Arkansas Nuclear One, Rancho Seco, Brunswick Unit 1 and 2, San Onofre Unit 1 and Pilgrim. They reported that they had cleaned and flushed their affected cooling water systems, and committed themselves to improving design features and detection techniques to preclude the fouling of safetyrelated cooling systems in the future.

The NRC conducted special inspections regarding the events noted above, and, on April 10, 1981 issued a Bulletin entitled "Flow Blockage of Cooling Water to Safety Systems Components by *Corbicula* (Asiatic Clam) and *Mytilus* (Mussel)," requesting all NRC licensees to determine whether either species was present and the extent of any fouling they may have caused. Responses to the bulletin were received from all of the operating plants, and represent 48 sites. Of these, 21 sites reported finding such species either in the plant, in the source of its cooling water, or in its receiving water body.

In July 1981, NRC issued an Information Notice, "Potential Loss of Direct Access to Ultimate Heat Sink," describing the loss of the decay heat removal at Brunswick, and emphasizing that licensees should initiate the actions described in the April bulletin for marine organisms that could foul their plants.

In addition, NRC issued a case study entitled "Report on Service Water System Flow Blockages by Bivalve Mollusks at Arkansas Nuclear One and Brunswick," in February 1982, and undertook a generic study of service water system malfunctions in March 1981. The latter study is being assisted through the Special Studies program at the Oak Ridge National Laboratory (ORNL). ORNL will evaluate the safety significance of service water malfunctions and recommend corrective measures needed. NRC will attempt to correlate plant design features, surveillance programs and preventive measures with the service water problems reported by licensees.

Seismic Design Errors

In September 1981, Pacific Gas and Electric (PG&E) of California submitted two letters to the NRC stating that some diagrams used in the Diablo Canyon Unit 1 seismic design were in error. Investigation showed that the diagrams for Diablo Canyon Unit 2 were used in the Unit 1 seismic design, among other design errors. This situation resulted in NRC's suspension of the Diablo Canyon Unit 1 fuel load and low-power operating license on November 19, 1981.

PG&E initiated a re-analysis of pertinent structures, equipment and components, this time using the appropriate diagrams, and found that modifications were required on a number of Unit 1 pipe supports. Modifications included adding snubbers and braces, changing the snubber size, replacing structural members, and stiffening base plates.

Subsequent investigations identified additional design concerns, and on November 19, 1981, the Commission defined what would be required from PG&E prior to fuel loading. The requirements included an independent design verification program for seismic-related service contracts, and such a program is now being performed in two phases. Phase I involves the reverification of seismic designs prior to June 1978. Phase II involves reverification of those performed after June 1978 by the licensee and its contractors. At the close of the report period, the reverification program had identified approximately 140 open items, including six items classified as "errors." The significance of the "errors" was being assessed by the NRC staff at the end of 1982.

Diesel Generator Cooling System Failures

On October 23, 1981, the NRC was notified by the Commonwealth Edison Company of Illinois that certain Dresden Station diesel generators had tripped due to insufficient cooling water flow to the generator heat exchangers. On November 19, 1981 a similar event occurred, and, on December 1, 1981 one of the generators was declared inoperable when a problem developed with its cooling water pump motor bearings.

Diesel generators at nuclear power plants provide emergency power when normal off-site sources of ac power are unavailable. In the events at Dresden, normal off-site sources of ac power remained available; however, the loss of generators constituted a serious reduction in safety redundancy.

The insufficient cooling water flow to the exchangers was caused most often by broken check valves in the water pump discharge. The check valves are not routinely covered by inservice testing programs or routine surveillance, and the failures were not adequately characterized by operators or instrument readings during surveillance tests. They were discovered by direct inspection of the internals of the check valve.

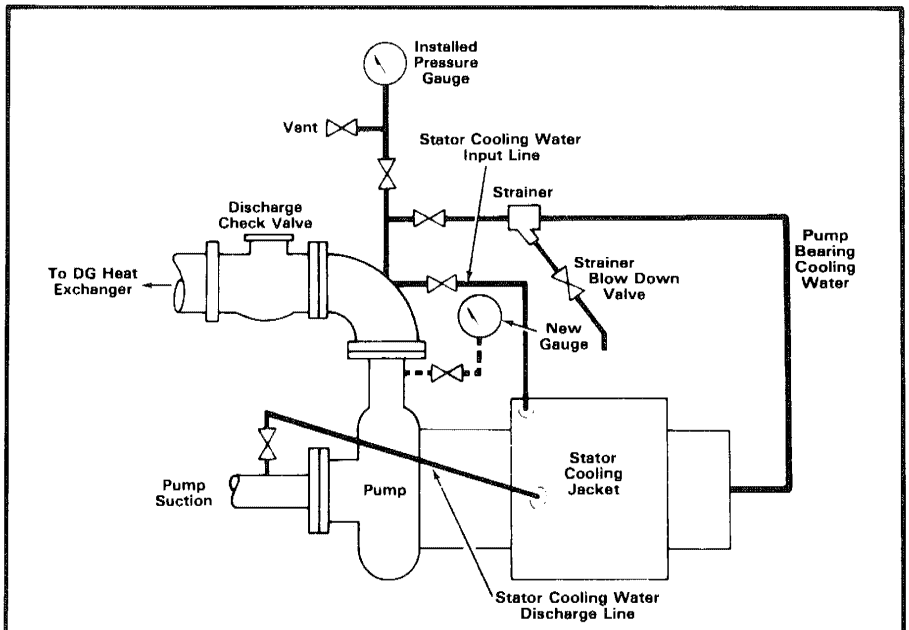
Corrective actions have been initiated. The three discharge check valves have been replaced and instrumentation will be changed for the cooling water systems to provide a more accurate indication of water flow. Plant procedures will be changed to lower the probability of air leakage into the pumps or inadvertent shutting of the pump suction valves. Because each diesel experienced a defective check valve, the licensee plans to examine and test each valve annually.

On March 26, 1982, the NRC issued an Information Notice titled, "Check Valve Failures on Diesel Generator Engine Cooling System," to all nuclear power reactor owners describing the event.

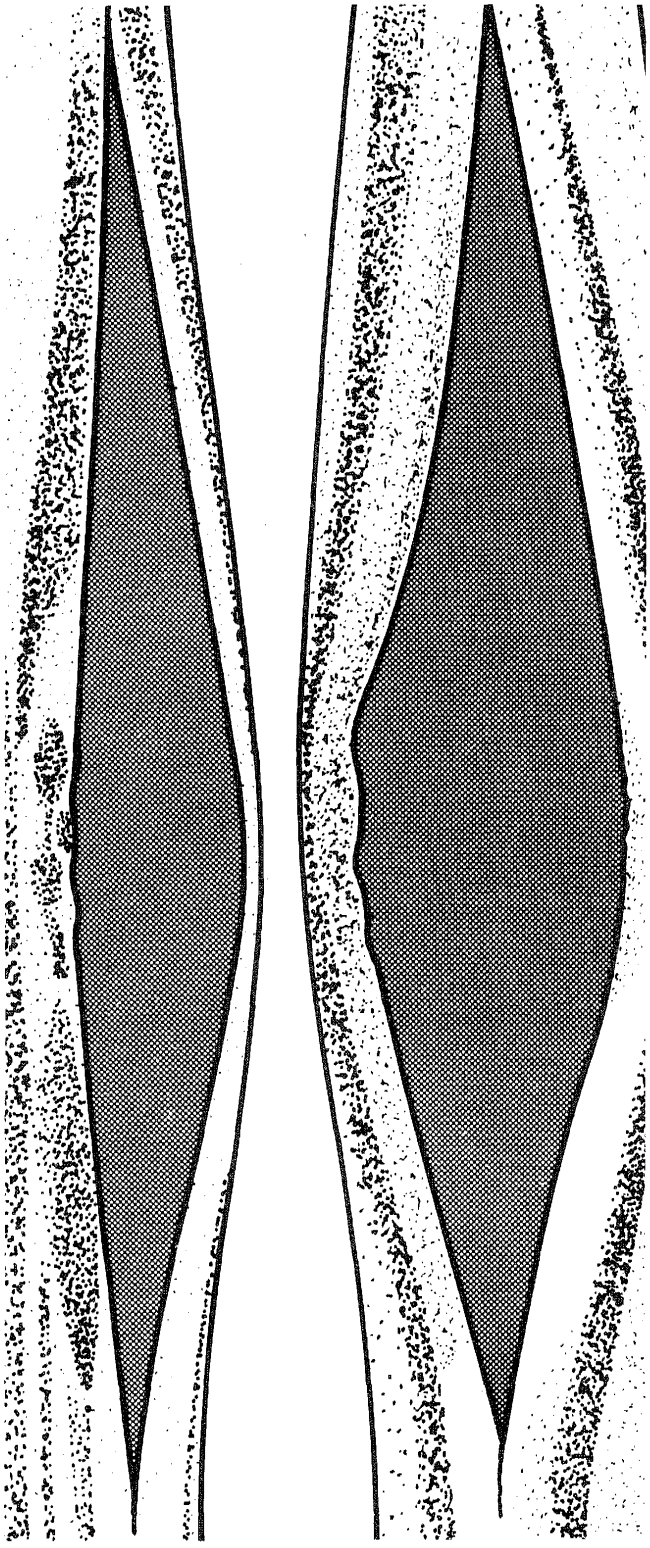
Pressure Transients During Shutdown

On November 28 and 29, 1981, Florida Power and Light Company reported that two reactor coolant pressure transients occurred while its Turkey Point Unit 4 was shut down. The cause was an un-

This schematic drawing shows key parts of a diesel generator which failed several times at the Dresden (Ill.) Nuclear Station during the latter part of calendar year 1981. The generators provide emergency power when offsite electric power fails. At Dresden, undetected broken discharge check valves caused a reduction of coolant flow which resulted in generator shut-downs.



Diesel Generator Cooling Water Pump (DGCWP) and Discharge Check Valve



Two views of the steam generator tube rupture that caused a reactor trip at the R.E. Ginna Nuclear Power Plant in New York in January 1982. The tubes normally have an outside diameter of 7/8 inch and a wall thickness of 0.0050 inches. The rupture depicted here is approximately five inches long and 0.75 inches wide at its center.

expectedly high pressure increase while starting the reactor coolant pump while overpressure mitigating systems were inoperable. The transients exceeded by a factor of two the temperaturepressure limits stated in NRC technical specifications, but reactor vessel integrity was not impaired. NRC was concerned, however, because the reactor vessel has received enough radiation exposure to reduce its fracture toughness at low temperatures. The reported transients had the potential for brittle fracture of the vessel if significant flaws had been present and if the transients had not been terminated promptly by the operators.

The NRC conducted a special safety inspection of the circumstances related to these events, and the licensee was issued a notice of violation for inadequate functional testing procedures and failure to include a check of certain valves in pertinent procedures. Subsequently, the licensee has made the required procedural changes.

An NRC Information Notice, "Overpressurization of Reactor Coolant System," was issued to other licensees informing them of these events and their potential significance.

Deficiencies in Management Control

Three occurrences at Boston Edison Company's Pilgrim Unit 1 indicated serious deficiencies in the management's control of certain safety-related activities. Two occurred over periods of several years.

The first of these occurrences involved failure of the licensee from 1978 to 1981 to comply with the regulations governing the control of combustible gas mixtures following postulated accidents. The second concerned violation of an NRC technical specification, with NRC inspections showing that improper management controls of maintenance activities on certain safety-related electrical power supplies significantly reduced the assurance that certain isolation valves would automatically close when required. The third item involved operation of the facility at various times from 1972 until 1981 with the primary containment drywell temperature greater than stipulated in the plant's Final Safety Analysis Report. Not only had the licensee been aware of the latter situation for several years, but there was no evidence that the safety evaluations required by NRC regulations had been accomplished, either.

Corrective actions for the first item included restoring the system to its original design and initiating an investigation of the causes for not complying with the regulations. For the second item, the licensee restored the electrical circuits to a fully operable condition. For the third item, corrective maintenance was initiated on the drywell cooling systems to restore the original design capacity. Drywell equipment insulation was repaired, additional instrumen-

tation was installed to monitor the drywell temperature and performance of cooling systems, and the technical specifications were changed to limit drywell temperatures. In addition, the licensee repaired or replaced some instrument limit switches, electrical cables, and solenoids which were found to be affected.

On January 18, 1982, the NRC issued to the Boston Edison Company a Notice of Violation and Imposition of Civil Penalties for $550,000, together with an Order modifying the license for the licensee to improve management to take immediate effect, and on February 4, 1982, it was further cited for various other violations, including inadequate management controls. In response, the licensee paid the civil penalty, engaged a contractor for an independent appraisal of management functions and procedures, and initiated a performance improvement program. For its part, the NRC Region I office has expanded the inspection program at Pilgrim to thoroughly evaluate the licensee's management controls.

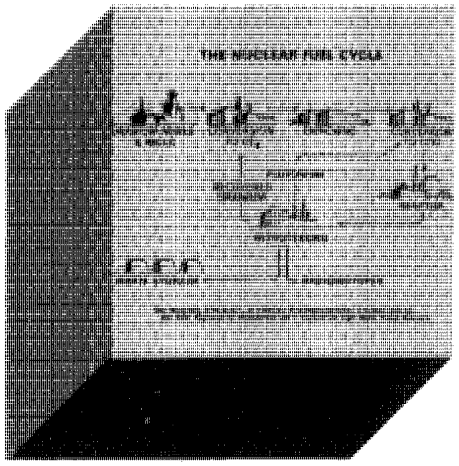
Steam Generator Tube Rupture

On January 25, 1982, R. E. Ginna Nuclear Power Plant in New York experienced a reactor trip as the result of a steam generator tube rupture. The licensee postulated that a large foreign object in the steam generator initiated a sequence of events which led to the rupture. The effective quality control practices during steam generator modifications in 1975 and subsequent modifications resulted in foreign objects falling (and remaining undetected) in the region outside the tube bundle. The postulated failure mechanism is that such objects impacted on and damaged the outermost peripheral tubes. These tubes were plugged, but the foreign objects continued to damage the plugged tubes until some collapsed, and in some cases, severed and damaged adjacent tubes. One of these adjacent tubes was ruptured on January 25, 1982.

The licensee identified a number of actions to be taken, both prior to and after restart of the plant, to upgrade equipment and procedural deficiencies identified in the evaluation of the event.

The NRC responded to the event by activating its Incident Response Centers at Headquarters and Region I, sending a site team to the plant site, and coordinating with the licensee on technical support matters and with other organizations on emergency preparedness and public information matters. After the event, an NRC Task Force was formed to study and report on the event. That report, NUREG-0909, published April 1982, provides the data needed for more NRC detailed analysis, and a discussion of the significant findings from and response actions to the investigation.

The NRC also reviewed the licensee's evaluation of the event and its proposed corrective actions. After resolution of the issues involved, the NRC agreed that the plant could be restarted and taken to full power. The reactor achieved criticality on May 25, 1982.



5 Nuclear Materials

The regulation of nuclear materials is administered by the NRC's Office of Nuclear Material Safety and Safeguards (NMSS). It is conducted under three major programs: fuel cycle and material safety, discussed in this chapter; safeguards, discussed in Chapter 6; and waste management, including uranium recovery, discussed in Chapter 7.

Activities covered in this chapter include licensing and other regulatory actions concerned with (1) purification and conversion of uranium ore concentrates (after mining and milling) to uranium hexafluoride, (2) conversion of the uranium hexafluoride (after enrichment in Government-owned diffusion plants) to ceramic uranium dioxide pellets and their fabrication into light water reactors fuel, (3) production of naval reactor fuel, (4) storage of spent reactor fuel, (5) transportation of nuclear materials, and (6) production and use of reactor-produced radioisotopes ("byproduct material").

Highlights of actions taken in fiscal year 1982 included:

- Completion of 57 major and 100 minor licensing actions dealing with uranium fuel.
- Completion of 110 design certification reviews for transportation packages.
- Completion of about 5600 actions on applications for new byproduct materials licenses and amendments and renewals to existing licenses, and completed 104 evaluations of sealed sources and devices containing radioactive materials.
- Evaluation of possibly contaminated sites to determine if action should be taken to protect the public, and
- Transfer of licensing responsibility for certain categories of materials licenses to Regions I and III as part of NRC's program to regionalize headquarters functions.

FUEL CYCLE ACTIONS

Environmental Effects of the Uranium Fuel Cycle. In determining whether a proposed nuclear power reactor meets the criteria for licensing, the Commission considers the environmental effects of all activities associated with providing its fuel, and storing or disposing of the spent fuel and other radioactive wastes. The summary of environmental effects of the uranium fuel cycle for a model 1000-MWe light water nuclear power plant is given in Table S-3 of regulation 10 CFR 51.20, amplified in an explanation published for public review (46 FR 15154) on March 4, 1981. Adoption of a final rule has been held up because of a decision (No. 74-2586) by the U.S. Court of Appeals on April 27, 1982, holding that "the Table S-3 rules are invalid because they fail to allow for proper consideration of the uncertainties concerning the long-term isolation of high-level and transuranic wastes, and because they fail to allow for proper consideration of the health, socioeconomic and cumulative effects of fuel-cycle activities." The Commission obtained a stay of mandate to allow the Table S-3 rules to remain in effect while the decision is being appealed to the Supreme Court. The Solicitor General, on behalf of the Commission, on September 27, 1982, filed a petition for review by the Supreme Court. The petition was granted, and it is expected that the Supreme Court will review the case in the first half of 1983.

In another matter related to Table S-3, the Commission received new data from a three-year program of measurement of releases of the radioactive gas radon-222, from open pit uranium mines. Radon-222 is formed in the radioactive decay chain descending from uranium-238 and is always present in natural uranium ore deposits and other locations where uranium is found. The new data were reported by Battelle Pacific Northwest Laboratory,

which found that average radon-222 releases per ton of uranium ore mined are a little higher than previously measured but that the amount of the increase is within the uncertainty range of the measurements. The staff's analysis of environmental impacts indicates that the change in average radon releases does not significantly change the calculations of atmospheric concentrations of radon and their effects in the U.S. and world populations. After the special hearing on radon issues before the Atomic Safety and Licensing Appeal Board, a partial decision (ALAB-640) was issued in 1981 affirming the radon release estimates developed by the staff but deferring the final decision on health effects to allow intervenors time to present additional information. After consideration of all information presented, the Board issued its final decision (ALAB-701, November 19, 1982) affirming the staff's assessment that radon releases from uranium mining and milling associated with reactor fuel do not have a significant environmental effect in terms of human health.

Radiological Contingency Planning. NRC continued to install radiological contingency plans for its major fuel cycle and materials licensees, with 62 selected licensees ordered to submit radiological contingency planning information or to reduce their radioactive material possession limits below designated threshold levels. (The bases for selection are set forth in NUREG-0767, "Criteria for the Selection of Fuel Cycle and Major Materials Licensees Needing Radiological Contingency Plans.")

Thirty of those licensees elected to reduce their possession limits or to accept qualifications on their possession of nuclear materials so that they would not have to submit radiological contingency plans. Twenty-eight other licensees submitted plans which were then reviewed and incorporated into their licenses as conditions. Four licensees who also operate collocated test and research reactors, have submitted radiological contingency plans for their materials activities and emergency procedures plans for their reactor facilities which are presently under review. The rulemaking proceeding announced on June 3, 1981 (see *1981 Annual Report*, p. 61) to codify contingency planning requirements, extend them to cover offsite emergency preparedness, and possibly to apply them to other licensees, continued in 1982. A notice of proposed rulemaking is planned for February 1983, and a final rule by early 1984.

Decommissioning and Decontamination. The NRC continued in 1982 to evaluate sites where radioactive material operations were formerly conducted. Oak Ridge National Laboratory and the NRC staff completed an evaluation of approximately 20,000 old docket files (see *1980 NRC Annual Report*, p. 106) to determine if the formerly used sites need corrective action to assure protection of the public. Twelve sites were identified. Two of them were decontaminated during the year by the former licensees. Two others were designated for inclusion in the Department of Energy's Formerly Utilized Sites Remedial Action Program (FUSRAP). Remedial action at one site is being overseen by an agreement state, and six sites were being evaluated by NRC at yearend for appropriate action. The remaining site—at Pompton Plains, N.J.—was formerly owned and operated by Rare Earths, Inc., now a part of the W. R. Grace Company. It was used to extract rare earths and thorium from monozite sands both for private use and for the now defunct Atomic Energy Commission. An aerial survey indicated that radioactive contamination was present on-site as well as in a creek adjacent to the site, and a comprehensive radiological survey has since been conducted. Results, anticipated early in 1983, will be turned over to the Department of Energy for review and possible inclusion in the agency's remedial action program.

Decontamination of the United Nuclear Corporation's (UNC) facility at Wood River Junction, R.I., is progressing on schedule. By early 1983, UNC plans to submit documentation that all waste material has been removed and that the site has been decontaminated to levels acceptable for unrestricted use. At that time, UNC plans to request termination of its license for this site.

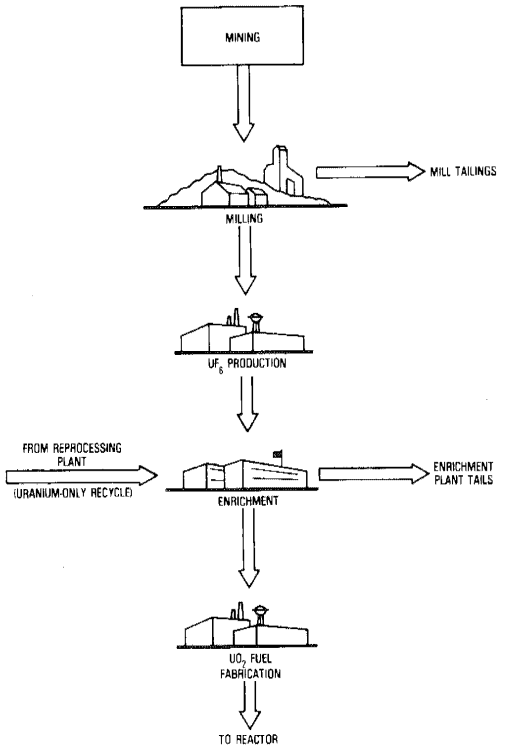
In 1982, the Commission published a draft environmental impact statement related to proposed decontamination and stabilization of Kerr-McGee Chemical Corporation's facility at West Chicago, Illinois. The licensee proposes to remove the process buildings and residues and store them on-site. The Final Environmental Statement is scheduled to be issued in early 1983. (For other information on this site, see *NRC Annual Reports for 1980 and 81.*)

Decontamination and decommissioning continued at Kerr-McGee's plutonium facilities at Cimarron, Ok.; Westinghouse facilities at Cheswick, Pa., and Babcock and Wilcox facilities at Leechburg, Pa. Decontamination of the plutonium facilities at the General Electric site near Vallecitos, Ca. was completed during the year. Presently, no commercial low-level radioactive waste disposal site will accept the plutonium wastes generated by these decontamination operations. However, in some cases, plutonium wastes are being accepted by DOE because the former plutonium operations were conducted under DOE contract. In other cases, packaged decontamination wastes are being stored at licensee sites until the disposal problem is solved.

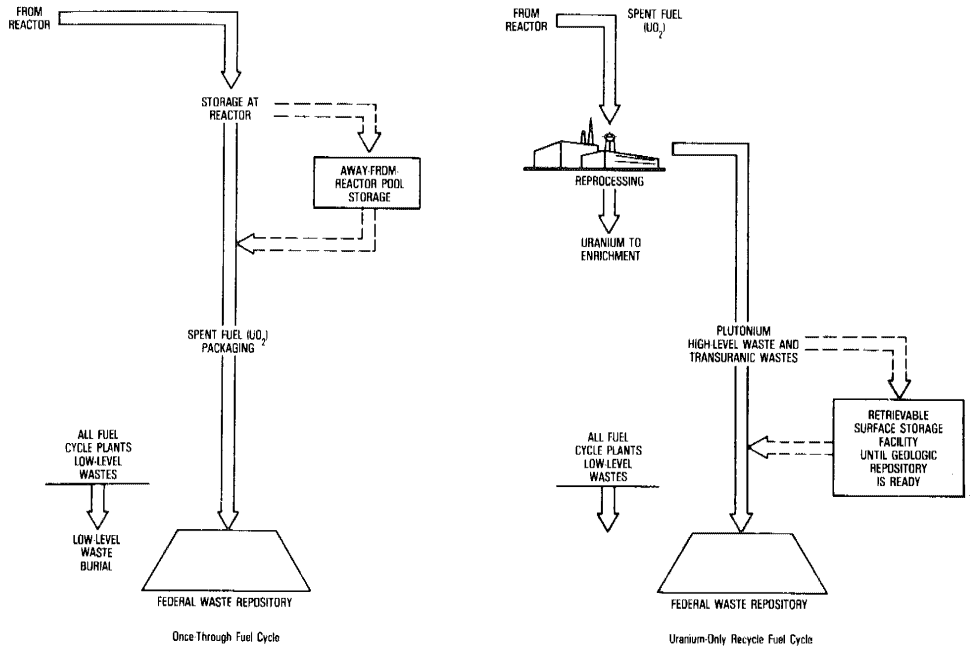
Plan for Review and Evaluation of Operational Data. During 1982, the NRC staff developed an improved procedure for the evaluation of routine inspection, investigation, operational-data and event reports to give proper emphasis to the identification

The NRC regulates all but two steps of the uranium fuel cycle. The exceptions are the mining of uranium ore and its enrichment. The diagrams on this page illustrate the fuel cycle in two parts. At top is the "front end" (from the mine to the reactor) and at bottom, the "back end" of the cycle in two configurations: left side shows a cycle in which reprocessing of spent fuel is not involved; at right, the cycle including reprocessing.

LWR URANIUM FUEL CYCLE FRONT END OPERATIONS



LWR URANIUM FUEL CYCLE BACK END OPERATIONS



and correction of possible generic issues. It provides for formal documentation, control and a more deliberate consideration of the reports than heretofore, when reviews and evaluations were performed principally by personnel concerned with the activities of specific licensees.

West Valley Demonstration Project. The NRC continued to prepare for its independent oversight role in DOE's high-level liquid-waste-solidification demonstration project at West Valley, N.Y. (See *1981 NRC Annual Report*, p. 61). Technical data needed by NRC on the status of high-level waste storage tanks and burial ground confinement capability were obtained with the assistance of DOE.

In 1981, NRC issued an amendment to the West Valley facility license that permitted transfer of the facility to Department of Energy. DOE assumed possession of the facility on February 25, 1982 and began decontamination activities in preparation for the solidification project. Also, in February 1982 the NRC issued another license amendment establishing conditions whereby the previous operator, Nuclear Fuel Services, Inc., would be relieved of all authority and responsibility. This amendment became effective on September 16, 1982 when the New York State Energy Research and Development Authority accepted all remaining licensing responsibility upon completion of DOE's project.

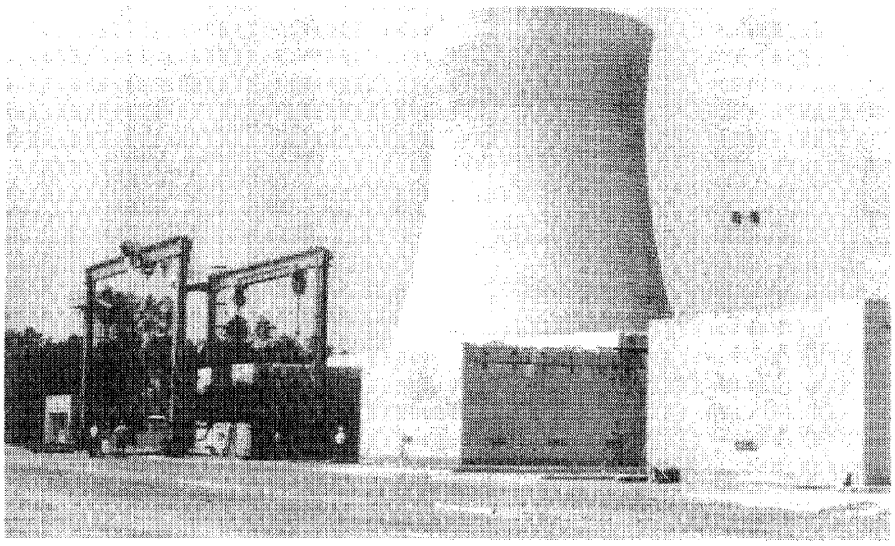
Low-Level Radioactive Waste Storage. Continuing uncertainty about disposal capacity for low-level radioactive waste at established sites has resulted in utilities taking a variety of measures to increase on-site contingency storage capabilities. (See *1981 NRC Annual Report*, p. 63). In response to this need, the NRC issued licensing and safety guidance (Generic Letter 81-38 dated November 10, 1981) to assist licensees in evaluating the need to add contingency storage for low-level radioactive waste under authority of the existing operating license. NRC regulations permit this without specific NRC approval if the licensee feels no change of technical specifications or unreviewed safety question is involved.

The NRC staff continued to conduct safety and environmental reviews, under 10 CFR Part 30, of applications for on-site low-level radioactive waste storage at Pennsylvania Power and Light's Susquehanna Steam Electric Station and at Tennessee Valley Authority's (TVA) Sequoyah and Browns Ferry nuclear plants. The reviews for the Browns Ferry application were completed and reports issued in June 1982. Issuance of a license awaits completion of appeal procedures for petitions to intervene and public hearings, if required. The safety evaluation report and environmental impact appraisal for on-site storage at TVA's Sequoyah Nuclear Plant were completed and a materials license was issued on September 17, 1982. The license, the first of its kind, authorizes storage on-site of up to five years low-level radioactive waste generated by the plant. In response to NRC requests, Pennsylvania Power and Light redesigned its on-site storage facility and submitted a revised application in September 1982.

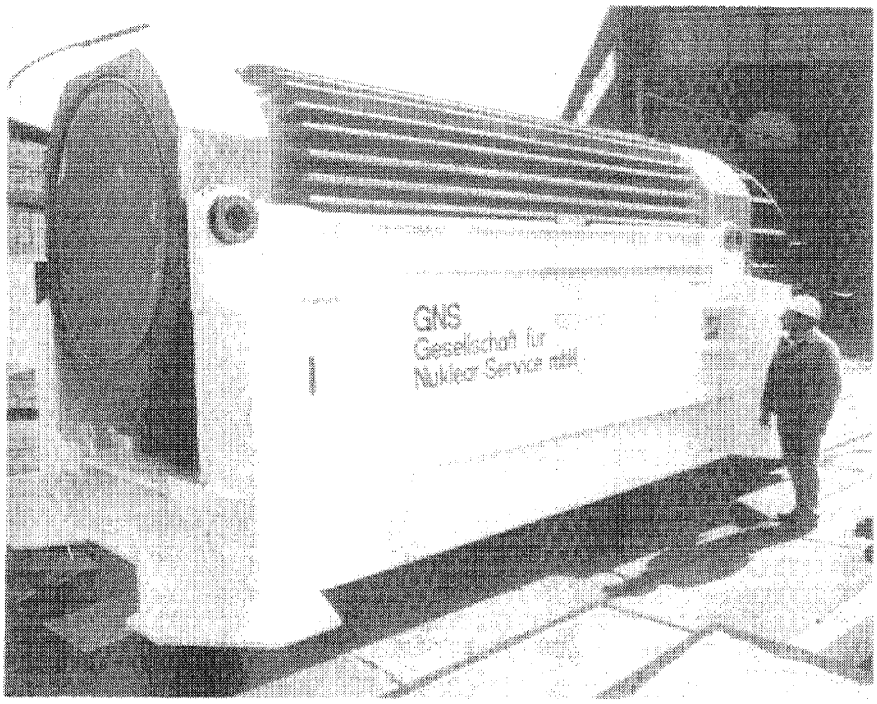
Spent Fuel Storage

As nuclear power plants continue to approach the capacity limits of spent fuel storage pools of reactor sites, interest continues in alternatives for providing additional storage capability.

Away-from-Reactor Storage. The proceeding on General Electric Company's application for renewal of its spent fuel storage license for the Morris Operation (formerly the Midwest Fuel Recovery Plant) at Morris, Il. continued into 1982. (See *1981 NRC An-*



Reinforced concrete modules shown here were licensed in September 1982 for on-site contingency storage of low-level radioactive wastes generated by operation of the Tennessee Valley Authority's Sequoyah nuclear plant. The mobile gantry crane (left) is used to move the module cell caps and to place and retrieve waste containers.



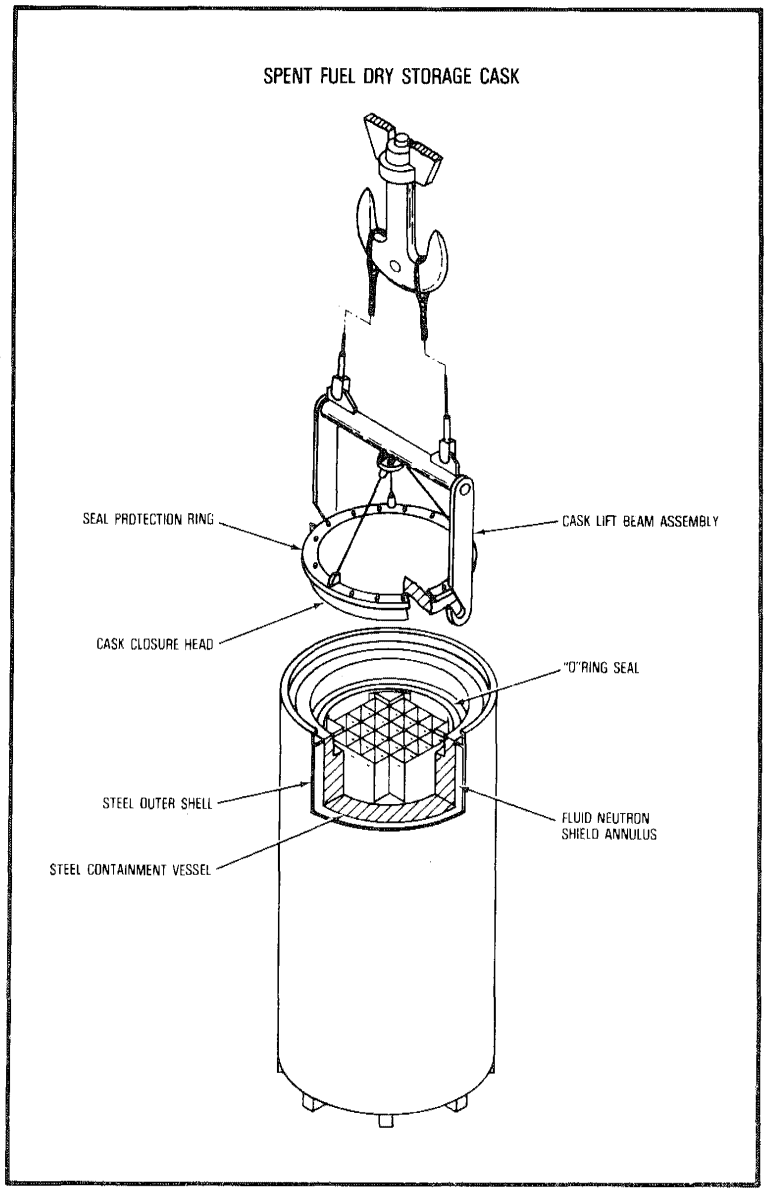
Shown is a storage cask developed by Gesellschaft fur Nuklear Services for dry cask storage of spent nuclear fuel. This could be used at a reactor site to provide additional spent fuel storage capacity. NRC is conducting a safety review of a topical report of this design.

nual Report, p.61.) On March 2, 1982, the Atomic Safety and Licensing Board granted the applicant's motion for summary disposition of all the contentions by the Illinois attorney general, the only remaining contestant to the license renewal. On May 4, 1982, a license (SNM-2500) for receipt and storage of spent fuel at the Morris Operation was issued to General Electric—the first to be issued under rule 10 CFR Part 72, "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation."

Dry Storage of Spent Fuel. Interest continues in dry storage of spent nuclear fuel, particularly dry cask storage, as an alternative to the water pool storage currently used. (See *1981 NRC Annual Report*). In June 1982, the NRC received a topical report from Gesellschaft fuer Nuklear Services, mbH (GNS) on the design of a modular cast iron dry storage cask (Castor Ic) which could be used at a reactor site for additional storage capacity. The cask has a capacity of approximately 3 tonnes uranium (TeV) of spent fuel. The report was reviewed by the NRC staff for completeness with respect to Regulatory Guide 3.48 and technical adequacy and detailed comments were provided to GNS. A revised report, based on NRC's comments, and a second topical report from GNS on an advanced design (Castor V model) are expected in late 1982. In May 1982, Ridihalgh, Eggers and Associates (REA) submitted for NRC review its quality assurance plan that will be used in the design and fabrication of dry storage casks. The quality assurance plan, a segment of a topical report being prepared, was approved. The remainder of the topical report on a cask design for dry storage of PWR spent fuel is expected early in Fiscal year 1983 and will be followed by a similar report on a cask for BWR spent fuel. On November 19, 1982, Combustion Engineering (CE) also submitted for review a topical report for dry cask storage. CE's design is a carbon steel cask which can hold 24 PWR spent fuel assemblies, approximately 11 tonnes uranium.

The Virginia Electric Power Company (VEPCO) submitted an application on October 13, 1982 under the provisions of 10 CFR Part 72 to permit the dry storage of spent fuel in casks at its Surry nuclear station. This application is in addition to its request to NRC, filed in July 1982, to permit receipt of Surry spent fuel at VEPCO's North Anna Power Station for storage in the pool of Units 1 and 2. Transshipment of spent fuel from the Surry site to North Anna presently is prohibited by an ordinance of the county where the North Anna station is located, but VEPCO has initiated proceedings in a Federal district court challenging the ordinance.

Also, the Tennessee Valley Authority has informed NRC staff that it will apply in 1983 for license authority to demonstrate the use of a cask from REA and possibly a cask from GNS for dry storage of spent fuel at its Browns Ferry site. This demonstration program is being planned in cooperation with the Department of Energy.



On November 19, 1982, Combustion Engineering (CE) submitted for review a topical report for dry cask storage using a carbon steel cask which can hold 24 PWR spent fuel assemblies, approximately 11 tonnes uranium.

BYPRODUCT MATERIAL LICENSING

Reactor-produced radionuclides are used extensively throughout the United States for civilian and military industrial applications, basic and applied research, the manufacture of consumer products, civil defense activities, academic studies, and medical diagnosis, treatment and research. The NRC's evaluation and licensing program is designed to assure that these activities do not endanger public health and safety.

The NRC administers approximately 9000 material licenses. Of these, about 500 are medical, 2900 academic, and 5500 industrial licenses. The agency took more than 5600 licensing actions during fiscal year 1982. Of these, 670 were on applications for new licenses, 4081 concerned license amendments, and 882 were license renewals. In addition to the NRC licenses, some 13,000 licenses were administered by 26 states which have authority over certain materials under regulatory agreements with the NRC (see Chapter 9).

Efforts to expand regionalization of NRC licensing functions continued in 1982 as the Region I licensing office (King of Prussia, Pa.) completed its first year of operations, and Region III (Glen Ellyn, Ill.) completed its third year. These offices license gauging devices, gas chromatographs, academic and medical institutions, and most industrial laboratories. Regions II, IV and V are currently being trained to assume the same licensing functions as Regions I and III. Establishment of licensing offices in NRC Regions II,

IV and V is planned for April 1, 1983. The transfer of these licensing functions to the Regions should enhance the licensing process and should result in better coordination and more timely responses.

Licensing Management System (LMS)

As a result of the licensing process study by Sandia National Laboratory, the NRC has developed an action plan for automated review of certain license applications and for upgrading the computer tracking system for casework. This system should be in full operation by the end of fiscal year 1984.

Industrial Licensing

NRC licensing of materials used in industrial activities continued in 1982 essentially as before, with regulation and licensing actions affecting industrial radiography, gauging devices, gas chromatography, well-logging and consumer devices. Descriptions of these activities may be found in the *NRC Annual Report for 1981*, pp. 63 and 64.

Medical and Academic Licensing

Hospitals, laboratories and physicians are licensed by the NRC to use reactor-produced radioisotopes in the diagnosis and treatment of human disease. The NRC also licenses academic institutions for research using radioisotopes. Licensees must demonstrate that facilities, personnel, equipment and safety programs are adequate to ensure the protection of the health and safety of workers and the general public. In 1982 NRC continued its effort to reduce the burden of the regulatory process, using an improved application form which speeds the licensing process. Critical to the planned reduction in the regulatory load is the development of a new 10 CFR Part 35, "Human Uses of Byproduct Material," and a new revision of Regulatory Guide 10.8, "Guide for the Preparation of Applications for Medical Programs."

Nuclear Medicine. Nuclear medicine is characterized by the use of radioisotopes in the diagnosis and treatment of human disease. Diagnostic nuclear medicine includes techniques involving small quantities of radioactive material resulting in minimal exposure to a patient.

The first sub-category of human use encompasses those tests that are performed using radioisotopes and patient specimens, usually blood samples. These tests are extremely sensitive and encompass a broad spectrum of biochemical studies ranging from determination of vitamin B-12 levels to measurement of drug toxicity. This sub-category constitutes the majority of radioisotope studies performed in nuclear medicine today.

A second sub-category of diagnostic studies includes those procedures involving the injection of radioisotopes into a patient. By using special cameras, a radionuclide "scan" of the patient may be produced. These studies range from the simple scan of a single organ to sophisticated studies of the human heart under stress using cameras and computers for acquisition, storage and data processing. With the growth of new imaging technology, highly sophisticated studies are now becoming clinically possible and it can be expected that single photon emission computed tomography and positron emission tomography will become clinically acceptable. With their acceptance, a new generation of radiopharmaceuticals would be created to fulfill future diagnostic needs. Due to this increased interest, there will be a continued need for NRC's involvement in diagnostic nuclear medicine.

Radiation Therapy. Radiation therapy is a second category of use of radioisotopes in humans. As the name implies, it is the controlled use of radiation to treat life-threatening disease. Therapeutic procedures may involve the use of radioactive drugs that are taken internally to treat hyperthyroidism, cancer, or blood disorders. Radioactive materials may also be encapsulated in a sealed source and placed in or on a patient's body to treat cancer. This use of sealed sources is called brachytherapy. Brachytherapy is used to apply the radiation directly to the affected area, conserving the adjacent healthy tissue from significant radiation damage. A third type, called teletherapy, also involves the use of sealed sources, usually cobalt-60 or cesium-137, contained in a special unit that can produce an intense radiation field. In this type of therapy the patient is placed at a distance from the source and the teletherapy unit provides shielding and beam collimation to direct the radiation to the affected body part. Because of the exceptional biohazard posed by these radiation sources, very critical review is given to license applications for therapy procedures.

Academic Licensing. The NRC also issues licenses covering academic activities ranging from very small programs using a single source for instruction to large programs that use many types of radioisotopes for research in physics, biomedicine, chemistry, biology, ecology, agriculture and energy. Some of the activities permitted under these licenses in 1982 included hydration studies on prong-horn deer, metabolism studies on moose, plant uptake studies using labeled pesticides, radiocarbon uptake studies in tropical forests, estuarine studies involving heavy metal uptake in clams and mollusks, gas chromato-

MATERIALS LICENSES ADMINISTERED BY NRC*
(OCTOBER 1982)

Types of Licenses

Medical	500
Academic	2900
Industrial	5500
	9000**

Licensing Actions Taken in FY 1982

New Licenses	670
License Amendments	4081
License Renewals	882
	5633

*In addition to the NRC licenses, some 13,000 licenses were administered by 26 states which have authority over certain materials under regulatory agreements with the NRC.

**Totals are approximate due to almost daily fluctuation in numbers.

graph design experiments, neutron experiments, and veterinary bone scans on the legs of race horses.

Regulation Revision

Simplifying Medical Licensing. During fiscal year 1982, an NRC task force was formed to simplify the materials licensing program for medical licensees. The requirements now imposed on medical licensees are contained in a variety of sources including regulations, guides, license conditions and submissions from the applicant. The proposed rulemaking being developed by this program, would clarify and consolidate all requirements in a complete revision of 10 CFR Part 35. When combined with a simplified license application form and computerized management information system, the paperwork burden on both the license applicant and the NRC staff would be reduced.

Physician Training and Experience Guidance. On January 22, 1982, NRC published a *Federal Register* notice concerning proposed revisions to the training and experience guidance for physicians who wish to use reactorproduced radioactive isotopes in humans. These revisions were recommended by NRC's Advisory Committee on the Medical Uses of Isotopes, a nine-member panel of physicians and a physicist retained by the NRC to provide expert advice in this area. (See Appendix 2, "NRC Committees and Boards.)

The Commission received 232 comment letters in response to the notice. All comments were carefully considered and, wherever possible, the guidance was changed to take them into account. A final *Federal Register* notice to establish the new guidance was published December 2, 1982.

New Teletherapy Licensing Guide. In 1982, NRC developed a new guide for teletherapy license applications and a companion application form keyed to the items in the guide. The availability of this guidance is expected to result in improving the quality of the applications that NRC receives, and this, in turn, will reduce licensing delays.

Computer Assistance

NRC's medical licensing staff also played a key role in the development of a prototype computer system to assist in the review of medical license applications and to generate letters to applicants when required. Using this system, the application reviewer prompts a pre-programmed standard review plan and flags deficient items. A letter notifying the applicant of deficient items is then automatically constructed using pre-programmed standard paragraphs. If necessary, the letter, can be modified using the computer's word processing capability. The system, now in daily use, has proven to be a positive factor in increasing reviewer efficiency and reducing the length of time required to process medical license applications.

Also, during the year, the NRC implemented a completely revised system for the management control of sealed source and device reviews, established an automated national registry of approved sealed sources and devices using the National Institutes of Health (NIH) computer. Agreement States and NRC regional offices will have direct access to the system through the NIH computer.

TRANSPORTATION OF RADIOACTIVE MATERIALS

The Federal Government regulates the transportation of radioactive materials primarily through the NRC and the Department of Transportation (DOT). State governments also regulate such transportation under certain circumstances. NRC and DOT partition their regulatory responsibilities in a Memorandum of Understanding. For international shipments, DOT is the designated U.S. authority for implementing the International Atomic Energy Agency (IAEA) standards. The NRC advises DOT on technical matters.

Packaging Standards and Actions

Quality Assurance Guides. NRC received public comment on two draft regulatory guides on quality assurance programs for packaging used in the transport of radioactive material. The comments have been incorporated into the guides, where appropriate, and both guides have been consolidated into one guide titled, "Establishing Quality Assurance Programs for Packaging Used in Transport of Radioactive Material." Issuance is planned for January 1983.

ACRS Review. In response to an NRC request in 1980, the Advisory Committee on Reactor Safeguards', Subcommittee on Transportation of Radioactive materials completed a review of procedures of the Transportation Certification Branch, NMSS, for certifying packages for the transport of radioactive materials. The ACRS issued its report on September 14, 1982, concluding that the staff is doing a generally excellent job of reviewing and certifying package designs. The ACRS recommended that a review of the entire regulatory process be undertaken because of the multiplicity of agencies involved in regulating transportation of radioactive materials and their sharing of responsibility. At the end of the fiscal year such a review was underway.

Computer Program. NRC published the SCALE (NUREG/CR-0200: Standardized Computer Analyses for Licensing Evaluation) computer program. SCALE is a modular computer code system developed by the Oak Ridge National Laboratory to provide a standard analysis tool for use by the NRC staff and licensees in evaluating nuclear fuel facilities and package designs. The automated sequences and stand-alone programs perform criticality shielding and heat transfer calculations with a minimum of user required input. Publication of the three volumes was in January 1982. The Technical Data Management Center (TDMC) at Oak Ridge completed the computer code package for distribution in November 1982.

Pre-Shipment Notification

In December 1980, the NRC published, for public comment, a proposed rule calling for advance notice to the governors of States through which spent reactor fuel or radioactive wastes posing potential hazards is to be transported. In January 1982, a final rule was published (47 FR 596). Of the estimated 400,000 packages of radioactive waste and spent fuel shipped each year, only a few hundred are deemed to pose a potentially significant hazard and, thus, to require advance notice to the States.

Emergency Response Planning

The NRC contributed in 1982 to the store of emergency planning guidance documents at the federal and state and the local level, respectively, reviewing and commenting on draft "Planning Guidance for the Preparation of the Federal Radiological Emergency Response Plan," which addresses Federal agency response to all types of radiological emergencies, including transportation accidents, issued for comment in September 1982, and contributed to the preparation of "Guidance for Developing State and

Local Radiological Emergency Response Plans for Transportation Accidents."

Inspection of Shipments

NRC's Office of Inspection and Enforcement dispatched Information Notice 81-24 in July 1982 to all NRC licensees who receive uranium hexafluoride shipments. It concerned water leaking from uranium hexafluoride overpacks, a recurring problem, and specified corrective action to prevent rain andcondensation water from building up in overpacks during storage and shipment.

6 Safeguards

Scope of NRC Programs

Under the Atomic Energy Act of 1954 and the Energy Reorganization Act of 1974 the NRC requires safeguards in licensed domestic activities to assure protection of the public health and safety and the common defense and security. To accomplish this, NRC requires that measures be taken to deter, prevent and respond to the unauthorized possession or use of special nuclear material (SNM), and to protect against sabotage of nuclear facilities and material in transport. In general, NRC safeguards programs for fuel cycle facilities emphasize protection against theft or diversion of SNM, while those for power reactors and transport of spent fuel stress protection against radiological sabotage.

NRC/IAEA Interaction. In 1980, the Commission had published regulations necessary to implement the US/IAEA Safeguards Agreement, and in 1981, the IAEA selected the Trojan reactor in Oregon, the Rancho Seco reactor in California, and the Exxon fuel fabrication plant in Washington as the first facilities for the application of safeguards under the Agreement. Arrangements for application of IAEA safeguards at Exxon were put into force on February 10, 1982, and those for the two reactors on April 16, 1982. The IAEA inspected these facilities during the year and NRC has submitted accounting data to the IAEA monthly through the reporting period.

In February 1982, the IAEA selected the Babcock and Wilcox low enriched uranium fabrication facility at Lynchburg, Virginia, and the Westinghouse low enriched uranium fabrication facility at Columbia, South Carolina, for the application of the provisions of the Protocol to the US/IAEA Agreement. These facilities will be subject to regular IAEA reporting requirements, but not routine inspection by the IAEA. Initial inventory reports for these two facilities were transmitted to the IAEA on March 29, 1982. Monthly reporting has continued since that date. The specific arrangements for the application of IAEA safeguards under the protocol at these facilities are still under negotiation with the IAEA.

During March 1982, an update of the eligible facility list for application of IAEA safeguards at licensed facilities was submitted to the Executive Branch for review and transmittal to the IAEA. The IAEA has requested the United States to provide additional information in the reporting of imports and exports of nuclear materials. Present requirements do not enable the IAEA to match shipper and receiver information in an automated mode. The State Department has requested that NRC modify the appropriate reporting instructions and data processing systems necessary to provide the required information. Changes in the reporting requirements have been developed and approved by NRC for submittal to OMB for approval.

STATUS OF SAFEGUARDS IN 1982

Fuel Cycle Facilities

Of the 30 licensed fuel facilities, five had actual holdings of formula quantities of strategic special nuclear material (SSNM) at the beginning of the year. One of these five facilities is in the process of reducing holdings to less than formula quantities, thus requiring a lower level of protection. A physical protection program consistent with the revised posture of this facility will be implemented.

Review of the physical protection plan for production activities at a facility which had temporarily discontinued operations and assumed a "storage fa-

Summary of Safeguards Inspection Visits—FY 1982[1]

	Number of Licensees Inspected	*Number of Inspection Visits*	*Percent of Visits Resulting in Findings of Noncompliance*	*Manhours of Inspection Effort*	*Number of Noncompliance*
FUEL FACILITIES					
Strategic (Formula Quantity)	5	59	27	4,161	20
Nonstrategic (Less than Formula Quantity)	15	67	16	2,905	15
TOTAL	20	126	21	7,066	35
REACTORS					
Power					
Group 2	6	12	58	1,491	16
Group 3	76	176	35	6,534	113
TOTAL	82	188	36	8,025	129
Nonpower					
Group 2	12	12	8	134	2
Group 5	9	10	20	89	3
TOTAL	21	22	14	223	5
REACTOR TOTAL	103	210	34	8,248	134
SHIPMENTS					
Formula Quantity	2	7	0	90	0
Irradiated Fuel	3	3	0	52	0
TOTAL	5	10	0	142	0
OTHER	11	11	9	130	1
GRAND TOTAL	139	357	28	15,586	170

[1]Based on information available as of 9/27/82; complete through approximately 7/30/82. This occurs because inspection visits are analyzed and evaluated before entry into the data base, consequently there is a 6-week to 2-month time lag.

cility" configuration was also completed, with final approval granted during the calendar year.

In addition to physical protection, fuel cycle facilities licensed to possess and use more than 1 effective kilogram of SNM are required to maintain detailed material control and accounting programs. As of September 30, 1982, there were 22 such facilities with levels of activity varying from active decommissioning to full scale production. Licensing activity for material control and accounting centered around review and approval of license amendments and decommissioning plans and the review of proposed material control measures to support revised physical protection rules.

At the Nuclear Fuel Services' (NFS) highly enriched uranium facility at Erwin, Tennessee, six physical inventories were conducted between September 1, 1981 and September 30, 1982. The inventory differences for all six fell within Commission-approved limits.

Inspection and Enforcement at Fuel Facilities. During fiscal year 1982, the NRC conducted 126 inspection visits at 20 facilities. The inspections required more than 7000 manhours and revealed 35 items of noncompliance with safeguards requirements. (See Table 1 for a summary of inspection activity at fuel facilities.)

Transportation

Spent Fuel Shipments. From the perspective of protection against sabotage, during 1982 NRC approved 40 routes over which 123 spent fuel shipments were made. No safeguards incidents or accidents occurred which involved these shipments. In conjunction with route approvals, and in compliance with Public Law 96-295, NRC publishes all approved routes in a document titled "Public Information Circular for Shipments of Irradiated Reactor Fuel." The last revision of this circular was published in June 1982.

Prohibitions Against Spent Fuel Shipments. Some state and local governments have passed laws or written rules which effectively stopped shipments of spent fuel within those jurisdictions. Two of these actions interrupted international shipments. One state legislature passed a law prohibiting the importation of spent fuel into the State for storage unless it originated in a State with which it had a reciprocal agreement. The governor vetoed the law, but the veto was overridden by one vote. Subsequently, a U.S. District Court judge in Chicago ruled that the law was unconstitutional. The State appealed the Circuit Court verdict to the U.S. Court of Appeals which upheld the unconstitutional verdict of the lower court.

SSNM Shipments. Seven export shipments and one domestic shipment of formula quantities of SSNM were made during the report period.

Shipment Route Surveys. In fiscal year 1982, NRC safeguards teams continued to conduct field surveys of routes proposed for the shipment of spent nuclear fuel or significant amounts of SSNM, working with more than 100 local law enforcement agencies. The teams analyzed 36 routes through 33 states, traveling approximately 4000 total route miles. The NRC brochure entitled "Information Package on Spent Nuclear Fuel Shipments for Law Enforcement Agencies" was distributed to local officials and agencies, as usual.

Advance Notification of Governors. In July 1982, NRC regulations were amended to require NRC licensees to notify the governor of a State before making a shipment of certain nuclear wastes or spent fuels in or through the State. The purpose of the rule is to provide States with information which will enable them to contribute to the safety, security and ease of transport of the shipments.

Transport Inspection and Enforcement. In fiscal year 1982, the NRC continued to inspect selected domestic shipments and the domestic segments of import and export shipments of formula quantities of SSNM at the points of origin, in transit, during intermodal transfers and temporary storage, and at destinations. No items of noncompliance were noted. (See Table 1 for a summary of transportation inspection activity.)

Reactor Safeguards

Power Reactors. No major changes were made in the requirements for physical security at power reactors during 1982; however, the Commission continued to consider measures to provide additional assurance against radiological sabotage by an insider. One measure is a proposal which considers means to better determine the trustworthiness of personnel authorized entry to nuclear power plants.

The NRC accelerated its reviews of physical security plans received from applicants for licenses to operate nuclear power reactors. Some 18 plans were approved during 1982. Simultaneously, the staff had under way a safeguards quality assurance program to evaluate the security systems of licensees, and to review the effectiveness of safeguards regulations at their reactors. These assessments are known as Regulatory Effectiveness Reviews (RER). Briefly stated, they provide for onsite analyses to determine whether or not the plants provide the level of public protection intended by NRC regulations. In support of this RER program, a final field test of the assess-

Under NRC's Regulatory Effectiveness Review Program in 1982, staff reviews of applicant physical security plans were accelerated, and on-site evaluations of such security systems by NRC inspectors were intensified. Here an inspector emerges form a radiation control area at a nuclear reactor plant during an effectiveness review visit.

ment methodology was conducted at the Pilgrim Nuclear Power Station. The first actual assessment was conducted at Palisades Nuclear Power Station in September 1982.

During the reporting period, the NRC staff also augmented its program for analysis of safeguards operational data to feed back the lessons of experience in order to improve safeguards in NRC licensed operations. This analysis indicated an increasing trend of drug and alcohol abuse incidents involving personnel at licensed facilities. As a result, a special task force was created to deal with this subject and formulate regulatory requirements regarding licensee employee "fitness for duty."

Nonpower Reactors. The regulation establishing requirements for the protection of Special Nuclear Material at nonpower reactors (NPR) was recently adopted. All 36 NPR licensees subject to this regulation, 10 CFR 73.67, have submitted revised protection plans responsive to these new requirements. Twenty-seven have been approved with the balance undergoing final review.

Inspection and Enforcement at Reactors. NRC inspection and enforcement activity provides a means for evaluating compliance with safeguards plans. In addition, NRC has started a program to help determine the impact that a noncompliance, or combination of noncompliances, could have on the effectiveness of a licensee's physical protection system. The NRC expended 8248 hours in onsite safeguards inspections at reactors during fiscal year 1982, and these revealed 134 items of noncompliance with safeguards requirements.

Contingency Planning and Threat Assessment

Safeguards contingency plans deal with threats, thefts and sabotage relating to licensed SNM and nuclear facilities. In March 1982, the NRC staff began revising its headquarters contingency plans to be consistent with "Agency Procedures for the NRC Incident Response Plan" (NUREG-0845). In May 1982, the staff developed and conducted a safeguards exercise involving NRC management and representatives of the FBI. This exercise provided an opportunity to further refine the response procedures between the two agencies with regard to nuclear safety matters, law enforcement activities, and the dissemination of information during a safeguards emergency. This program will continue into fiscal year 1983.

As part of its continuing threat assessment and data analysis effort, the staff again updated its "Safeguards Summary Event List" (NUREG-0525) in December 1981 and June 1982. This list provides data on safeguards-related events involving licensed nuclear materials and facilities. The staff also initiated a semiannual threat review procedure. In these semiannual reviews (the first of which was completed in June 1982) the staff evaluates domestic and foreign safeguards-related data to determine the soundness of NRC's design basis threats described in 10 CFR 73.1(a).

The "Communicated Threat Credibility Project" continued to provide guidance and support for investigations of communicated threats. This project provides advice to the DOE, the NRC, the FBI, and other concerned agencies during an actual or perceived emergency arising, for example, from nuclear extortion threats.

SAFEGUARDS REGULATORY ACTIVITIES AND ISSUES

Fuel Facilities Material Control and Accounting

Strategic Special Nuclear Material (SSNM). As noted in the 1981 NRC Annual Report (see p. 73), physical inventories require time to complete and reconcile, and the resulting inventory difference statistics can be difficult to interpret and relate to the

possibility of material loss. Accordingly, such indications might not be available rapidly enough to permit an effective response. NRC's study of this situation has resulted in an advance notice of proposed rulemaking, published in September 1981, inviting public comment on a regulatory approach featuring these goals: (1) provide for more timely indication of possible loss of SSNM; (2) facilitate the recovery of lost material; and (3) provide long-term assurance that no significant loss has occurred.

The public comment period ended in February 1982, and the NRC staff is preparing a proposed rule for Commission consideration. This action applies to fuel cycle facilities only, and will not affect any reactors.

Low Enriched Uranium (LEU). Little substantive difference exists between the accountability requirements for fuel cycle facilities handling SSNM and those handling low enriched uranium (LEU). Steps have been taken during both 1981 and 1982 (see 1981 Annual Report, p. 73) to better reflect the difference in safeguards significance between SSNM and LEU and to develop more costeffective accountability requirements for LEU facilities by allowing the licensees greater flexibility in designing specific measures to satisfy regulations. This action applies to fuel cycle facilities only, and will not affect power reactors.

Transportation

At the end of 1982, the Commission was considering proposed regulatory amendments to implement the Convention on the Physical Protection of Nuclear Material, a part of the IAEA agreements originally proposed by the Secretary of State in 1974 and signed in 1980. The Convention, which provides for the security of international shipments of significant quantities of source or special nuclear material, was ratified by the Senate on July 30, 1981. Implementing legislation in the form of amendments to the criminal code has since been passed by the Congress and was signed by the President on October 19, 1982.

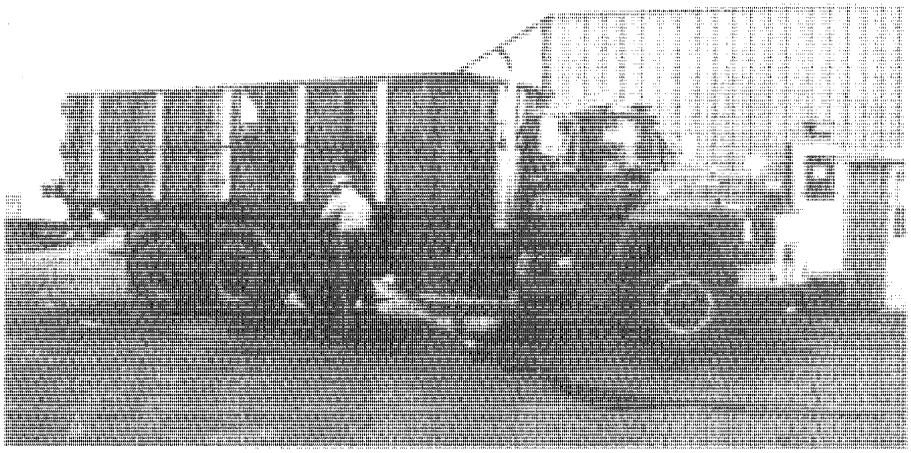
The amendments to NRC regulations needed to fulfill the provisions of the convention will require: (1) physical protection of transient shipments of special nuclear material of moderate and low strategic significance and irradiated reactor fuel; (2) advance notification to NRC concerning export of convention defined nuclear materials; and (3) advance notification and assurance of protection to NRC concerning the importation of convention defined nuclear material from any country that is not a party to the convention.

Spent Fuel Transportation. The NRC staff has been developing a final rule for physical protection of irradiated reactor fuel shipments to replace interim requirements issued in 1979. Research projects completed in 1981 and 1982 show that the quantity of radioactive material likely to be released as a result of sabotage is much less than was supposed when the interim rule was issued. The rule being developed would eliminate overly conservative requirements applicable to spent fuel shipments and could save licensees an estimated $40,000 annually.

High-Level Waste Transportation. A similar program is under way to analyze safeguards needs for the transportation of high-level waste, since radioactive dispersal hazards could be similar to those from sabotaged spent fuel.

Reactors

Power Reactors. Over the past several years, the NRC has developed a package of three distinct rulemaking actions designed to help safeguard nuclear power reactors against an "insider threat." The cornerstone of the package is the proposed Access Authorization Rule providing for a screening program for persons seeking unescorted access to the protected

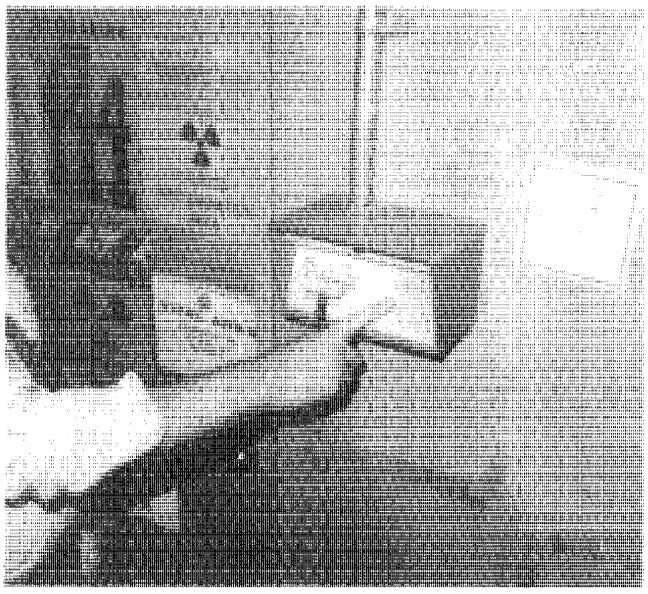


A plant security officer conducts a vehicle search prior to permitting it to enter the protected area of a licensed nuclear facility.

areas and vital areas of nuclear power reactors (see 1981 Annual Report, p. 75). The Commission has expressed interest in achieving an appropriate balance between safety and safeguards objectives and has directed the staff to examine this issue. The proposed "insider rule" contains options which may enable licensees to reduce the burdens of access controls at vital areas in power reactors. The Commission also plans to request public comment on the use of psychological testing for screening power reactor employees. The other two rulemaking actions of the "insider rule" package have to do with physical ("pat-down") searches at protected area portals and the designation and protection of vital areas. The NRC plans to publish the proposed rules in 1983 and final rules in 1984.

Nonpower Reactors. As noted in the NRC Annual Report for 1981, p. 75, the interim requirements for nonpower reactor licensees which were approved at the time the Physical Protection Upgrade Rule (10 CFR 73.20) was published were replaced by proposed amendments (10 CFR 73.67). Under the proposed new amendment, such licensees would not be required to implement the upgrade rule; however, they would be required to protect material in their possession at least at the level required for SSNM of moderate strategic significance, except when the material is extremely self-protecting. During periods when licensees possess five (5) formula kilograms or more of SSNM with dose rates which do not exceed 100 rem/hr at a distance of three (3) feet without intervening shielding, additional physical protection measures will be required.

In response to public comments, the NRC in 1982 revised the originally proposed amendments, and at the end of the year planned to submit them for additional public comment. The newly revised amendments replace prescriptive requirements with performance goals and allow licensees more flexibility in designing site-specific cost-effective physical protection measures which, when combined with certain reactor and fuel design features, will afford protection comparable to that provided SSNM at fuel cycle facilities. Since most licensees can avoid the additional requirements indefinitely by maintaining radiation dose rate levels above the 100 rem/hr level, the proposed amendments are considered less burdensome than requiring continuous implementation of the upgrade rule.



NRC safeguards personnel regularly assist licensees in evaluating the effectiveness of protective systems at sensitive areas. Here a wide variety of warning signs, and a key card reader are observed and tested by an NRC inspector.

Information Rulemaking

Safeguards Information. A new rule requiring protection of "safeguards information" became effective October 1981. This rule (10 CFR 73.21) defines the types of information to be protected and establishes conditions for access to such information. The objective is to prevent unauthorized disclosure of safeguards measures used by licensees to protect nuclear power reactors and certain other nuclear facilities and materials.

Classified Safeguards Information. Under Executive Order 12356, "National Security Information," the Atomic Energy Act of 1954, as amended, and 10 CFR Parts 25 and 95, "Access to and Protection of National Security Information and Restricted Data," the NRC can classify information on material control and accountability, physical protection at fixed sites, and in-transit protection of non-self-protecting SSNM if its disclosure could assist unauthorized individuals or groups in acquiring or using SSNM. Under NRC's implementation program, some 3,000 NRC access authorizations (security clearances) have been granted to individuals. In addition, NRC evaluations of the facility security plans and conduct of site surveys have resulted in approvals for the implementation of the Classified Safeguards Program at most of the facilities. Licensees subject to inspection by IAEA representatives under the US/IAEA Safeguards Agreement are inspected by foreign nationals not normally authorized access to U.S. classified information. Efforts continued in 1982 to refine Part 95 to reflect criteria and procedures for their access to such information.

SAFEGUARDS RESEARCH, STANDARDS AND TECHNICAL ASSISTANCE

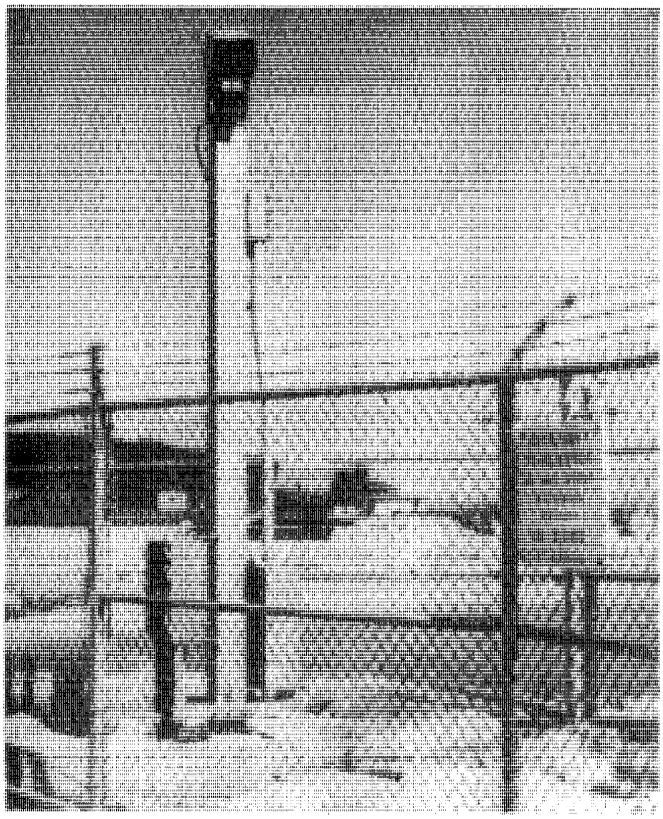
Approximately $8.1 million was spent in fiscal year 1982 on Safeguards research and technical assistance contractual projects. Of this amount, approximately $5.0 million was spent on technical assistance projects, and the remaining $3.1 million on research projects. These projects are discussed below.

Technical Assistance

- *Transparent Armor Testing.* This project, undertaken in fiscal year 1981 (see 1981 Annual Report, p. 77) and continued in 1982, is developing and validating a new standard for transparent armor to protect against armament capabilities specified in NRC's design basis threats. The armor used by NRC licensees will also be tested to determine if they meet the new standard.

- *Tactical Improvement and Security Force Evaluation.* This project was undertaken to develop and test a self-contained teaching package using laser equipped training weapons to help licensees improve a security force response to an armed attack. Using the package, licensees could improve security capabilities at individual, team, and response-force levels; and develop a capability to train and exercise them against simulated adversaries.

- *Advanced Material Accounting System Simulation Model.* The year 1982 saw the successful application of the Automated Material Accounting Statistics System (AMASS) described in the 1981 Annual Report (p. 77). AMASS provides a standard means for modeling systematic measurement errors and by estimating the contribution to inventory differences of unmeasured process variability. The model can be applied to any linear algebraic sum of components and thus can be applied to inventory difference analysis as well as other safeguards statistics such as shipper-receiver differences. This computerized methodology was used in 1982 to evaluate inventory differences at four fuel cycle facilities and shipper-receiver differences at seven facilities. At year's end, work was under way to extend AMASS capability for treating nonmeasurement contributions to inventory difference and estimating uncertainties in limit-of-error computations. The AMASS storage/analysis system and its data are also being improved.



Closed circuit television, as well as E-Field intrusion detection systems are used in perimeter alarm networks at nuclear power plants. NRC undertook a number of safeguards studies during 1982, including tests of systems such as those shown here.

Safeguards Research

- *Reactor Safeguards Research.* Research to improve the reactor safeguards includes engineering evaluations of power plant damage control measures and design changes needed for sabotage protection. In 1982 new research considered the system interactions and common mode failures that might result from sabotage actions. Final reports were issued on the second phase of a study of design concepts for sabotage protection at nuclear power plants. The reports address damage control measures and design changes (NUREG/CR-2585) and methods for protection against sabotage by an insider (NUREG/CR-2643). A number of other ongoing initiatives in 1982 aimed at developing more advanced safeguards measures and better methods of assessing power reactor safeguards effectiveness. During fiscal year 1982, for example, refinements were completed on the Safeguards Automated Facility Evaluation (SAFE)/ Safeguards Network Analysis Procedure (SNAP). These computer software packages were designed to support safeguards licens-

ing and effectiveness reviews. Final SAFE and SNAP documentation is scheduled for delivery to NRC in early 1983.

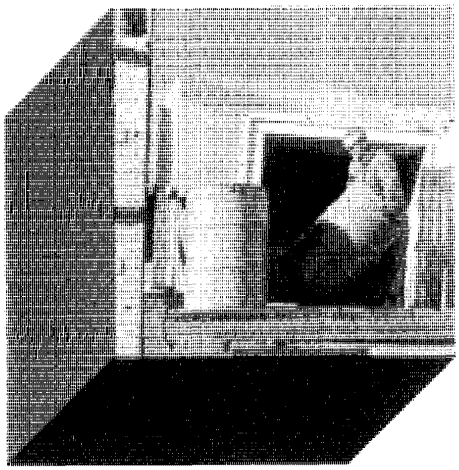
- *Research in Support of Licensing.* Several studies were undertaken in 1982 to improve the technical safeguards bases for safeguards licensing. These included: (1) research to improve modeling of potential system interactions and common mode failures resulting from sabotage at nuclear power reactors, (2) tests of perimeter alarm systems under adverse weather conditions, (3) identification of needs for safeguards-related human factors research similar to those identified in NRC's long-range human factors plan for reactor safety regulation (NUREG/CR-2833, August 1982), and (4) in response to a TMI-related recommendation, a study to identify technical alternatives concerning the functioning of security guard forces during a safety emergency. The draft report has been received. Publication of the final report is anticipated for March 1983.
- *Research in Support of Material Control and Accounting Regulations.* Two projects relating to the Material Control and Accounting Reform Amendments, discussed above, were continued in 1982. Both projects develop alternatives for licensee compliance with proposed prompt accountability requirements. The first, the Controllable Unit Approach project, developed a methodology for partitioning a plant and assessing the licensee's ability to detect losses of special nuclear material. The project was completed in June 1982 and a manual was published (NUREG/CR-2538). An additional report on tests of the methodology was published as the final product (NUREG/CR-2831) in August 1982. In the second project, work continued toward improving methods to estimate process holdup. The experimental and analytical phases of this project will be concluded in fiscal year 1983, with final reports to be published in 1984.
- *Standards Development.* Although the major rulemaking effort of the Office of Nuclear Regulatory Research (RES) was the "Insider Safeguards" package, the RES staff continued in 1982 to clarify and update regulations on the reporting of physical security events, changes to physical security plans, and licensee reporting requirements under the US/IAEA safeguards agreement. Guidance on the protection of shipments of strategic special nuclear material was issued as Regulatory Guide 5.63 in July 1982. Revisions of additional regulatory guides were under way as the period ended on reporting physical security events, requirements for entry into nuclear facilities, and physical protection of special nuclear material of moderate and low strategic significance. Work also continued on the final draft of a standard for closed circuit security television for nuclear facilities, and a standard for statistical terminology used in nuclear materials accounting.

SAFEGUARDS REGIONALIZATION

The NRC staff is continuing to implement the policy goals approved by the Commission in October 1981 for enlarging the role Regional Offices have in regulatory operations.

The first NRC safeguards functions to be regionalized are licensing reviews for plan changes which do not decrease safeguards effectiveness, covered under 10 CFR 50.54(p) and 70.32(c), (d),(e), and (g). The functions are scheduled to be transferred to Regions I and II in the fall of 1982 and to the remaining regions in the fall of 1983. The next function to be regionalized will be transportation route surveys and contingency planning for spent fuel and Category I SNM shipments, covered under 10 CFR 73.37 and 73.26. This function is scheduled to be transferred to Region III in October 1983, and to the remaining regions in October 1984.

This phased regionalization of safeguards licensing functions will allow for lessons to be learned in the transfer and to facilitate a smooth, efficient transfer of functions. Safeguards regionalization planning in 1982 included preparation of and coordination with Regional Administrators of the following documents, before transfer of safeguards functions to the regions: the Licensing Review Criteria for the technical reviewer in making a licensing decision, training plans for side-by-side training of regional personnel, the Field Policy Guidance, for carrying out the Safeguards licensing functions, a definition of the appraisal system to evaluate Regional Office implementation, and the memorandum delegating authority and a *Federal Register* notice.



7 Waste Management

The NRC's nuclear waste management activities are managed and coordinated by the Office of Nuclear Material Safety and Safeguards (NMSS). These activities cover the regulation of all NRC-licensed source, byproduct and special nuclear material waste, including uranium mill tailings. Waste management functions include:

- Developing the criteria and framework for high-level waste regulation, including the technical bases for the licensing of high-level waste repositories.
- Licensing and regulating low-level waste disposal facilities and providing technical support for such regulation.
- Providing national program management for licensing and regulating uranium recovery facilities and associated mill tailings. (These operations include uranium mills, heap-leach facilities, ore-buying stations, solution mining and byproduct uranium recovery.)

Highlights of 1982

In the area of high-level waste, the NRC staff completed the final draft of the portion of 10 CFR Part 60 containing technical criteria for regulating geologic disposal. (The procedural portion of 10 CFR Part 60 had been issued as a rule in 1981.) The final technical rule was expected to be issued in early 1983. Through most of 1982 the staff continued to prepare for the review of DOE's first Site Characterization Report (SCR) and began the actual review when the SCR was received on November 15, 1982. The staff also continued to develop regulatory guides. The Nuclear Waste Policy Act of 1982 became law in 1983, after the close of this report period. (See Chapter 1.)

In the low-level disposal area, the NRC completed the proposed final 10 CFR Part 61 rule, "Licensing Requirements for Land Disposal of Radioactive Waste," and also issued the supporting final environmental impact statement. Development of guides to assist in licensing, and assessments of the health, safety and environmental protection aspects of low-level waste facilities and management practices continued in 1982.

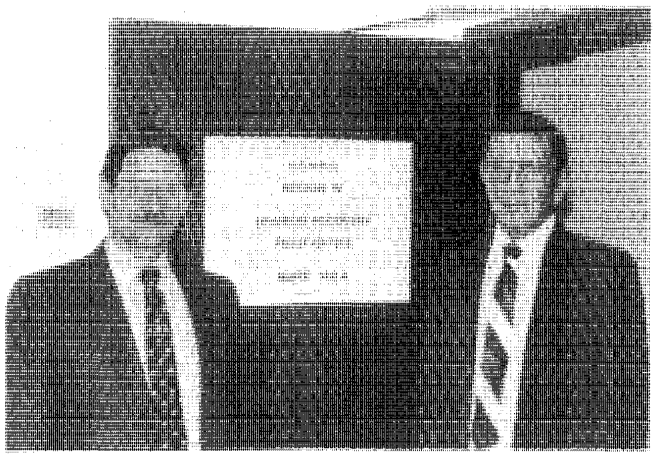
In uranium recovery, as part of an effort to improve licensing activities, the Commission established a Uranium Recovery Field Office in Denver, Colorado, and transferred the licensing functions to it from headquarters. Also in 1982, 17 licenses were issued, renewed, or amended; 3 amended agreements were negotiated with Agreement States, and a program review plan was developed and tested successfully for mills and commercial in-situ facilities in Agreement States.

The NRC Waste Management Review Group (see 1980 NRC Annual Report pp. 127-8) responsible for coordinating technical assistance and research projects, reviewed descriptive summaries and statements of work for 86 projects during the reporting period.

HIGH-LEVEL WASTE PROGRAM

Regulatory Development

In 1982, NRC continued to make significant progress towards the completion of the 10 CFR Part 60 regulations for the management and disposal of high-level wastes. The regulation spells out the procedures and criteria under which the NRC will determine that a high-level waste repository poses no unreasonable risk to the public. The technical portion of Part 60 was proposed in July 1981 and the



On October 4, 1982, the NRC officially opened a field office in Denver, Colo., to provide close regulatory attention to matters involving uranium mill tailings. The new Uranium Recovery Field Office is attached to the NRC Region IV Regional Office in Dallas, Tex., for administration, but will perform licensing functions formerly handled by the Office of Nuclear Material Safety and Safeguards at NRC Headquarters in Washington, D.C. Shown here are R. Dale Smith, Director of the Denver field office, and John T. Collins, Region IV Administrator.

public comment period closed in November of that year. A draft final rule reflecting comments was completed in July 1982 and the final rule and detailed responses to public comments were submitted to the Commission in October. It is anticipated that the final technical rule will be issued along with supporting documentation early in 1983. Since NRC published the procedural portion of 10 CFR 60 as a final rule in February 1981, when the final technical rule is issued in 1983, a comprehensive regulatory framework for the licensing of high-level wastes in a geologic repository (10 CFR 60) will be in place.

Regulatory Guidance

The NRC staff continued developing regulatory guidance for DOE, the States and the public in 1982 on acceptable methods to satisfy the requirements of 10 CFR Part 60. The initial step in licensing a waste repository requires DOE to submit a Site Characterization Report (SCR) prior to the selection of a repository site, and in 1982 NRC issued its Standard Format and Content Guide for an SCR. The guide specifies the data DOE must provide in the SCR to adequately describe the site and any investigation required to assess the suitability of a site for a repository. It also specifies the data needed by NRC to evaluate any proposed test programs, and provides guidance on the format and content of the semiannual DOE progress reports required during the site characterization process.

Regulation 10 CFR Part 60 also requires DOE to prepare an environmental impact statement and a safety analysis report. The NRC staff initiated work in 1982 on the format and content guides for these documents and plans to complete them in late 1984.

Other NRC regulatory guidance takes the form of staff technical positions on high-level waste issues on which consensus is needed in the technical community. In preparing these positions, NRC is involving DOE and the technical community to identify problem areas early and to develop mechanisms to resolve them. During 1982, four draft technical positions were developed addressing geochemistry, borehole and shaft seal, geotechnical investigations, and waste package performance. Additional directives will cover performance assessment, siting and repository design.

Review of DOE Site-Screening Investigations

In its approach to high-level waste repository site selection and development, the Commission has encouraged extensive interaction between the DOE and NRC staffs to identify licensing issues early and to consult on the programs for resolving them. The NRC staff, with DOE cooperation, is conducting a series of reviews of DOE activities both in the laboratory and at the potential repository sites, and, during 1982, NRC continued to review DOE site screening investigations initiated earlier. (See *1981 NRC Annual Report* p. 81.) As part of this review, the technical staff evaluated the DOE program at both the basalt rock site at the Hanford Reservation in Washington and the tuff site at the Nevada Test Site. The evaluations included the review of technical information on the geologic and hydrologic characteristics of each area, as well as appraisals of the exploration programs, the techniques employed and the data being collected.

To upgrade its site and licensing review capabilities the NRC continued to sponsor research on waste forms and packaging, geohydrology, geochemistry, and the interaction of the waste with the geologic systems as they affect the selection and design of a repository. At year's end contractors were testing analytic models with field and laboratory data, maintaining and updating computer models developed under research contracts, evaluating alternative tests and test methods for demonstrating compliance with regulations, and helping to develop and maintain an information base for future performance assessment.

Cooperation with DOE

Anticipating that DOE would submit the first site characterization report to NRC in November 1982, the NRC prepared a plan to assure the timely review of the report and the preparation of a draft final

Site Characterization Analysis (SCA). The plan spells out the process for reviewing the SCR, identifies the major areas of concern, establishes schedules and identifies the staff responsible for each major area. Separately, NRC is also developing a list of the issues which are of concern for each of these areas and which will have to be resolved during the site characterization phase of the licensing process. These issues were based on site reviews by NRC, the National Academy of Science, and other groups, and on technical peer review and published reports.

As the pace of the National High-Level Waste Program picked up at DOE sites early in 1982, NRC increased its own activity and its interaction with DOE on specific technical issues at specific sites. For example, NRC required access to more of the data being generated by DOE so that suggestions could be made on the direction of the site investigation programs while they are in the formative stages. In order to provide information to NRC in the areas that DOE is investigating, NRC and DOE jointly conducted workshops on in situ testing, hydrogeology, geochemistry, and waste form and packaging.

Work with Other Agencies

NRC continued to participate with other agencies in high-level waste management programs as follows:

The Environmental Protection Agency is responsible for developing a standard for the performance objectives of the disposal of high-level wastes. NRC was consulted during EPA's development of the standard, and provided comments, as appropriate. The current draft standard sets limits on the amounts of radionuclides to be released from a repository, and for NRC to evaluate license applications against this standard, it will have to assess the performance of the entire repository. In anticipation of this, in 1982 NRC initiated trial assessments of repository sites being considered by DOE, to determine if the numerical values in the standard are reasonable and achievable.

The Materials Characterization Center (MCC) was established by DOE "to provide an unbiased basis for identifying properties and establishing test methods of nuclear waste materials." NRC staff participates in the DOE Materials Review Board which reviews MCC products to ensure that they will provide the information needed to prepare a license application.

NRC also continued the work with DOE on the West Valley Demonstration Project, giving specific attention to waste forms that are acceptable for receipt in a high-level waste repository. (See 1980 NRC Annual Report, p. 130, and 1981 Report p. 81.) During 1982, the staff also reviewed the DOE draft and final environmental impact statements for West Valley as well as the project plans and the record of decision on the final EIS.

Waste Confidence Rulemaking

Work continued in 1982 on the generic rulemaking proceeding to reassess the Commission's confidence that high level radioactive waste and spent fuel produced by nuclear facilities can and will be safely disposed of, among other objectives. This activity has been described in detail in the 1980 NRC Annual Report, pp. 130, 131, and 1981 Annual Report, pp. 81 and 82.) On November 6, 1981, the Commission issued a second pre-hearing memorandum and order which called for oral presentation by the participants in early 1982. Since that time, the Commission has had under consideration the wording of a statement of the extent of its confidence that wastes can be disposed of in the required time period.

REGULATING LOW-LEVEL WASTE

Regulatory Development

In 1982, NRC made significant progress in the development of low-level waste regulations with the completion of both the proposed final 10 CFR Part 61 rule, "Licensing Requirements for Land Disposal of Radioactive Waste" and the supporting final environmental impact statement.

The rule was first proposed in July 1981, (see *NRC 1981 Annual Report*, p. 82), and the NRC received public comments until January 14, 1982. The staff reviewed these comments and submitted a revised draft to the Commission on May 14, 1982, over five months ahead of schedule. The rule was approved by the Commission on October 26, 1982. The supporting environmental impact statement, (NUREG-0782), which provides a basis for decisions on the performance objectives and technical and institutional criteria set forth in the rule, was revised and published in final form in November 1982. Amendments and supplements to the statement addressing wastes not suitable for near-surface disposal will be published later.

Part 61 establishes institutional, financial, administrative, and procedural requirements for licensing a disposal facility; technical requirements for a waste classification system; performance objectives for land disposal of wastes, and technical requirements for the siting, design, operations and closure activities for a near-surface disposal facility. The rule establishes requirements for NRC licensees and will be the basis for Agreement State regulations, since State regulations must be compatible with NRC rules.

Work initiated in 1981 on nine technical position/ regulatory guides to supplement the regulations regarding licensing of near-surface disposal facilities for low-level wastes continued in 1982. In addition to the technical positions previously prepared on site closure, stabilization and post-operational surveillance, the agency issued draft technical positions on (1) waste classification; (2) site suitability, selection and characterization; (3) funding assurances for closure and long-term care, and (4) waste form. Final Technical positions on facility design and operations and site suitability were issued in 1982. Regulatory guides are in preparation on the standard format and content of license applications and of environmental reports for near-surface disposal. Regulatory guides for all of the topics are expected to be completed in 1984 and 1985, rather than 1983, as reported last year.

Low-Level Waste Licensing

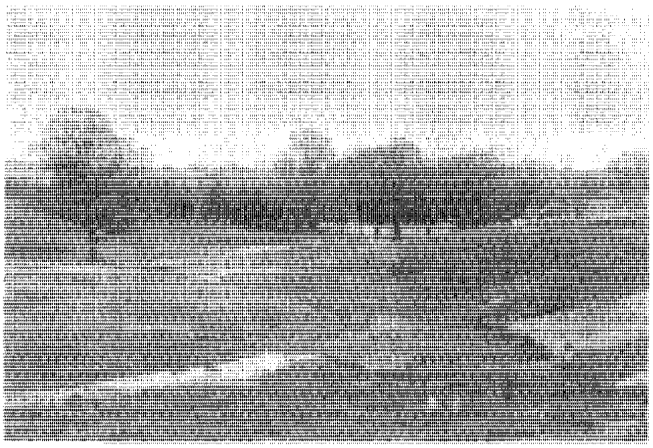
As previously reported (see 1981 NRC Annual Report, p. 82), the NRC license covering the disposal of SNM at Hanford was renewed in November 1981, but, U.S. Ecology, the operator, had originally refused to accept SNM under the new license. During 1982, NRC, the State of Washington, and the licensee negotiated measures to renew SNM disposal, and NRC provided the State ongoing technical assistance in evaluating the licensee's proposed plan for site closure and stabilization, and for suggested license amendments.

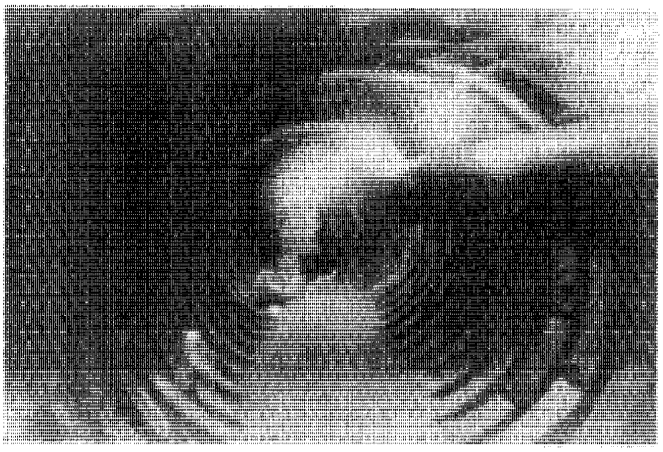
The NRC license covering the disposal of SNM at Barnwell, renewed in September 1981, was amended March 15, 1982, to delete urea-formaldehyde as an acceptable waste form. NRC also performed an environmental assessment of the site in connection with the State license renewal process.

The site at Beatty, Nevada is being closed. On August 27, 1982 the Nevada Board of Health upheld an earlier decision to deny U.S. Ecology's renewal of the license for continued receipt of waste. Use of the site has been reduced signficantly and it was closed several times during 1979 because of packaging and transportation problems. No NRC special nuclear materials license is in effect at this site. The future of the site is uncertain.

At the Sheffield (Ill.) site, all new licensing activities have ceased while the NRC continues to analyze the health, safety, and environmental aspects of site closure. The Atomic Safety and Licensing Board continued considering whether to close the site and terminate the license. However, hearings on these issues were suspended until February 1983, at the request of the parties involved so that negotiations to resolve the issues could be pursued. NRC is following these negotiations. In January 1982, low levels of tritium were detected off-site. Since that time, NRC, the State, and the licensee have developed and implemented a program to determine the extent and source of the tritium migration.

The 1980 Low-Level Waste Policy Act (P.L. 96-573) made each State responsible for disposal of low-level radioactive waste generated within its borders, except for Federal waste from defense or research and development activities. The Act also authorized the formation of compacts to dispose of low-level wastes, and at year's end, most of the States were opting for compact arrangements. The Northwest Interstate Compact consisting of seven States has been formed and enabling legislation for six other compacts is being developed. NRC has assisted several other planned compacts in reviewing drafts of enabling legislation.





These two photos show the extent of groundwater monitoring operations at the Sheffield (Ill.) low level radioactive waste burial facility. Just visible in the foreground and at left center (near tree) of the photo at left are instrumented in-ground devices which are periodically sampled by NRC personnel to check radiation levels and ensure proper operation of the equipment. At right a U.S. Geological Survey tunnel beneath a portion of the site is instrumented to effect checks at deeper levels. Information from this USGS operation is given to NRC.

Neither the NRC nor any Agreement State received an application for a new low-level waste disposal site during fiscal year 1982. However, Chem Nuclear Corp. announced in May 1982 that it was considering developing a low-level waste and mill tailings disposal site in Montrose County, Colo. The company is working with the State to expedite proceedings and projects that an application could be submitted in approximately one year. On June 16, 1982, NRC received a letter from Colorado asking for technical assistance and arranged for the staff to assist the State in this licensing activity.

Assistance to Agreement States

The NRC continued providing technical assistance during 1982 to the State of Washington in its regulatory efforts and to Kentucky in the review of its stabilization and closure plans for the Maxey Flats site.

Other Activities

As reported earlier, (see *1981 Annual Report*, p. 83), NRC is analyzing the generation of waste to identify disposal problems at the point of waste production, assessing NRC licensees generating the most significant low-level wastes in terms of volumes or radioactivity. During 1982, assessments were completed for New England Nuclear and Union Carbide and reports prepared. Assessments at the National Institutes of Health and Ohio State University were underway at year's end, and plans were being made to identify three additional licensees for assessment.

URANIUM RECOVERY AND MILL TAILINGS

During 1982, NRC's uranium recovery licensing program was affected by two decisions: (1) moving the licensing functions to a new regional Uranium Recovery Field Office in Denver, Colo. and (2) Congressional prohibition of the use of NRC's 10 CFR Part 40 regulations during the fiscal year. Part 40 contains NRC's Uranium Mill Licensing Requirements.

The Commission's decision to transfer licensing functions to the regional Uranium Recovery Field Office in Denver was made because the Commission believed that its proximity to the regulated industry, would improve the NRC working relationships with the States and the uranium industry. The Denver office was formally established in October 1982 and should be fully staffed by October 1983. It will have licensing responsibilities for uranium recovery facilities, with program and policy functions remaining at headquarters. The new office will report directly to the Region IV Administrator in Dallas, Texas.

Regulatory Development

The Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) (see 1980 NRC Annual *Report*, p. 133) requires the Environmental Protection Agency (EPA) to develop radiation standards for mill tailings and the NRC to develop regulations for uranium recovery operations consistent with the EPA standards.

In 1980, the NRC issued Uranium Mill Licensing Requirements (10 CFR Part 40) which were based on evaluations of costs and health risks contained in the Generic Environmental Impact Statement on Uranium Milling (NUREG-0706, September 1980), and the provisions of UMTRCA, as well as on previous licensing experience.

As noted in the *1981 NRC Annual Report*, p. 83, the uranium industry has filed a lawsuit claiming that the regulations are impractical, too costly, and untimely because they were issued prior to the release of EPA's standards. The suit was rejected, but the Congress included language in NRC's fiscal year 1982 appropriations legislation prohibiting implementation or enforcement of the NRC's regulations during the fiscal year. Consequently, in fiscal year 1982, NRC was only authorized to license on a case-by-case basis as permitted under the September 1980 revisions to 10 CFR Part 40.

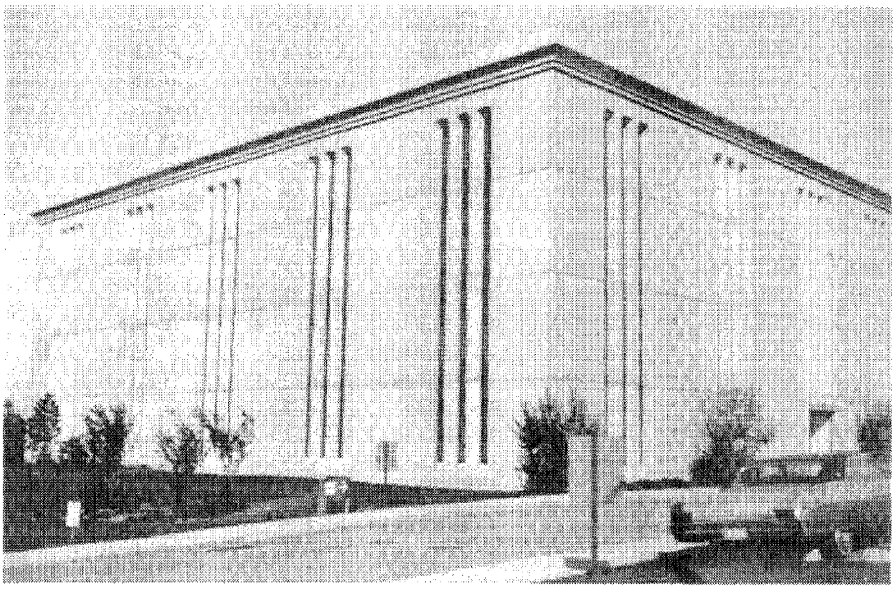
Legislation before Congress in late 1982 proposed to extend the prohibition of the use of 10 CFR Part 40 until EPA issues final standards. When this happens, NRC will take appropriate action to bring 10 CFR Part 40 into conformance.

EPA's Environmental Radiation Protection Standards for Nuclear Fuel Cycle Facilities (40 CFR Part 90), issued in December 1980, provide limits for the radiation doses received by members of the public from the nuclear fuel cycle. NRC continued to monitor the releases for 14 mills and preliminary evaluations were expected to be available in December 1982.

Work continued on regulatory guides during 1982, including those on the following topics: site characterization techniques and methods for evaluating groundwater protection of tailings disposal sites, occupational health and safety at uranium mills, and standard format and content for various applications and reports. NRC plans call for completion of approximately 20 regulatory guides on uranium recovery facilities within the next few years.

Licensing Activities

In uranium recovery and mill tailings licensing activities during fiscal year 1982, the NRC staff: issued four new licenses and began review of three license applications; completed three license renewals and



Shown here is the building housing NRC's new Uranium Recovery Field Office in Denver, Colo., established as part of a general agency reorganization initiated in 1982.

was reviewing four renewals; completed 10 major license amendments and had an additional 13 under review; and reviewed over 200 operating facilities safety and environmental data reports and NRC inspection reports.

Of the 43 uranium recovery facilities licensed at the end of the reporting period, 14 were uranium mills, 10 were heap-leach/ore-buying stations or by-product recovery facilities, 16 were research and development solution mining operations; 2 were commercial solution mining activities; and one was a facility with both uranium mill and commercial solution mining activities at the same site.

Technical Assistance to Agreement States

UMTRCA established a number of new requirements related to the Agreement States Regulatory Program (see *1981 NRC Annual Report*, p. 84). In order to retain regulatory authority over tailings, four Agreement States (Colorado, Washington, Texas and New Mexico) had to upgrade their programs in accordance with the requirements of UMTRCA by November 1981. None of them met the deadline, and regulatory authority over uranium tailings in those States reverted to the Commission.

During Fiscal Year 1982, all of the mill Agreement States sought amended agreements with NRC to reinstate their regulatory authority over tailings activities. At year's end, amended agreements with Washington, Texas, and Colorado had been negotiated and the NRC staff was negotiating with New Mexico over its request.

In addition, to support the annual review and audit of Agreement State licensing programs, NRC staff developed a program review plan for mills and commercial in-situ (underground, in place mining) facilities in Agreement States. After successful testing in Texas and Washington in the spring of 1982, the review plan was expanded to include a review plan for research and development in situ facilities. The New Mexico program was reviewed in June and the Colorado program was reviewed in August.

Remedial Action at Inactive Sites

The NRC continued its review of DOE's Uranium Mill Tailings Remedial Actions Program (UMTRAP) at inactive tailings sites in 1982 (see *1980 NRC Annual Report*, pp. 133-4). The staff also conducted site visits and participated with the DOE and various State agencies in public meetings dealing with environmental effects at UMTRAP sites at Cannonsburg, Pa.; Salt Lake City, Utah, and Durango, Colo. A Preliminary Draft Environmental Impact Statement for Salt Lake City was reviewed by NRC and comments were provided to DOE. At the end of the year, NRC was reviewing the Draft Environmental Statement for the Cannonsburg site. The staff also helped DOE define criteria for identifying and screening alternate disposal sites for further field evaluation.

Although not a formal part of the DOE remedial action plan, the need for remedial action due to offsite contamination is also being evaluated at Edgemont, S. D. where an active license exists for an inactive uranium mill. The NRC has reviewed existing radiological monitoring data and has conducted additional monitoring at 695 structures to identify those requiring remedial action to protect the occupants. So far, 80 properties have been identified that will need remedial action to meet EPA radiation protection standards.

8

Inspection, Enforcement and Emergency Preparedness

Fiscal year 1982 was a time for refocusing the efforts of NRC's Office of Inspection and Enforcement (IE). In late 1981, the role of the NRC regional offices was enlarged, and they became, organizationally, separate offices reporting directly to the NRC's Executive Director for Operations. Additionally, plans were developed for an orderly transfer of selected responsibilities from the headquarters IE and other offices to the regional offices. Within the Office of Inspection and Enforcement, plans were developed for the transfer of certain enforcement and emergency preparedness activities and functions. Also during 1982, the NRC established a new Office of Investigations reporting directly to the Commission. All IE responsibilities and staff involved with investigations were transferred to this new office in mid-1982 (see Chapter 13).

The NRC Operations Center was activated for one event, which occurred at the R. E. Ginna (N.Y.) operating reactor (see Chapters 2 and 4). In addition, the center was activated nearly every other month for emergency preparedness exercises.

Inspection and enforcement (IE) activity during 1982 included 6,400 inspections involving 279,356 hours of inspection effort, and the proposed imposition of 37 civil penalties totalling nearly $2.25 million. Six orders were issued to cease and desist operations or to modify, suspend or revoke licenses for non-compliance with NRC requirements. NRC resident inspectors now have been assigned to each operating power reactor site, each site where a reactor is being constructed (greater than 15% completed) or is undergoing preoperational testing and to one major fuel facility. Additional efforts included the review of licensee reports on events and the issuance of 55 Bulletins, Circulars and Information Notices to licensees about events and generic concerns. The NRC Reactor Training Center (located in Chattanooga, Tenn.) provided 2000 student weeks of intensive technical training for new inspectors and other NRC staff. These and other IE activities are detailed below.

INSPECTION PROGRAMS

NRC inspections are conducted to identify conditions that may adversely affect public safety; to determine if licensees are complying with NRC requirements; to gain information used in issuing, denying or amending permits or licenses; and to determine the adequacy of quality assurance programs. Routine inspections emphasize direct and planned verification of licensee activities by observing licensee tests, by examining construction and operating facility activities, by making direct measurement, by reviewing procedures, by checking records, and by conducting interviews. Reactive inspections respond to reports of new or unusual conditions or events from routine inspections, applicants, licensees, contractors or suppliers, or members of the public.

NRC inspection programs are of different types. The operating reactor inspection program covers both power and nonpower reactors. The reactor construction inspection program covers reactors being constructed or in preoperational test. The vendor inspection program covers the quality assurance activities of manufacturing and service firms that serve and supply licensees. The fuel facilities and materials licensee inspection program is self-explanatory.

NRC policy is to assign resident inspectors at all operating reactor sites and at all active construction sites at which a unit is at least 15 percent completed. At the end of fiscal year 1982, there were 81 such sites, manned by a total of 133 resident inspectors. A resident inspector is also assigned to the Nu-

Table 1. Inspections Conducted During FY 1982

Program	*Number of Licensees Inspected*	*Number of Inspections*
Power Reactor Construction	76	1,471
Operating Power Reactors	70	1,995
Other Reactors	36	56
Fuel Facilities	35	279
Materials	2,107	2,196
Vendors	109	143
Shipments	22	292

clear Fuel Services facility in Erwin, Tenn. (Under current construction schedules, NRC plans for the assignment of a total of about 17 more resident inspectors during fiscal year 1983.)

Quality Assurance

In a November 27, 1981 memorandum, Chairman Palladino directed the NRC staff to develop and assess various approaches that could be taken to strengthen quality assurance, and to provide the Commissioners with a preliminary evaluation of the approaches that appeared most promising. On January 29, 1982, the staff briefed the Commission on initiatives that appeared to merit further consideration. Industry representatives from the Institute of Nuclear Power Operations met with the Commission on February 4, 1982, to present their plans for improving quality assurance at plants under construction. On July 15, 1982 and September 29, 1982, the staff briefed the Commission on the actions taken and the initiatives under consideration.

Operating Reactor Inspection Program

The operating reactor inspection program is developed by the Office of Inspection and Enforcement and is implemented by the regional offices. Table 1 shows the number and types of licensees inspected and the number of inspections performed during fiscal year 1982.

The program is performed by both region-based and resident inspectors. Region-based inspectors are specialists whose efforts, during 1982, included detailed inspections in such areas as plant operations, systems surveillance, maintenance, modifications, in-service inspection, fire protection, nondestructive testing, training, refueling, radiation protection, quality assurance, emergency planning, environmental protection, management systems, and security/safeguards. Resident inspectors are generalists who concentrate on day-to-day operations, event follow-up, and licensee management and staff performance. In addition, they coordinate on-site activities of various NRC offices, issue Bulletins and Circulars, and participate in emergency exercises. They also serve as NRC contact with local officials, the press and the public.

In 1982, NRC personnel monitored a number of the full-scale emergency preparedness exercises that are required to be conducted annually. The exercises demonstrated that significant progress had been made in upgrading emergency preparedness, since the issuance of new emergency planning regulations on August 19, 1980. (See p. 100, 1981 NRC Annual Report). Many licensees were unable to meet one provision of the regulations—installation of a prompt notification system by July 1, 1981—and the Commission extended the deadline to February 1, 1982. All but eight sites had systems installed and operating by that date, and installation was completed at those sites by June 30, 1982. The effectiveness of the prompt notification systems was being evaluated by the Federal Emergency Management Agency at year's end.

Health physics and environmental protection efforts were devoted to follow-up on corrective actions by licensees as a result of the Health Physics Appraisals (see *1981 NRC Annual Report*, p. 90), licensee programs for minimizing routine radiation re-

leases to levels as low as reasonably achievable (ALARA), and health physics-related TMI actions. Most licensees are developing formalized ALARA programs, and are also working toward meeting the TMI commitments.

Each regional office is equipped with a mobile laboratory capable of making independent assessments of a licensee's ability to measure radioactive effluent gases, liquids or particulates. The laboratories also can be moved to the sites of emergencies to make prompt measurements of samples collected in the environment. They are used as part of NRC's participation in selected licensee emergency exercises to demonstrate licensee readiness and capabilities during an accident, and were used during 1982 to analyze environmental samples collected at several nonreactor sites where radioactive materials had previously been processed or used.

Another NRC environment measurement program is the direct radiation monitoring network. Radiation detectors, called thermoluminescent dosimeters (TLDs), have been placed in the vicinity of all operating power reactors and those nearing construction completion. The TLDs are periodically replaced and analyzed to measure radiation present at that location. None of the TLD data analyzed to date has shown levels of radiation significantly above the natural background level. See pp. 141 and 142, 1980 NRC Annual Report, and p. 91, 1981 Annual Report.)

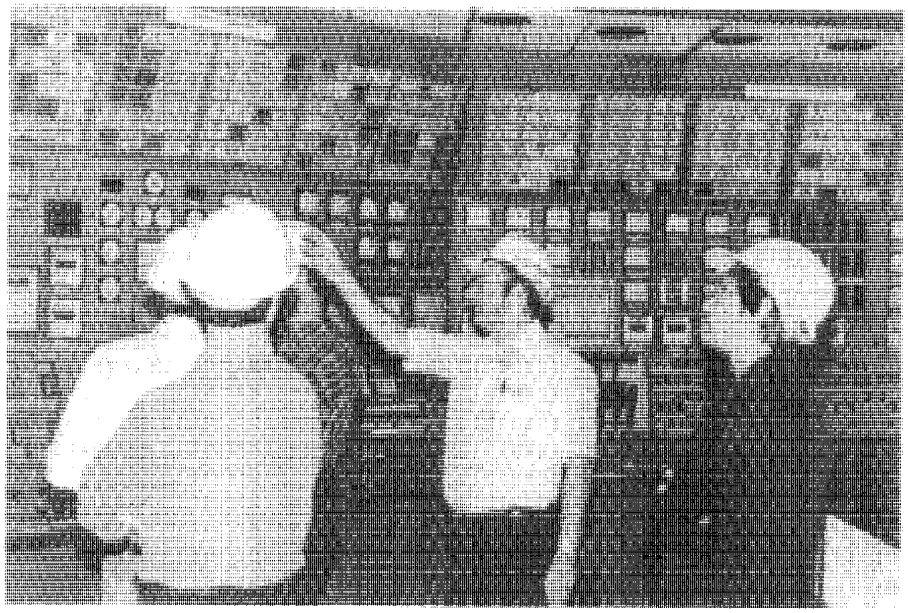
In 1982, a multi-year review by NRC of all inspection procedures for operating reactors was initiated to reflect field experience and better reflect current regulatory requirements. Others were being reduced in scope or frequency or are being eliminated. The review has been structured to ensure that a proper balance is achieved between safety significance and inspection resources and among the technical disciplines involved in inspecting operating reactors.

Also during 1982, the inspection procedures for resident inspectors were reviewed and modified, and, at the close of the report period, work was under way to upgrade the inspection procedures associated with startup testing for newly licensed operating reactors.

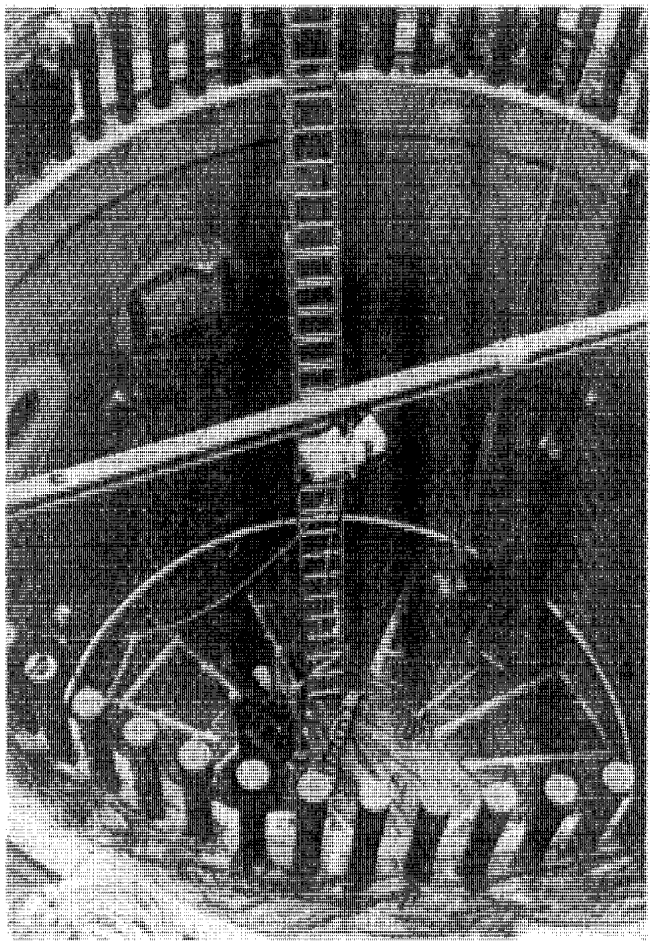
Reactor Construction Inspection Program

The reactor construction inspection program also is carried out by region-based specialists and resident inspectors, the region-based specialist inspector addressing such things as welding and nondestructive examination, civil, mechanical, electrical and instrumentation engineering, preoperational testing, emergency preparedness, and environmental protection, resident inspector applying more general experience in construction activities to assure that installations of equipment and structures are in accordance with design requirements and quality assurance procedures. The resident inspector has daily contact with construction management personnel from the utility, architect engineer, constructor, vendors, and contractors. He reviews procedures, observes the work, and audits quality control. He may also participate in NRC hearings, licensing meetings and public discussions.

Supporting the region-based and resident inspectors, NRC maintains a specially equipped mobile laboratory at its Region I (Philadelphia) office. This laboratory performs independent nondestructive exami-



Bruce Little, NRC's Senior Resident Inspector at the Fermi II Nuclear Power Station, in Michigan, discusses control room features with licensee personnel. Nearly 2,000 separate inspections were conducted at operating reactor sites during 1982.



Workmen above are maneuvering equipment in the upper portion of the Fermi II Nuclear Power Station (Mich.). The Detroit Power Co. plans to have the facility licensed and operating by the end of 1983.

nations, with primary emphasis on welds and associated base metals, although the van also is equipped for the examination of concrete, electrical cabling and other materials. The laboratory was used in 1982 at Beaver Valley (Pa.) Unit 2, Limerick (Pa.) Unit 1, and Seabrook (N.H.) Unit 1 to complement the regular construction inspection program, and at Shoreham (N.Y.) and WNP (Wash.) in prelicensing reviews.

Vendor Inspection Program

The NRC vendor inspection program focuses on architect and engineering firms, nuclear steam system suppliers and companies producing the piping, valves, pumps, electrical equipment and instrumentation for reactors and safety-related systems. The inspection staff for the program is part of the NRC Region IV office in Dallas, Texas. More than 60 inspections of vendors were conducted during the report period, with emphasis on design verification, interfaces with plant site construction, and the development, verification, and use of computer codes. The emphasis was in response to a significant increase in the number of companies which provide safety-related consulting services to the nuclear industry. In all, the NRC responded to 300 requests for special inspections under the program. Such deficiency follow-up inspections have proven an efficient way to assess the quality assurance programs of vendors and also to assure that the generic aspects of the deficiencies are examined by the NRC.

The NRC also continued its efforts to recognize and use accreditation and inspection activities of third parties to supplement NRC direct inspections. These included active NRC participation in the process by which Certificates of Authorization (N-stamps) are issued to nuclear suppliers by the American Society of Mechanical Engineers (ASME), involvement in code and standard writing, and monitoring of code inspectors. The vendor inspection program scope was expanded in 1982 to include laboratories and manufacturing companies engaged in qualification testing of safety-related electrical equipment.

Fuel Facilities and Materials Licensee Inspection Program

The fuel facilities and materials licensee inspection program covers all safety and safeguards-related activities at licensed fuel facilities—uranium mills, uranium conversion facilities, and fuel production plants, and materials licensees—firms dealing with source, byproduct, or special nuclear materials used in nuclear medicine, radiography, industrial testing, well-logging, and academic and other purposes, including handling and storage of radioactive wastes. Through State agreements, the NRC has delegated similar licensing responsibility to States. (See Chapter 9, "Cooperation With the States"). The program also involves inspections of nuclear fuel shipments, and shipments of other radioactive materials, as well as inspections of nuclear material exported from or imported into the United States. (See Chapter 10, "International Cooperation).

In 1981, the NRC initiated a special inspection of the radiation safety programs at uranium mills. The scope of the inspection, the findings, and the recommendations for improving uranium mill radiation safety programs were issued in August 1982, in the "Uranium Mill Appraisal Program" (NUREG-0883). The appraisal program required approximately 1,600 person hours of inspection effort at 10 mill sites, by teams consisting of NRC inspectors, NRC licensing personnel and contractor radiation safety specialists. The major weaknesses in licensees' programs identified by the appraisal were in licensee organization

and management, employee training, internal exposure control and licensee commitment to ALARA programs. Follow-up NRC inspections to evaluate the effectiveness of licensee response to the appraisals were begun in 1982.

During the year, a special effort was made to reduce the backlog of materials licensee inspections, focusing primarily on users of industrial gauges and smaller medical licensees, many of whom had not previously been inspected. At year's end the regional offices were taking steps to assure that all new licensees are inspected within six months after the license is issued.

APPRAISAL PROGRAMS

Systematic Assessment Of Licensee Performance

A program for the Systematic Assessment of Licensee Performance (SALP) is a component of the TMI Action Plan (NUREG-0660) aimed at improving both NRC regulator efforts and licensee performance in the operation and construction of nuclear power facilities. Each regional office is responsible for implementing the program. Observations and data are collected from NRC offices, managers, license reviewers, and inspectors who have contacts with the licensee, and assessed by a SALP Board composed of NRC managers and inspectors. The board's findings are then shared with corporate and plant managers.

In 1982, the regional offices made a major commitment to SALP, with assessments and licensee meetings at 67 nuclear power facilities entailing 30,000 person-hours. The program has been judged effective, both in drawing corporate officers' attention to weaknesses in their operations, and in helping NRC regional management plan and allocate inspection resources.

Appraisal Teams

During 1982, the Performance Appraisal Team (PAT) inspection program was reduced, in recognition that similar evaluations are now carried out by the nuclear industry's Institute of Nuclear Power Operations (INPO). Independent NRC PAT inspections are now conducted at a few facilities each year, to provide an independent check on Regional Office effectiveness, and to judge the effectiveness of INPO. Members of the PAT periodically accompany INPO personnel during plant evaluations, and meetings are held several times each year to keep the NRC abreast of INPO activities.

In August 1982, the NRC also initiated a Construction Appraisal Team (CAT) program, applying the PAT concept to reactors under construction. The first CAT inspection, performed in late 1982 at the Tennessee Valley Authority's Bellefonte (Ala.) nuclear facility, required approximately 220 person-days of on-site effort. INPO has developed criteria for use in licensee evaluation of nuclear plants under construction. The NRC plans to review the results of the INPO efforts as the results become available.

Emergency Preparedness Appraisals

The purpose of NRC's Emergency Preparedness Appraisal Program is to provide a comprehensive evaluation of the adequacy and effectiveness of emergency preparedness at each licensed power reactor site in the country. Licensees must demonstrate

A health physicist under contract to the NRC checks an air sampler at a Hazelwood, Mo., site where uranium residues are stored. The residues remain stored at the site where they were once processed for shipment to a uranium mill. The site buildings and most of the land have been decontaminated by the present owner under NRC and NRC-contractor supervision.

that proper equipment, trained personnel, and adequate procedures are in place to detect and assess the course of an accident and its potential severity; that the licensee emergency organizations, appropriate government authorities and the public will be notified promptly; and that adequate protective actions will be taken in response to the emergency.

The program for power reactor licensees began in March 1981 and was completed for all 49 sites with operating plants by April 1, 1982. During this period five plants applying for an operating license were also appraised. Since April 1, 1982 two additional appraisals were conducted and several were scheduled for early 1983.

Emergency Preparedness Exercises

The emergency plan, as well as the overall emergency preparedness at a nuclear power plant, is tested in integrated exercises involving major local response organizations. The exercises typically include the simulation of a radioactive release and resulting dose assessment, medical emergencies, site evacuation, and radiological monitoring. NRC evaluates the licensee's performance while the Federal Emergency Management Agency (FEMA) evaluates the performance of State and local authorities. Fifty-three exercises involving State and local participation were conducted between October 1981 and September 1982. Initial exercises have now been conducted at every operating reactor site and the second round of exercises (required once a year) was well underway at the end of 1982.

Darrel Wiedeman, a section chief in the Technical Inspection Branch in Region III, examines a damaged soil density gauge at a construction site in Schaumburg, Ill. The gauge may have been damaged when it was accidentally run over by a truck. Although the housing was badly damaged, the radiation source inside was not damaged and there was no contamination.

Inspection Program Effectiveness

The NRC initiated a limited assessment program in 1982 to ascertain if each region is performing the inspection programs properly, and to observe how consistent program performance is from one region to another. The assessment includes a systematic review of inspection reports and enforcement correspondence, observation of inspectors at work, independent inspections, and discussions with regional office inspectors and management.

THE ENFORCEMENT PROGRAM

The purpose of the NRC's enforcement program is to protect public health and safety by ensuring that licensees comply with regulatory requirements. The program is carried out under the revised enforcement policy published this year (47 FR 9987, March 9, 1982). The policy calls for strong enforcement measures to encourage compliance and prohibits operations by licensees who fail to achieve adequate levels of protection.

The NRC uses three types of enforcement actions, described in detail in earlier annual reports (see the *1980 NRC Annual Report*, p. 144). In summary, Notices of Violations are issued for all instances of noncompliance with NRC requirements. Civil penalties are issued in case of significant or repetitive noncompliance or when a Notice of Violation has not been effective. Orders to cease and desist operations, or to suspend, modify or revoke licenses are issued to cover extremely serious cases.

Certain headquarters enforcement functions have been regionalized. The regional administrators have always been authorized to issue Notices of Violation not involving civil penalties. Recently, they have been authorized to issue proposed civil penalties, with the concurrence of the Director of the Office of Inspection and Enforcement. The latter, however, remains responsible for all enforcement decisions and

Table 2. Civil Penalty Action During FY 1982

Licensee	*Amount*	*Reason*
Nuclear Pharmacy, Inc. Milwaukee, Wis. (Radiopharmaceutical Distributor)	$24,000 (Proposed in FY 79)	Distribution of radioactive material not intended for human use to medical licensees, relabeling and misrepresenting the material as suitable for human use. Matter referred to the Department of Justice (DOJ). Based on DOJ decision the penalty was mitigated to $2,000 which the licensee paid.
Consolidated Edison of New York New York, N.Y. (Indian Point Unit 2)	$210,000 (Reported as pending in FY 81)	Violations relating to the flooding of the reactor containment and failure to report. The licensee did not pay the penalty and the matter was referred to the Department of Justice. In accordance with an agreement with the U.S. Attorney for the Southern District of New York, the licensee paid a mitigated penalty of $185,000.
Isotope Measurements Laboratories, Inc. Northbrook, Ill. (Materials Licensee)	$5,700 (Reported as pending in FY 81)	Violation relating to unauthorized distribution of radiopharmaceuticals. The licensee requested a hearing. The matter is pending.
Met Lab, Inc. Hampton, Va. (Radiographer)	$4,000 (Reported as pending in FY 81)	Violations relating to the exposure of an individual. The licensee requested a hearing after a mitigated penalty of $3,000 was imposed by order. The hearing request was withdrawn and the penalties remitted in their entirety by a Stipulation for Settlement.
Georgia Power Company Atlanta, Ga. (Edwin I. Hatch Unit 2)	$40,000 (Reported as pending in FY 81)	Violations relating to the operation of the plant in excess of a Technical Specification Limiting Condition for Operation. The licensee paid the penalty after it was imposed by order.
Pharmatopes, Inc. Oak Park, Mich. (Radiopharmaceutical Supplier)	$5,000 (Reported as pending in FY 81)	Violation relating to an extremity exposure of an individual. After review of the licensee's response, the $5,000 penalty was imposed by order and the licensee paid the penalty.
Mustang Services Houston, Tex. (Materials Licensee)	$6,000 (Reported as pending in FY 81)	Violations relating to radiation protection practices and the loss of a sealed source. A mitigated penalty of $4,000 was imposed by order and the licensee paid the penalty.
Commonwealth Edison Co. Chicago, Ill. (Dresden 2)	$80,000 (Reported as pending in FY 81)	Violations relating the whole body exposures of two individuals. The licensee paid the $80,000 penalty.
Niagara Mohawk Power Corp. Syracuse, N.Y. (Nine Mile Point 1)	$50,000 (Reported as pending in FY 81)	Violations relating to the bypassing of isolation signals in violation of a technical specification limiting condition for operation. The licensee paid the $50,000 penalty.
Tennessee Valley Authority Chattanooga, Tenn. (Sequoyah 2)	$40,000 (Reported as pending in FY 81)	Violation relating to the failure to return recirculation valves in the Containment Spray System to their normally locked-shut position, in violation of procedures. The licensee paid the $40,000 penalty.

Table 2. Civil Penalty Action During FY 1982

(continued)

Licensee	*Amount*	*Reason*
Public Service Electric and Gas Co. Newark, N.J. (Salem Units 1 and 2)	$40,000 (Reported as pending in FY 81)	Violations relating to inadequacies in the management of the licensee's physical security program. After review of the licensee's response, the $40,000 penalty was imposed by order and the licensee paid the penalty.
Union Electric Company St. Louis, Mo. (Materials Licensee)	$2,000 (Reported as pending in FY 81)	Violations relating to failure to lock out level gauges before performing maintenance in coal hoppers which resulted in an exposure to an individual. The licensee paid the $2,000 penalty.
Carolina Power & Light Co. Raleigh, N.C. (Brunswick Unit 2)	$40,000	Violations relating to an inadequate radiation survey which resulted in the exposure of an individual. The licensee paid the $40,000 penalty.
Nuclear Diagnostics, Inc. Troy, Mich. (Radiopharmaceuticals supplier)	$1,000	Violations relating to failure to perform adequate surveys which resulted in uptake of radioactive material by an employee. The licensee paid the $1,000 penalty after it was imposed by order.
Dairyland Power Cooperative LaCrosse, Wis. (LaCrosse Boiling Water Reactor)	$38,000	Violation relating to a modification of a pressure sensing line which resulted in the temporary loss of the automatic actuation signal for certain safety-related safety components. After veview of the licensee's response, a mitigated penalty of $25,000 was imposed by order and the licensee paid the penalty.
Stepan Chemical Company Maywood, N.J. (Materials Licensee)	$20,000	Violation involving the knowing omission of information pertaining to the number of radioactive material burial sites on the licensee's property. The $20,000 penalty was imposed by order and the licensee paid the penalty.
Power Authority of the State of New York New York, N.Y. (James A. FitzPatrick Nuclear Power Plant)	$40,000	Violations relating to the failure to adhere to Technical Specification requirements for having operable containment leakage detection systems. The licensee paid the $40,000 penalty.
Maine Yankee Atomic Power Company Augusta, Me. (Maine Yankee)	$40,000	Violations relating to failure to shut down when required by a Technical Specification limiting condition for operation associated with maintaining containment integrity during power operation. After review of the licensee' response, a mitigated penalty of $30,000 was imposed by order and the licensee paid the penalty.
Cincinnati Gas and Electric Company Cincinnati, Ohio (William H. Zimmer)	$200,000	Violations relating to the licensee's failure to exercise adequate oversight and control of his principal contractors to whom he delegated the work of establishing and executing quality assurance programs. The licensee paid the $200,000 penalty.

Table 2. Civil Penalty Action During FY 1982

Licensee	*Amount*	*Reason*
University of Wisonsin Madison, Wis. (University Nuclear Reactor)	$500	Violations relating to the licensee's failure to follow operating instructions resulting in the research reactor being operated at full power without a licensed operator present at the controls for a short period of time. After review of the licensee's response, the penalty was remitted in its entirety.
Carolina Power and Light Company Raleigh, N.C. (H. B. Robinson 2)	$50,000	Violations relating to failure to follow established procedures for steam generator maintenance work. After review of the licensee's response, a mitigated penalty of $40,000 was imposed by order and the licnesee paid the penalty.
Consolidated Edison Company of New York New York, N.Y. (Indian Point 2)	$40,000	Violations relating to the misuse of personnel monitoring devices by a licensee contractor. The licensee paid the $40,000 penalty.
Northern States Power Co. Minneapolis, Minn. (Monticello)	$20,000	Violations relating to the unauthorized removal of low level radioactive waste from the plant site which resulted in radiation levels in an unrestricted area. The licensee paid the penalty.
American Electric and Power Indiana and Michigan Power Co. Benton Harbor, Mich. (Donald C. Cook Units 1 and 2)	$80,000	Violations relating to the licensee's failure to implement its fire protection program and maintain contain-pending.
Boston Edison Company Boston, Mass. (Pilgrim)	$550,000	Violations relating to breakdowns in the control of several activities wherein certain safety-related functions of systems relied upon to mitigate the consequences of postulated accidents were not assured of being available in a post-accident situation. The licensee paid the $550,000 penalty.
Nuclear Energy Services, Inc. Houston, Tex. (Radiography Licensee)	$9,000	Violations relating to an untrained individual performing radiography. The $9,000 penalty was imposed by order and the licensee paid the penalty.
Georgia Power Company Atlanta, Ga. (E. I. Hatch 1)	$50,000	Violations relating to failure to review proposed changes to unit systems that affect nuclear safety and reporting requirements. The licensee paid the $50,000 penalty.
Tennessee Valley Authority Chattanooga, Tenn. (Sequoyah 2)	$50,000	Violations relating to exceeding a limiting condition for operation, not maintaining an adequate unit staff retraining program and failure to implement procedures as required. The licensee paid the $50,000 penalty.
New England Nuclear Corp. Boston, Mass. (Materials Licensee)	$3,600	Violations relating to failure to properly package radioactive material prior to shipment and reporting requirements. The licensee paid the $3,600 penalty.

Table 2. Civil Penalty Action During FY 1982

(continued)

Licensee	*Amount*	*Reason*
RAD/IRID, Inc. Washington, D.C. (Materials Licensee)	$6,000	Violations relating to improper disposal of radioactive waste material. The licensee paid the $6,000 penalty.
Salisbury Engineering Co. Griffith, Ind. (Materials Licensee)	$500	Violations relating to the licensee's failure to maintain constant surveillance and immediate control over a nuclear moisture-density gauge. The licensee paid the $500 penalty.
Consolidated X-Ray Service Corporation Dallas, Tex. (Radiography Licensee)	$4,000 (Pending)	Violations relating to the loss of a radiographic exposure device. The $4,000 penalty was imposed by order and the licensee requested a hearing. The case is pending.
University of Michigan Ann Arbor, Mich. (Materials Licensee)	$2,000	Violation relating to the licensee's failure to adequately evaluate the discharge of radioactive material from a hood in the nuclear pharmacy. After review of the licensee's response a mitigated penalty of $1,500 was imposed by order. The licensee paid the $1,500 penalty.
Pharmatopes, Inc. Toledo, Ohio (Radiopharmaceutical Supplier)	$4,000	Violations relating to the licensee's failure to perform an adequate survey and a radiation exposure to an employee. The licensee paid the $4,000 penalty.
Tennessee Valley Authority Chattanooga, Tenn. (Browns Ferry 1, 2 and 3)	$50,000	Violations relating to positive access control to vital areas and the licensee's failure to take the initiative in identifying potential problems. The licensee paid the $50,000 penalty.
Virginia Electric and Power Company Richmond, Va. (Surry 1)	$50,000	Violation relating to the licensee's failure to follow procedures which resulted in exceeding a limiting condition for operation. The licensee paid the $50,000 penalty.
Consumers Power Company Jackson, Mich. (Palisades)	$16,000	Violations relating to the licensee's failure to maintain containment integrity during reactor startup and to follow safety-related procedures during maintenance on a control rod drive mechanism. The licensee paid the $16,000 penalty.
Portland General Electric Company Portland, Ore. (Trojan)	$60,000	Violation relating to the licensee's failure to complete corrective action on an identified deficiency which would, under certain conditions, render one emergency diesel inoperable. After review of the licensee's response, a mitigated penalty of $50,000 was imposed by order and the licensee paid the penalty.
Overhoff and Associates, Incorporated Cincinnati, Ohio (Materials Licensee)	$500	Violations relating to unauthorized distributions and transfers of gauges containing licensed material. The licensee paid the $500 penalty.

Table 2. Civil Penalty Action During FY 1982

Licensee	*Amount*	*Reason*
Southern California Edison Company Rosemead, Cal. (San Onofre 1)	$60,000	Violation relating to positive access control to vital areas associated with implementation of the physical security plan. After review of the licensee's response, the $60,000 penalty was imposed by order and the licensee paid the penalty.
Sacramento Municipal Utility District Sacramento, Cal. (Rancho Seco)	$120,000 (Pending)	Violations relating to exceeding limiting conditions for operation involving inoperability of a diesel generator and an inoperable high pressure injection pump. The case is pending.
Duke Power Company Charlotte, N.C. (Oconee 1)	$44,000 (Pending)	Violation relating to the licensee's failure to ensure that procedures affecting safe operation of the plant are meticulously followed. The case is pending.
Commonwealth Edison Co. Chicago, Ill. (Zion Unit 1)	$100,000	Violations relating to failure to make an adequate evaluation of radiation hazards before entry into an area beneath the reactor vessel resulting in an employee receiving a whole body radiation dose. The licensee paid the $100,000 penalty.
Georgia Power Company Atlanta, Ga. (Hatch Units 1 and 2)	$20,000	Violation relating to an inadequate search prior to entry into the protected area and inadequate posting of guards. The licensee paid the $20,000 penalty.
Carolina Power and Light Company Raleigh, N.C. (Brunswick Unit 1)	$120,000	Violation relating to the failure of operators to recognize a failed safety-related water level instrument and to fully implement a required action statement once the failure was recognized. The licensee paid the $120,000 penalty.
Blanchard Valley Hospital Findlay, Ohio (Materials Licensee)	$1,000	Violations relating to an exposure of an individual while manually closing the shutter of a malfunctioning teletherapy unit and the licensee's failure to report the occurrence within the specified time limit. The licensee paid the $1,000 penalty.
Nuclear Fuel Services, Inc. Erwin, Tenn. (Fuel Facility Licensee)	$2,500	Violation relating to an inadvertent shipment of low enriched licensed material in drums thought to be empty. The licensee paid the $2,500 penalty.
Nebraska Public Power District Columbus, Neb. (Cooper)	300,000 (Pending)	Violations relating to the timely installation and testing of the prompt notification system required by the regulations and inaccurate information supplied to the Commission concerning the prompt notification system. The case is pending.
Iowa Electric Light and Power Company Cedar Rapids, Ia. (Duane Arnold Energy Center)	$40,000 (Pending)	Violations relating to limiting conditions for operation concerning the inability of one emergency diesel generator to start within design requirements and procedural errors which resulted in the failure to test operability of the emergency diesel generator after maintenance. The case is pending.

issues orders, including those imposing or proposing civil penalties. (Table 2 provides a listing and brief summary of the 37 civil penalty actions during fiscal year 1982.) The amount of the proposed penalties totalled approximately $2.25 million. With some cases still pending and some of the penalties remitted or mitigated, a total of $1.6 million in penalties had been collected at the close of the report period.

Table 3 provides a description of the six enforcement orders issued during Fiscal Year 1982.

Bulletins, Circulars and Information Notices

The NRC issues Bulletins, Circulars and Information Notices to licensees, including construction permit holders, to inform them of events that may have generic implications. Each of these issuances is based on events reported by licensees, NRC inspectors, Agreement States, or others, where a preliminary evaluation may affect other licensees. A total of 49 NRC Information Notices were issued in fiscal year 1982, including four revisions to and updates of previously issued Information Notices. (Table 4 lists all Information Notices issued in fiscal year 1982.) Information Notices provide information but do not require specific actions; they are rapid transmittals of information which may not yet have been completely analyzed by the NRC, but which licensees should be aware of. Licensees receiving an Information Notice are expected to review the information for applicability to their current and future licensed operations. If the information does apply, licensees are expected to take action necessary to avoid repetition of the problem described in the NRC Information Notice.

NRC Circulars are used when the implications of one or more similar events indicate that both licensee notification and specific licensee action is recommended. Circulars do not require that licensees submit a reply to the NRC describing their actions. Licensees review the information and implement the recommendations if they are applicable.

Two Circulars were issued in fiscal year 1982. One concerned the large number of instances in which power reactor main steam isolation valves failed to close. The isolation valve failures were found to result largely from (1) poor quality air supplied to the associated pilot valves and (2) binding of the valve stems in the isolation valves. The circular recommended actions to prevent recurrence of these events. The other circular dealt with the potential for unnecessary radiation exposures to the public and workers during possession and use of measuring devices containing radioactive sources. The major causes were (1) failure to employ an authorized user to handle radioactive devices and (2) modification of shielding of the radioactive source.

NRC Bulletins provide information about one or more similar events and require that licensees take specific actions. The licensee reports actions taken or to be taken and provides information the NRC may need to assess the need for further action. Prompt response by licensees is required and failure to respond will normally result in NRC enforcement action. Prior to issuing a Bulletin, the NRC may seek comments from the nuclear industry. This technique has proven effective in generating faster and more informed responses from affected licensees. However, the nature of the problem and a need for timely action may limit such prior consultation. NRC Bulletins generally require one-time action and are not intended as substitutes for formally issued regulations or for imposed license amendments.

In 1982, the Office of Inspection and Enforcement issued two Bulletins, and two supplements/revisions to previously issued Bulletins:

(1) Bulletin 82-01 dealt with the discovery that a radiograph interpreter employed by a fabricator of piping subassemblies had been enhancing the penetrameter image so that some radiographs would appear to have the sensitivity required by the ASME code. Licensees who had purchased piping assemblies from the companay were required to review all radiographs for that fabricator's shop-assembled piping assemblies.

(2) Bulletin 82-01, Rev. 1, added three licensees to the list of potentially affected plants.

(3) Bulletin 82-01, Rev. 1, Supplement 1, was issued for action to another group of licensees when the same problem described in the original bulletin was found to have occurred with piping subassemblies fabricated by another manufacturer.

(4) Bulletin 82-02 dealt with the problem of degraded threaded fasteners in the reactor coolant pressure boundary (RCPB) of pressurized water reactors. For RCPB closures using threaded fasteners, licensees were required to develop and implement maintenance procedures where they did not already exist; remove, clean, and inspect threaded fasteners for those closures opened for maintenance and inspection; and identify bolted closures which had previously experienced leakage and where fastener lubricants and/or injection sealant materials had been used to stop leakage.

Bulletins are entered into regional office computerized tracking systems. Licensee responses to them are evaluated for adequacy and completeness, and are verified by direct observation during subsequent

Table 3. IE Orders Issued During FY 1982

Licensee	*Date*	*Reason*
Dayton X-Ray Company Dayton, Ohio (Radiography Licensee)	11/27/81	Order to Show Cause. **Reason:** Inability of the licensee to conduct its industrial radiography program in accordance with Commission requirements and unwillingness of the licensee over a period of years to assure that radiographic procedures were performed only by authorized personnel. Based on the licensee's response the order was rescinded on March 25, 1982.
Boston Edison Company Boston, Mass. (Pilgrim)	1/18/82	Order Modifying License Effective Immediately. **Reason:** Issued in conjunction with proposed civil penalty in the amount of $550,000. The order required the submission of a comprehensive plan of action that will yield an independent appraisal of site and corporate management organizations and functions, recommendations for improvements in management controls and oversight, and a review of previous safety-related activities to evaluate compliance with Commission requirements.
Midstate Testing Laboratory Inc. Hammond, Ind. (Radiography Licensee)	7/22/82	Order to Show Cause and Order Suspending License Effective Immediately. **Reason:** The licensee apparently abandoned its radiographic facility and its five radiographic exposure devices, three sealed radiography sources and a soil moisture probe. The order suspended the license effective immediately and required the transfer of all licensed material to an authorized recipient, and further required the licensee to show cause why the license should not be revoked. (Pending)
Nebraska Public Power Columbus, Neb. (Cooper)	8/9/82	Order Modifying License Effective Immediately. **Reason:** Serious breakdowns in management controls. The order required submission for review and approval a comprehensive plan of action to include an independent appraisal of site and corporate management organizations and functions, and recommendations for improvements in communications, management controls, and oversight. (Pending)
Radiodiagnostic Imaging Affiliates of Virginia, Inc. Nashville, Tenn. (Materials Licensee)	8/27/82	Order to Show Cause and Order Modifying License (Effective Immediately). **Reason:** Inadequate management control over radiation safety matters which involved operating without a required survey meter and failure to perform tests to properly check a dose calibrator. (Pending)
Orian Chemical Company Provo, Utah (General Licensee)	9/3/82	Order to Show Cause and Order Temporarily Suspending License (Effective Immediately). **Reason:** The licensee refused to make available to an NRC inspector record of transfer, contamination was present in areas outside the licensee's premises, source material was possessed in excess of authorized limits, and material receipt records were incomplete. (Pending)

The NRC Operations Center, upgraded during 1982, was the scene of six full-scale test exercises involving the participation of NRC headquarters and regional officials, other federal agencies, licensees, and State and local emergency organizations. Shown here during a conference call exchange are senior NRC staff members.

inspections. This verification is documented in NRC inspection reports. NRC inspector verification is guided by written direction provided by the Office of Inspection and Enforcement. Licensee actions in response to NRC Circulars are also tracked by the regional offices, followed up by inspectors, and documented in inspection reports.

While there is no requirement for regional office follow-up on Information Notices, such issuances are normally reviewed by resident inspectors for applicability to that plant, and discussed with licensee management, as appropriate.

INCIDENT RESPONSE

Procedures

In March 1982, the NRC published "Agency Procedures for the NRC Incident Response Plan" (NUREG-0845) for interim use and comment. These procedures describe the functions of the NRC during an incident and detail the kinds of actions that constitute an NRC response. Six individual supplements to NUREG-0845, representing response procedures in each of the five regional offices and headquarters, also were compiled. In addition, NRC has participated with FEMA and other agencies in publishing planning guidance for *Preparation of the Federal Radiological Emergency Response Plan.* This document identifies the authorities and responsibilities of each Federal agency having a significant role in a peace-time radiological emergency, describes the concept of operations, and establishes Federal government-wide policies and assumptions for use in preparing individual agency plans.

Operations Center Upgrade

The NRC Operations Center was the subject of an intense upgrading effort in fiscal year 1982. The effort extended to space arrangement, furniture and equipment; duty officer training and roles; technical team capabilities; a central information management system; and a test of a prototype Nuclear Data Link. A functional design study, including human factors considerations, was completed by an NRC contractor in March 1982; this study is the basis upon which the Operations Center is being upgraded. More extensive and flexible space is being used and move-in date in the late spring of 1983 has been set. The new Operations Center is being designed as a dedicated facility, strictly for NRC incident response purposes.

In previous years, the Operations Center duty officer has come from various NRC offices on a temporary schedule. In 1982, four professionals were assigned full time as duty officers and five professionals were identified as duty officers on a 50 percent basis to provide a more efficient cadre of personnel.

Major progress has been made with technical team analytical capabilities, particularly in radiological dose assessment capability. Initial scoping dose assessments are now uniformly made with the implementation of the Interactive Rapid Dose Assessment Model (IRDAM). This portable computer hardware/software package is intended for use during the ini-

Table 4. IE Information Notices Issued During FY 1982

Information Notice No.	*Subject*	*Date of Issue*	*Issued to*
82-40	Deficiencies in Primary Containment Electrical Penetration Assemblies	9/22/82	All power reactor facilities holding an OL or CP*
82-39	Service Degradation of Thick Wall Stainless Steel Recirculation System Piping at a BWR Plant	9/21/82	All BWR facilities holding an OL or CP
82-38	Change in Format and Distribution System for IE Bulletins-Circulars, and Information Notices	9/22/82	All NRC licensees
82-34 Rev. 1	Welds in Main Control Panels	9/17/82	All power reactor facilities holding an OL or CP
82-37	Cracking in the Upper Shell to Transition Cone Girth Weld of a Steam Generator at an Operating Pressurized Water Reactor	9/14/82	All power reactor facilities holding an OL or CP
82-36	Respirator Users Warning for Certain 5-Minute Emergency Escape Self-Contained Apparatus	9/2/82	All power reactor facilities holding an OL or CP, fuel facilities and Priority I material licensees
82-35	Failure of Three Check Valves on High Pressure Injection Lines to Pass Flow	8/25/82	All power reactor facilities holding on OL or CP
82-34	Welds in Main Control Panels	8/25/82	All power reactor facilities holding an OL or CP
82-33	Control of Radiation Levels in Unrestricted Areas Adjacent to Brachytherapy Patients	8/20/82	All Medical Institutions
82-32	Contamination of Reactor Coolant System by Organic Cleaning Solvents	8/19/82	All power reactor facilities holding an OL or CP
82-31	Overexposure of Diver During Work in Fuel Storage Pool	7/28/82	All power reactor facilities holding an OL or CP
82-30	Loss of Thermal Sleeves in Reactor Coolant System Piping at Certain Westinghouse PWR Power Plants	7/26/82	All power reactor facilities holding an OL or CP and applicants for operating license (NTOL)
82-29	Control Rod Drive (CRD) Guide Tube Support Pin Failures at Westinghouse PWRs	7/23/82	All power reactor facilities holding an OL or CP Westinghouse-designed NSSS
82-28	Hydrogen Explosion While Grinding in the Vicinity of Drained and Open Reactor Coolant System	7/23/82	All power reactor facilities holding an OL or CP
82-27	Fuel Rod Degradation Resulting from Baffle Water-Jet Impingement	8/5/82	All power reactor facilities holding an OL or CP

Table 4. IE Information Notices Issued During FY 1982

(continued)

Information Notice No.	*Subject*	*Date of Issue*	*Issued to*
82-26	RCIC and HPCI Turbine Exhaust Check Valve Failures	7/23/82	All BWR power reactor facilities holding an OL or CP
82-25	Failures of Hiller Actuators upon Gradual Loss of Air Pressure	7/22/82	All power reactor facilities holding an OL or CP
82-24	Water Leaking from Uranium Hexafluoride Overpacks	7/20/82	All NRC licensed enriched uranium fuel fabrication plants
81-26, Part 3, Sup. No. 1	Clarification of Placement of Personnel Monitoring Devices for External Radiation	7/20/82	All power reactor facilities holding an OL or CP
82-23	Main Steam Isolation Valve (MSIV) Leakage	7/16/82	All BWR power reactor facilities holding an OL or CP
82-22	Failures in Turbine Exhaust Lines	7/9/82	All power reactor facilities holding an OL or CP
82-21	Buildup of Enriched Uranium in Effluent Treatment Tanks	6/30/82	All uranium and plutonium fuel fabrication licensees
82-20	Check Valve Problems	6/28/82	All power reactor facilities holding an OL or CP
82-19	Loss of High Head Safety Injection Emergency Boration and Reactor Coolant Makeup Capability	6/18/82	All power reactor facilities holding an OL or CP
82-18	Assessment of Intakes of Radioactive Material by Workers	6/11/82	All power reactor facilities holding an OL or CP, other specified licenses
82-17	Overpressurization of Reactor Coolant System	6/10/82	All power reactor facilities holding an OL or CP
82-16	HPCI/RCIC High Steam Flow Setpoints	5/28/82	All power reactor facilities holding an OL or CP
82-15	Notification of the Nuclear Regulatory Commission (NRC)	5/28/82	All NRC licensees and all power reactor facilities holding a CP
82-14	TMI-1 Steam Generator/Reactor Coolant System Chemistry/Corrosion Problem	5/12/82	All power reactor facilities holding an OL or CP
82-13	Failures of General Electric Type HFA Relays	5/10/82	All power reactor facilities holding an OL or CP
82-12	Surveillance of Hydraulic Snubbers	4/21/82	All power reactor facilities holding an OL or CP
82-11	Potential Inaccuracies in Wide Range Pressure Instruments used in Westinghouse Designed Plants	4/9/82	All power reactor facilities holding an OL or CP

82-10	Following up Symptomatic Repairs to Assure Resolution of the Problem	4/9/82	All power reactor facilities holding an OL or CP
82-09	Cracking in Piping of Makeup Coolant Lines at B&W Plants	3/31/82	All power reactor facilities holding an OL or CP
82-08	Check Valve Failures on Diesel Generator Engine Cooling System	3/26/82	All power reactor facilities holding an OL or CP
82-07	Inadequate Security Screening Programs	3/16/82	All power reactor facilities holding an OL or CP
82-06	Failure of Steam Generator Primary Side Manway Closure Studs	3/12/82	All power reactor facilities holding an OL or CP
82-05	Increasing Frequency of Drug-Related Incidents	3/10/82	All power reactor facilities holding an OL or CP
82-04	Potential Deficiency of Certain AGASTAT E-7000 Series Time-Delay Relays	3/10/82	All power reactor facilities holding an OL or CP
82-03	Environmental Tests of Electrical Terminal Blocks	3/4/82	All power reactor facilities holding an OL or CP
82-01 Rev. 1	Auxiliary Feedwater Pump Lockout Resulting from Westinghouse W-2 Switch Circuitry Modification	2/26/82	All power reactor facilities holding an OL or CP
80-32 Rev. 1	Clarification of Certain Requirements for Exclusive-Use Shipments of Radioactive Materials	2/26/82	All facility, materials and Part 50 licensees
82-02	Westinghouse NBFD Relay Failures in Reactor Protection Systems at Certain Nuclear Power Plants	1/27/82	All power reactor facilities holding an OL or CP
82-01	Auxiliary Feedwater Pump Lockout Resulting from Westinghouse W-2 Switch Circuit Modification	1/22/82	All power reactor facilities holding an OL or CP
81-39	EPA Crosscheck Program - Low Level Radioiodine in Water Test Program	12/23/81	All power reactor facilities holding an OL or CP and Priority I material licensees
81-38	Potentially Significant Equipment Failures Resulting From Contamination of Air-Operated Systems	12/17/81	All power reactor facilities with an OL or CP
81-37	Unnecessary Radiation Exposure to Public and Workers during Events Involving Thickness and Level Measuring Devices	12/15/81	All byproduct material licensees
81-36	Replacement Diaphragms for Robertshaw Valve (Model No. VC-210)	12/3/81	All power reactor facilities with an OL or CP
81-35	Check Valve Failures	12/2/81	All power reactor facilities with an OL or CP
81-34	Accidental Actuation of Prompt Public Notification System	11/16/81	All power reactor facilities with an OL or CP
81-33	Locking Devices Inadequately Installed on Main Steam Isolation Valves	11/9/81	All power reactor facilities with an OL or CP
81-32	Transfer and/or Disposal of Spent Generators	10/23/81	All medical licensees
81-31	Failure of Safety Injection Valves to Operate Against Differential Pressure	10/8/81	All power reactor facilities with an OL or CP

*OL = Operating License
CP = Construction Permit

tial hours of an emergency condition. IRDAM capability will exist in each Regional Office Incident Response Center and will be deployed as needed to the appropriate site. The ability to make subsequent, refined dose assessments is being integrated into the hardware systems at the Operations Center. Techniques developed by the staff and the National Laboratories are the focus of the Intermediate Dose Assessment System (IDAS) that will provide agency respondents with plant and site specific dose projections. IDAS will integrate assessments performed by licensees with independent staff evaluations and have the capability to assimilate environmental surveys. The capability will be accessible from the regional office and the site to ensure a consistent agency response to public inquiries. IDAS will be implemented when the upgraded Operations Center is completed.

Several exercises were held during fiscal year 1982. These exercises train response personnel and test new procedures and resources. Exercises range from a very limited regional office response to a licensee small-scale exercise, to the full-scale activation of all NRC resources, including participation by the NRC chairman, NRC headquarters and regional office staff, other Federal agencies, the licensee, and State and local government. The NRC participated in six full-scale exercises in 1982. Each Regional Office participated in at least one of these full-scale exercises.

Regional Response Capability

Each of the five NRC regions has an Incident Response Center (IRC), a dedicated area from which the incident response activities at the regional office level are managed. Through IRC, primary communications can be established among the Regional Base Team, the NRC Operations Center in Bethesda, Md., the Site Team, and the nuclear plant site. For operating reactor sites this is accomplished via two dedicated emergency telephone lines: the Health Physics Network and the Emergency Notification Network. Telephone communications for events at other nuclear facilities and for transportation events are accomplished by conventional means. Each IRC provides the capability of accessing national weather service observations and forecasts for the nuclear plant sites. In addition, Region II (Atlanta), covering the southeastern states, has the capability of assessing hurricane tracking information. Other forms of communication equipment are being tested in most of the regions: high-frequency radios, wireless telephones in the control room of the plant, and flight telephones are all being utilized during emergency preparedness exercises.

The regional-office level of response is based on predetermined classification of events and NRC response modes. For a more significant event, a Regional Base Team and a Regional Site Team are assembled. The base team monitors licensee performance, supports NRC headquarters incident management and coordinates response efforts until the site team arrives at the site of the event and is operational. The site team goes to the site and is responsible for coordinating the NRC's incident response activities there. By the end of 1982, all regional offices had tested their incident response capabilities by participating in at least one annual full-scale exercise at a nuclear plant site. In 1982, the regional IRCs were activated 13 times. In response to one event, a site team led by the Region I Administrator responded to an emergency at the R. E. Ginna Plant located near Rochester, N.Y. The site area emergency was declared following a steam generator tube rupture complicated by a loss of primary coolant through a stuck-open valve. The licensee was able to control the facility; no individuals were hurt and there was no property damage. (See Chapters 2 and 4.)

9

Cooperation with the States

The program for NRC contacts with regional, State and local agencies for purposes other than inspection and enforcement or emergency planning is administered through NRC's Office of State Programs. Certain aspects of the program are being implemented by the Regional Offices under policies and procedures established by that office. This chapter reports on activities in three major areas of operation: the State Agreements Program; various liaison and cooperative programs; and financial protection and related concerns.

STATE AGREEMENTS PROGRAM

The Nuclear Regulatory Commission has agreements with 26 States under which those states have assumed regulatory responsibility over byproduct and source materials and small quantities of special nuclear material. At the end of 1982, Agreement States had issued about 13,000 radioactive material licenses; these represent about 60 percent of all the materials licenses in the United States. The Agreement States are listed in the *1981 NRC Annual Report,* p. 103, and shown on the map, next page. The NRC State Agreements Program is implemented by the NRC regional offices in accordance with policies and procedures established by the Office of State Programs.

Review of State Regulatory Programs

The NRC is required by the Atomic Energy Act of 1954 to periodically review Agreement State radiation control programs and confirm that they are adequate to protect public health and safety and are compatible with NRC programs. The reviews follow the guidelines contained in a Commission Policy Statement published in the *Federal Register*, December 4, 1982. Any problems identified in these reviews are brought to the attention of State authorities with recommendations for corrective action. Twenty-four routine program reviews were conducted in 1982. As part of the program review, the NRC technical staff accompanied State inspectors to State-licensed facilities to evaluate inspector performance and reviewed selected license and compliance casework in detail.

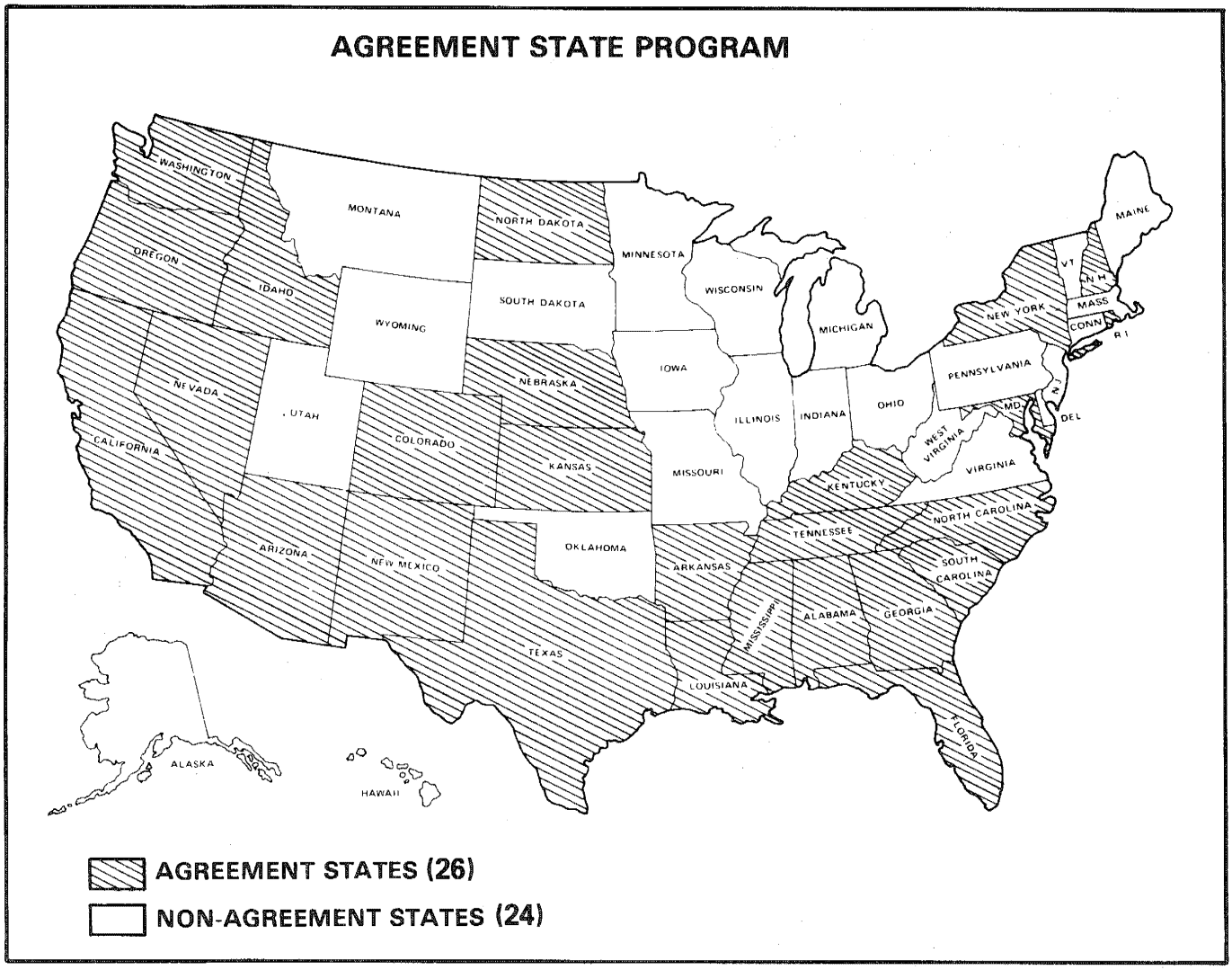
Follow-up reviews of problem areas identified in 1981 reviews were conducted in Kansas and New Hampshire in 1982 to assess the State's corrective actions. In Kansas, these actions responded to a need to augment staffing, reduce inspection backlog and update regulations. In New Hampshire, there was a need to improve the technical quality of licensing actions.

In late 1981, a strike by the Oil, Chemical and Atomic Workers Union at Tennessee Nuclear Specialities, Inc. in Jonesboro, Tenn., a manufacturer of depleted uranium metal products, attracted considerable media attention. The 1982 review of the Tennessee radiation control program included a review of the State's regulatory actions with respect to this licensee's activities. It was concluded that the State was taking proper measures in dealing with this licensee.

The overall results of the NRC reviews conducted during this report period indicated that the Agreement States continue to conduct effective regulatory programs. Periodic meetings are held with U.S. Department of Labor officials to exchange information and to keep them apprised of the status of Agreement State radiation control programs.

NRC Technical Assistance to States

The NRC provided technical assistance to Agreement States during 1982 in the areas of licensing, in-



spection, and review of proposed statutes and regulations. Special assistance was provided to Washington and California in their evaluation of applications for approval of generally licensed devices, to Florida in its evaluation of an application to incinerate radioactive waste, and to Mississippi in its review of an application for a radiopharmacy. Arkansas and Maryland were assisted in their evaluation of the design of sealed sources for use in a large irradiator.

Training Offered by NRC

State radiation control personnel regularly attend NRC-sponsored courses to upgrade their technical and administrative skills and, thus, their ability to maintain high quality regulatory programs. In 1982, the NRC sponsored 21 short-term training courses, attended by 286 State personnel. Courses included health physics, industrial radiography safety, nuclear medicine procedures, orientation in licensing practices, inspection procedures, biological effects of ionizing radiation, program management, teletherapy calibration, and regulation of uranium mills.

Annual Agreement States Meeting

The annual meeting of Agreement State radiation control program directors, held in October 1982, covered a wide range of issues being faced by State personnel, including waste management, emergency preparedness, industrial radiography safety, enforcement policies, uranium mill regulation and materials licensing.

Regulation of Uranium Mill Tailings

On December 4, 1981, President Reagan signed the NRC Appropriation Bill (PL 97-88) which among other things, deferred the NRC's accession to

jurisdiction over uranium mill tailings in Agreement States without amended agreements during fiscal year 1982. The law precluded NRC from spending any money to implement or enforce its mill tailings standards published on October 3, 1980. The law did not prohibit NRC from entering into amended agreements permitting Agreement States to continue regulating mill tailings as required by the Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA).

Washington, Colorado, and Texas—which have active milling operations— applied for amended agreements pursuant to UMTRCA. Amended agreements with these three States were consummated in 1982. New Mexico, which also has active milling operations, submitted a draft proposal for NRC comment. The NRC was working with the State to complete an agreement at the close of the fiscal year.

Special Study of the Agreement State Program

In 1977, an internal NRC Task Force reporting on a study of the Agreement State program recommended a reappraisal in about five years. A contract was awarded to the National Governors' Association (NGA) in late 1981 to examine the program.

The objectives of the study are to determine how well the program satisfies the purposes of the Atomic Energy Act, how well it satisfies the needs of the States and of the Federal Government, what its long term goals should be, and what structural, administrative and fiscal changes should be considered. During 1982, NGA conducted a survey of State attitudes towards the Agreement State program, conducted management case studies of selected State programs, and held two public meetings with a special advisory group to solicit additional views from the regulated community and from other interested parties. An NGA task force will prepare a report of the findings of the study, including recommendations, to be issued in January 1983.

LIAISON AND COOPERATIVE ACTIVITIES

Low-Level Waste Compacts

In response to the Low-Level Radioactive Waste Policy Act, enacted in December 1980, the States have made a concerted effort to resolve this major policy issue through the interstate compact process. NRC has supported the States in their endeavors to realize workable compacts providing for regional low-level waste disposal sites. Whenever possible, NRC Regional State Liaison Officers attended compact negotiating meetings as observers and as resource persons. Further, NRC provided invitational travel to the seven compact groups and the unaffiliated States of California and Texas to the joint NRC/Oak Ridge National Laboratory symposia on low-level waste disposal, which focused on the proposed rule 10 CFR Part 61.

Finally, NRC has responded to the compact groups with comments and reviews of their compact language, when requested. Major issues include: achieving new operating sites by the Congressionally mandated cutoff date of January 1986, the focus of the compact being management versus disposal of waste and State inspection of NRC licensees.

Transportation Surveillance

During 1982, six States continued to participate in a joint NRC/Department of Transportation program to monitor the transport of radioactive materials through and within the States. The results of such surveillance in 1981 were published by NRC for the States of Illinois, Maryland, Michigan, Nevada, South Carolina, and Washington. Two of the major findings reported by the States are that the number of transportation violations at the low-level radioactive waste disposal sites is diminishing, and that cargo handlers and drivers of radiopharmaceuticals need additional instruction to limit their exposure to a more acceptable level. The surveillance program, which began in 1973, was enlarged in 1981 to include all hazardous materials. The Department of Transportation has assumed primary funding and administrative responsibility, with the NRC playing a supporting role. The enlarged program—the State Hazardous Materials Enforcement Development program—is designed to promote adoption of the Federal Hazardous Materials Regulations as a means to achieving national safety uniformity in this area and to increasing levels of safety through increased levels of inspection and enforcement, primarily in highway transportation.

Reporting State Legislation

There has been an increase in the scope of the NRC periodical "Information Report in State Legislation," providing summaries of all introduced and enacted legislation dealing with nuclear energy in all States. In addition to legislative reports on agreements, emergency preparedness, initiatives, power plant siting, transportation, uranium milling, and waste management, the categories of high-level waste, low-level waste compacts and safeguards were added in 1982. The report, available through subscription, is one of the few reference tools available which compiles information on current State legislation in the nuclear field.

In February 1982, an amendment to the agreement between the NRC and the State of Washington was signed in Washington, D.C. by NRC Chairman Nunzio J. Palladino (left), and in Olympia, Wash., by Governor John Spellman (right). The amended agreement allowed continued regulation of uranium mill tailings by the State of Washington.

Memoranda Of Understanding

Since 1976, the NRC has been engaged in entering into Memoranda of Understanding with States in which the parties pledge cooperation in certain areas of mutual interest. A total of 14 such agreements have been developed, dealing with such matters as the quality of water discharged from NRC-licensed facilities, or other, more general, mutual concerns.

In 1982, NRC entered into nearly identical memoranda with the two States that are the regulators of the major low-level waste disposal facilities in the U.S., Washington and South Carolina. Under these memoranda, NRC agrees to use State-gathered evidence of violations by NRC licensees of packaging and shipping regulations, and the State agrees to make such evidence available to NRC and to make the inspectors available as witnesses in any NRC enforcement hearing.

State Liaison Officers

The Governors of all 50 States and the Commonwealth of Puerto Rico have appointed State liaison officers to maintain contact with the NRC. Regional meetings of these liaison officers and NRC staff are held periodically to keep the former updated on major aspects of NRC's programs.

Regional meetings for the State liaison officers were held in Region V (San Francisco) in March 1982, in Region I (Philadelphia) in June 1982 and in Region II (Atlanta) in September 1982. Subjects discussed at these regional meetings included emergency planning, waste management, spent fuel shipments and notification, regionalization, and other items of mutual regulatory interest.

NRC's regional State liaison officers have continued to play an active role in State low-level radioactive waste compact activities and off-site emergency planning.

Model State Radiation Control Act

The *1981 NRC Annual Report* (see p. 104) discussed a major revision to the Model State Radiation Control Act developed in cooperation with other Federal agencies and the Conference of Radiation

Control Program Directors. The 1981 report stated that the model act had been submitted through OMB to the Council of State Governments (CSG) for possible publication in its 1982 Compendium of Suggested State Legislation. CSG has approved the model act and it is being published in the compendium.

INDEMNITY, FINANCIAL PROTECTION, AND NEED FOR POWER

The Price-Anderson System

NRC regulations implementing the Price-Anderson Act provide a three-layered system to pay public liability claims in the event of a nuclear incident causing personal injury or property damage. The first layer requires all licensees of commercial nuclear power plants rated at 100 electrical megawatts or more to provide proof of financial protection in an amount equal to the maximum liability insurance available from private sources. Currently, this amount is $160 million.

The second layer provides a mechanism—payment of a retrospective premium— whereby the utility industry would share liability for any damages exceeding $160 million that result from a nuclear incident. In the event of such an incident, each licensee of a commercial reactor rated at 100 electrical megawatts or more would be assessed a prorated share of damages up to the statutory maximum of $5 million per reactor per incident. Presently, the secondary financial protection layer is $400 million (i.e., 80 power reactors rated in excess of 100 MW(e) licensed to operate X $5 million/reactor).

The third layer - Government indemnity - would equal the difference between the $560 million limit of liability and the sum of the first and second layers. Government indemnity for reactors was phased out on November 15, 1982 when the sum of the first and second layers totaled $560 million. The limit of liability for a single nuclear incident will now increase without limit in increments of $5 million for each new commercial reactor licensed.

Price-Anderson Renewal Study

The Commission is required to submit to the Congress by August 1, 1983, a detailed report concerning the need for renewal or modification of the PriceAnderson Act, which will expire on July 31, 1987. This report is mandated by the Atomic Energy Act of 1954, by an amendment added in 1975. The NRC is statutorily required to examine "the need for continuation or modification of the provisions of this section [170], taking into account the condition of the nuclear industry, availability of private insurance, and the state of knowledge concerning nuclear safety at this time, among other relevant factors, and shall include recommendations as to the repeal or modification of any of the provisions of this section." The Commission is presently examining these areas and focusing on other issues relating to the extension or modifications of the Price-Anderson Act.

Amendment to 10 CFR Part 140

The Commission has decided to remove Appendices A through H from 10 CFR Part 140 and publish two Regulatory Guides in their place.

Appendix A contains the Facility Form of nuclear energy liability policy furnished by certain licensees as evidence of financial protection. The Commission has decided that, because of the level of detail in the Facility Form policy and the fact that this policy was just one possible acceptable form (rather than the one required form), it would be more appropriate to publish Appendix A as a Regulatory Guide. Appendices B, C, D, E, G and H contain the forms of indemnity agreements entered into by licensees required to maintain financial protection under the Price-Anderson Act. Appendix F is not a form of indemnity agreement but a determination by the Commission of what the boundaries of indemnity locations should encompass when multiple reactors exist as part of a single operating station. The Commission decided that in the interest of reducing the level of detail in the regulations, Appendices B through H should also be removed from 10 CFR Part 140 and published as a Regulatory Guide.

Indemnity Operations

As of September 30, 1982, 136 indemnity agreements with NRC licensees were in effect. Indemnity fees collected by the NRC from October 1, 1981 through September 30, 1982 totaled $1,142,785.00. Fees collected since the inception of the program total $23,192,841.00. Future collection of indemnity fees will continue to decrease since the indemnity program has been phased out for commercial reactor licensees. No payments have been made under the NRC's indemnity agreement with licensees during the 25 years of the program's existence.

Insurance Premium Refunds

The two private nuclear energy liability insurance pools, American Nuclear Insurers and the Mutual Atomic Energy Liability Underwriters, paid to policyholders the sixteenth annual refund of premium

reserves under their Industry Credit Rating Plan. Under the plan, a portion of the annual premiums is set aside as a reserve for either payment of losses or ultimate return to policyholders. The amount of the reserve available for refund is determined on the basis of loss experience of all policy holders over the preceding 10-year period. Refunds paid in 1982 totaled $2,301,758—approximately 35.1 percent of all premiums paid on the nuclear liability insurance policies issued in 1972 and covering the period 1972-1982. The refunds represent 48.11 percent of the premiums placed in reserve in 1972.

Property Insurance

On March 31, 1982, the Commission published an interim final rule in the *Federal Register* (47 FR 13750) that, for the first time, requires electric utilities to obtain on-site property damage insurance for licensed commercial power reactors. This insurance is to make sure that licensees have adequate funds to cover the potential costs of decontaminating and cleaning up a reactor after an accident. The Commission, concerned with inadequate insurance funds for cleanup at TMI, believes that this requirement significantly reduces the likelihood that lack of funds will cause cleanup delays and thus increase risk to public health and safety. The rule does not specify an actual dollar amount of insurance required; rather it is based on what is available in the commercial nuclear insurance markets: as the amounts offered by certain insurers increase, so does the amount required by the NRC. Insurers project that, within the next year, insurance of over $1 billion will be available.

The rule was made an *interim* final rule pending completion of a staff study on various issues germane to nuclear property insurance. This study was published in May 1982 as "Nuclear Property Insurance: Status and Outlook" (NUREG-0891), and written by Dr. John D. Long, Professor and Chairperson of Insurance at Indiana University. Because NUREG-0891 recommended several actions beyond what is required in the interim rule, the Commission sought comments on the study and the efficacy of the interim rule by publishing an advance notice of proposed rulemaking (47 FR 27371) on June 24, 1982. Numerous comments were received and will be incorporated, where appropriate, into any revised rule.

Financial Qualifications

(For background, see the *1981 NRC Annual Report*, pp. 9 and 108.)

On March 31, 1982, the Commission published in the *Federal Register* a final rule which eliminated entirely its financial qualifications review, litigation, and findings for electric utilities applying for construction permits or operating licenses for nuclear power plants. In publishing the final rule the Commission affirmed its earlier rationale that (a) the link between public health and safety and financial qualifications is tenuous; and (b) electric utility applicants can recover construction and operating costs either through the economic regulatory process or through their ability to set their own rates.

As part of the proposed rule, the Commission considered retaining that portion of the power reactor operating license review relating to financial qualifi-

In 1982, the NRC sponsored 21 short-term training courses for radiation control officials of various Agreement States. Pictured here are two officials of the State of Louisiana taking part in a radiography safety training course at Baton Rouge, La.

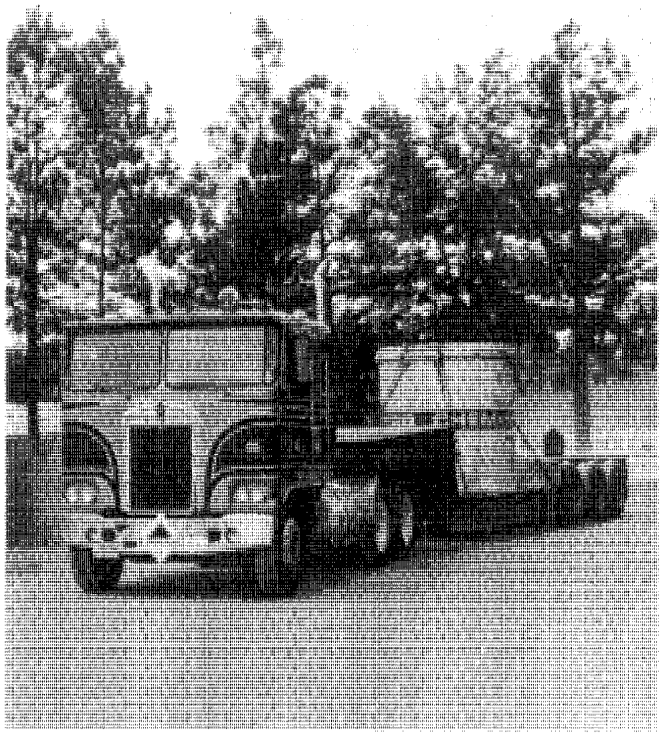
cations for permanently shutting down and maintaining the facility in a safe condition - that is, decommissioning. In issuing the final rule, the Commission chose not to adopt that alternative; it decided that any action on decommissioning is more appropriate in the context of the separate, generic rulemaking on decommissioning now being conducted, and that it was premature to include any final decision on decommissioning in the final rule on financial qualifications.

Need for Power and Alternative Energy Sources

In response to Commission directives progress was made in revising procedures for treating need for power and alternative energy sources in the staff's environmental impact statements for nuclear power plants.

First, regulations in 10 CFR Part 51 were amended to eliminate this review from individual licensing actions at the operating licensing stage. While the review may be an important issue at the construction permit stage, by the time the operating license stage is reached, the nuclear plant is almost certain to be operated, if licensed. Its comparatively low operating costs mean consideration of this issue is very unlikely to affect the cost-benefit balance. Alternatives to the nuclear power plant are also not to be evaluated at the operating license stage, according to the amended rule.

Second, the NRC will place greater reliance on State evaluations of need for power at the construction permit stage. While the NRC staff must make the final recommendation, State evaluations can be used by the staff if they meet NRC standards, especially the evaluations prepared for a State permit proceeding. The staff is working with States to improve their evaluation capabilities. One ongoing program furnishes guidelines to States through workshops and reports on acceptable need for power evaluation procedures. Another familiarizes State regulatory officials with the electricity forecasting code developed by the Oak Ridge National Laboratory with funding by the NRC.



NRC's role in the surveillance of transportation involving radioactive materials was reduced in 1982 as funding and administrative responsibility for this activity was transferred to the U.S. Department of Transportation.

STATUS OF TMI-2 FACILITY

Financial Aspects of Cleanup

Funding by GPU. As reported in the *1981 Annual Report*, there are several actual or potential sources of funds available to the General Public Utilities Corp. companies for TMI-2 cleanup. As of late August 1982, approximately $54 million of unused insurance proceeds remained to meet cleanup funding. Based upon the pace of cleanup activity, it is projected that $40 million will remain at the end of 1982. As a result, depending on the range of funding available from other sources, insurance will run out in 1984-1985. The second source, approved during 1982, is revenues allowed through rates set by the Pennsylvania Public Utility Commission (PaPUC) and the New Jersey Board of Public Utilities (NJBPU). GPU has announced its intention to seek increases in the Pennsylvania cleanup allowances in January 1983 to $25 million for Metropolitan Edison Co. and $12.5 million for Penelec. A third source is short-term credit under a revolving credit agreement with a consortium of banks. Since GPU and its subsidiaries continue to be unable to issue any stocks or bonds, bank credit constitutes its only outside source of credit. However, amounts available from this source of funds have continued to become increasingly limited and are dependent upon the amount of progress in other developments affecting the GPU companies. GPU has announced its intention to seek a renewal of the credit agreement for 1983.

Proposals for Sharing Costs. The plan for cleanup financing proposed by Pennsylvania Governor Richard Thornburgh and discussed on p. 43 of the 1981 Annual Report, is a proposal for sharing of

cleanup costs by the nuclear industry, the Federal Government, GPU, property insurance, the Commonwealth of Pennsylvania, and the State of New Jersey.

The Federal Government has committed through the Department of Energy to accept TMI's high-level waste for permanent disposal and to fund research at TMI-2 in the amount of $123 million, an estimated $69 million of which will directly offset cleanup costs. The agreement between DOE and GPU provides for future negotiation regarding reimbursement to DOE of costs that are not attributable to research and development.

Several bills were considered in Congress during 1982 that would provide for utility industry funding of a portion of cleanup costs but none have been enacted. There is some prospect, however, for voluntary contributions by the utility industry, apart from any legislative mandate.

The State of Pennsylvania recently appropriated $5 million as the first of six annual installments for the State contribution to TMI-2 cleanup in accordance with the Thornburgh Plan. There is some prospect that New Jersey will include some cleanup funds in a supplemental appropriations bill. The NRC is continually monitoring the financial condition of the GPU companies.

10 International Cooperation

The NRC program of international activities continued to develop in fiscal year 1982, shaped by concerns over issues of nuclear health and safety, and the proliferation of nuclear explosives. During the year, the NRC:

- renewed bilateral information exchange arrangements with Brazil, the Netherlands, and Switzerland; and signed six new research agreements with agencies of four countries and renewed four other foreign research agreements.
- arranged meetings between the NRC staff and visitors from 30 countries and four international organizations;
- sponsored foreign regulatory representatives to participate as observers at emergency preparedness exercises at U.S. facilities;
- provided technical assistance on both bilateral and multilateral levels to countries embarking on nuclear power programs;
- provided on-the-job training for 21 regulatory staff members from ten countries;
- issued 268 export licenses and 129 amendments to existing licensees;
- issued 5 export licenses for reduced-enrichment fuel to be installed as test elements in foreign research reactors;
- provide statutorily-required views on 19 nuclear material retransfer and nuclear technology authorization cases of the Department of Energy;
- provided statutorily-required views on 136 nuclear-related export cases of the Department of Commerce; and
- continued to cooperate with the Executive Branch in U.S. efforts to improve international safeguards.

Reassessment of U.S. Participation in IAEA

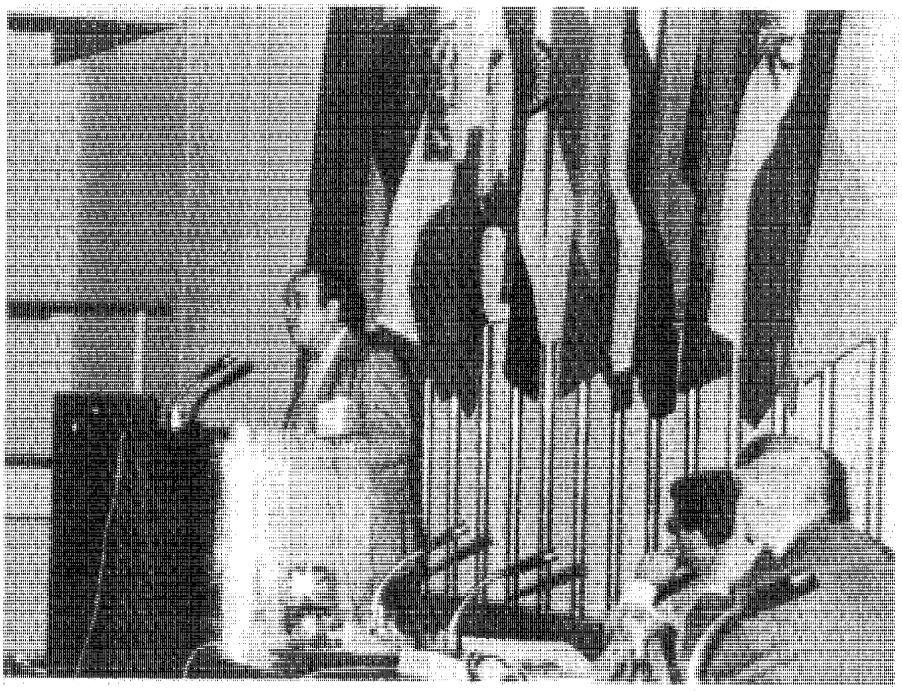
In September 1982, following a decision of the General Conference of the IAEA to refuse to recognize the credentials of the Israeli delegation for the Conference, the United States delegation walked out of the General Conference meeting and announced that the U.S. would reassess its policy regarding participation in the IAEA and its activities.

During the reassessment period, which continued into 1983, most, NRC and other U.S. interactions with the IAEA were suspended. (See "Cooperation with International Organizations" below). The suspensions affected meetings of the IAEA nuclear power plant safety standards program, nuclear safety and safeguards training courses, working groups on regulatory and safeguards topics, technical assistance missions and personnel assignments in developing countries, and the placement of IAEA fellows in U.S. organizations for educational and training assignments.

INFORMATION EXCHANGES

Bilateral Arrangements

In mid-1974, the NRC began to initiate nuclear safety information exchange and cooperation arrangements with countries which had made major commitments to light-water reactor technology. Since then, the program has been expanded to include



NRC Commissioner Thomas R. Roberts visited Argentina where he addressed the Second International Conference on Nuclear Technology Transfer in Buenos Aires, on November 1, 1982.

some countries with small nuclear power programs and countries with plans to enter the nuclear power field as well. These arrangements establish official communications channels on reactor safety problems, providing a network for cooperation and a vehicle for U.S. assistance in health and safety matters, particularly in countries importing U.S. reactors and other equipment.

NRC has bilateral exchange arrangements with 21 foreign nuclear energy regulatory agencies: Belgium, Brazil, the People's Republic of China, Denmark, Egypt, Finland, France, the Federal Republic of Germany, Greece, Israel, Italy, Japan, Korea, Mexico, the Netherlands, the Philippines, Spain, Sweden, Switzerland, Taiwan, and the United Kingdom. During 1982, NRC also continued its negotiations for arrangements with several other countries.

NRC's bilateral arrangements call for the exchange of regulatory information—technical reports, correspondence, newsletters, meetings, training courses—and, in some cases, for cooperation in reactor safety research or for exchanges of personnel and/or joint nuclear programs. They cover a five-year period, and may be extended by written agreement.

In 1982, NRC renewed its arrangements with Brazil, the Netherlands, and Switzerland.

Foreign Visitors and Training Assignees

Delegations and individuals from 30 countries and four international organizations visited NRC in 1982 for discussions that frequently included visits to nuclear facilities and DOE national laboratories. The discussions in 1982 examined safety and policy concerns experienced in the U.S. and abroad, including those dealing with pressurized thermal shock, steam generator integrity, operator licensing, probabilistic risk assessment, waste management, and safety goals.

Foreign regulatory agencies continued their interest in NRC on-the-job training, sending twenty-one regulatory staff members to be assigned for periods of 4 months to 2 years within the NRC staff in this program during 1982. Those participating and areas participating were Czechoslovakia, Finland, France, Japan, Korea, Mexico, the Philippines, Spain, Turkey, and Taiwan.

International Emergency Preparedness Cooperation

NRC in cooperation with foreign regulatory organizations in radiological emergency training began with sponsorship of two Radiological Emergency Response Operations training courses for foreign participants (see Annual Report 1981). In 1982, that sponsorship was transferred to the International Atomic Energy Agency (IAEA). In a complementary effort, the NRC scheduled 12 foreign regulatory representatives to participate on NRC teams observing emergency preparedness exercises at U.S. power plants. This enabled the foreign observers to examine the practical aspects of such exercises and to consider how similar exercises might best be carried out in their own countries.

In a related area, the recently renewed bilateral arrangement with the Korean Ministry of Science and Technology includes a provision for NRC assistance to be on call to Korean regulatory authorities to render technical advice and assistance as agreed on a case-by-case basis, in the event of an emergency at the Ko Ri I nuclear facility near Pusan. A similar arrangement is also under consideration by NRC with the Mexican National Commission for Nuclear Safety and Safeguards for the Laguna Verde nuclear facility. In both cases the bilateral cooperation contemplated by the involved agencies is not envisioned as the only, or even the primary, mechanism for bringing U.S. expertise to bear in the event of a major accident. The safety of the plant is the responsibility of the foreign operator who in the case of an emergency may look to various domestic and overseas sources for help, including the U.S. manufacturer. NRC's role would be to offer regulatory advice, if requested by its counterpart agency, on questions concerning U.S. equipment or U.S.-derived procedures at the foreign plant.

COOPERATION WITH INTERNATIONAL ORGANIZATIONS

Technical Assistance

NRC continued to cooperate with countries embarking on nuclear power programs throughout 1982, with NRC staff members presenting courses on "Pressurized Water Reactor Technology" to the atomic energy authorities in both Egypt, and Taiwan; assisting the National Nuclear Energy Commission in Brazil with low-power physics tests, waste treatment conditioning and health physics procedures; and advising the Korean Atomic Energy Bureau in Seoul on fire protection, standards evaluation and radiation monitoring. An NRC staff member also was assigned to a one-year IAEA advisory position in the Philippines, and others continued to serve in Mexico and in several nuclear safety staff positions of the IAEA in Vienna.

Foreign nationals from Korea, Mexico, Brazil, Yugoslavia and Taiwan visited the NRC, with a number of engineers from their regulatory authorities participating in certain training classes at the Reactor Training Center in Chattanooga, Tenn. NRC specialists continued to lecture at IAEA-sponsored courses for foreign nationals held at the Argonne National Laboratory.

Cooperation with the OECD

In 1982, NRC Executive Director for Operations William S. Dircks assumed the chairmanship of the Committee on the Safety of Nuclear Installations (CSNI) of the Organization for Economic Cooperation and Development's (OECD) 24-country Nuclear Energy Agency (NEA). The CSNI is the committee of primary NRC interest, and NRC staff members sit on each of its five principal working groups: operational experience and human factors; transients and breaks; primary circuit integrity; source term and environmental consequences; and risk assessment. On

More than 30 countries sent delegations to visit the NRC during 1982. One of these was a Korean group interested in mutual arrangements whereby NRC would provide real-time technical assistance to the Koreans in the event of an operating reactor emergency there. The NRC's Deputy Director, Division of Preparedness (IE) Sheldon A. Schwartz, is shown (center) in discussion with the Korean delegation.

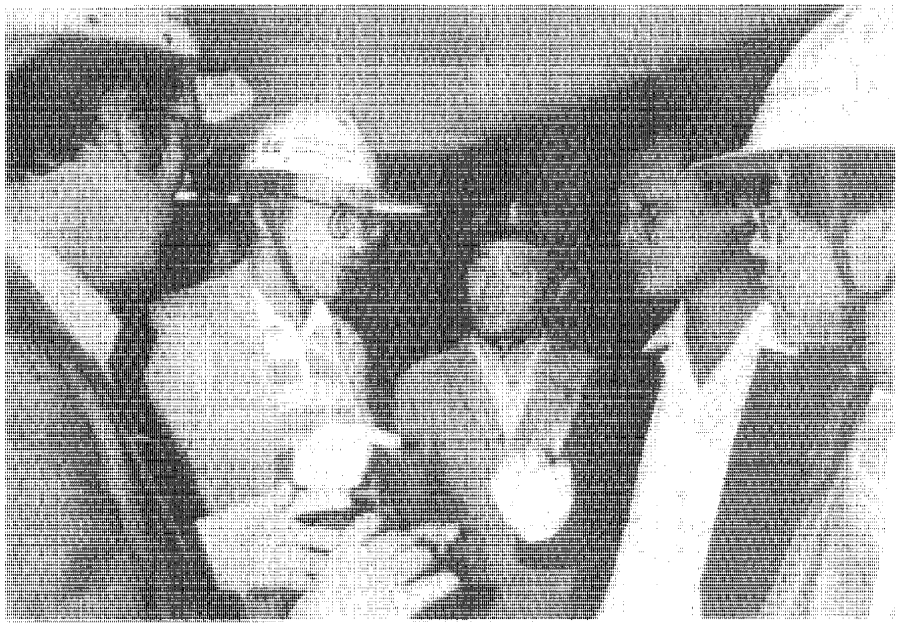
assuming the chairmanship, Mr. Dircks urged greater Committee attention to regulatory matters and the application of the Committee's traditional safety research work to resolving technical issues of licensing.

NRC staff also participated in some non-CSNI activities of the NEA, most notably some radiation protection, legal, and waste management efforts with a regulatory or safety focus of interest to the U.S.

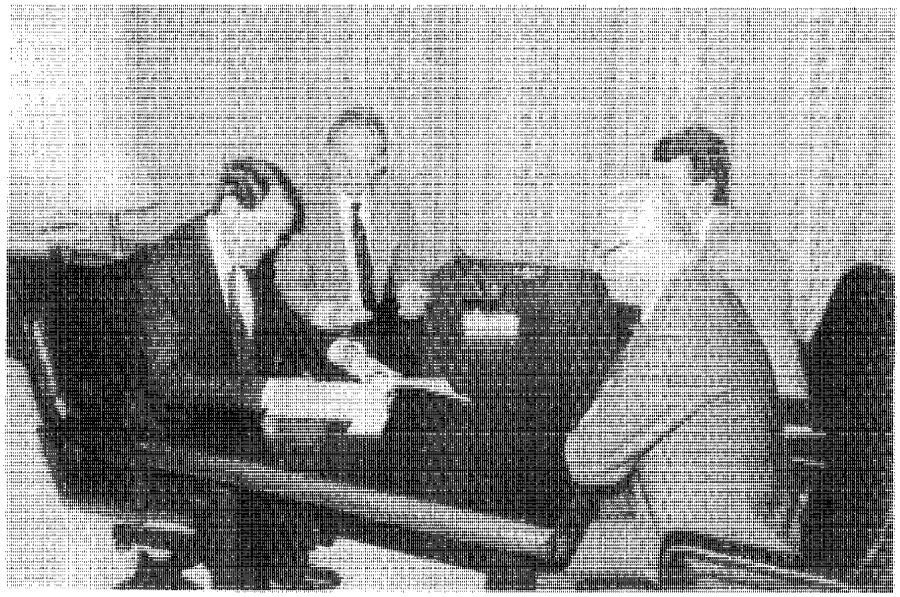
Research Agreements

Fiscal year 1982 saw the NRC sign new research agreements with agencies of three countries and extend another of long standing:

- The umbrella arrangement with the UK Atomic Energy Authority in the field of nuclear safety research and development was renewed for a five-year period to August 3, 1987. With the introduction of the LWR to the UK, and their corresponding increasing activities in LWR safety research technology, our mutual cooperation is becoming more valuable to NRC.
- On March 29, 1982, two agreements between the NRC and the United Kingdom Atomic Energy Authority (AEA) were signed. One provides for AEA participation in the NRC Severe Accident Research Program in return for payment of $1,000,000. Several other countries have expressed interest in possible participation in this program. The second provides for AEA participation in the NRC programs for the modeling loss-of-coolant accidents (LOCA), also in return for $1,000,000. Both agreements are in force for a period of 18 months.
- Two agreements were concluded with the French Commissariat a l'Energie Atomique (CEA). On May 14, 1982, an agreement was initiated that provides for joint participation in and exchanging the results of tests conducted by each party to determine the performance of polymer base-materials in various severe environments. On June 8, 1982, the CEA and NRC initiated an agreement providing for CEA participation in the NRC safety research project with the decommissioned Surry nuclear steam generator. The CEA will pay $200,000 annually for a period of five years or for the duration of the project.
- In December 1981, the NRC formally extended its participation in the OECD Halden Research Project to December 31, 1984. The Halden program covers research and experimental studies of fuel performance and process computer applications in reactor operations. The work is conducted at the Halden boiling water reactor in Norway. Nine countries participate in the project.
- An outline Plan of Research Cooperation between NRC and the CEN/SCK, (MOL Belgium) Laboratory was concluded on January 22, 1982. This plant delineates specific areas of cooperation relating to reactor pressure vessel integrity between both establishments.
- On March 24, 1982, NRC entered into an agreement with the Power Reactor and Fuel



In July 1982, Commissioner Victor Gilinsky visited the Republic of Korea to discuss nuclear matters of mutual concern between the United States and that country. Commissioner Gilinsky is shown here discussing nuclear power plant operation experience with officials of the Korean Electric Power Company during a site visit on July 29. Commissioner Y. K. Lim of the Korean Ministry of Science and Technology is at right (without helmet).



The arrangement between the NRC and the Netherlands Ministry of Social Affairs and Employment, providing for the exchange of technical information and cooperation in regulatory safety research was renewed during the year. This photo shows NRC Director of International Programs James R. Shea (left) and W. A. van den Berg of the Netherlands Ministry in signing ceremonies at The Hague on September 15, 1982.

Development Corporation of Japan under which NRC will arrange and manage a program at Sandia National Laboratory to adapt debris-bed coolability models in a form suitable for use in the CONTAIN computer code in return for annual financial payments. The agreement runs through March 31, 1984.

- In April, the NRC extended two research agreements with the Osterreichisches Forschungszentrum Seibersdorf Ges. m.b.H., OFZS, of Austria (formerly Studiengesellschaft fur Atomenergie). The first agreement provides for OFZS participation in the LOFT research program in return for associated and ongoing tasks and tests related to LOFT. The second agreement provides for OFZS participation in the PBF research program in return for access to the BALOON computer code.

NON-PROLIFERATION/EXPORTS

NRC Export License Summary for Fiscal Year 1982

During the fiscal year ending September 30, 1982, the NRC issued 268 export licenses and 129 amendments to existing licenses. Of the licenses issued, 66 were "major" licenses in three categories: special nuclear material, source material, and reactors. The remaining 202 export licenses (considered "minor") included 38 for small quantities of special nuclear material, 14 for source material, 19 for byproduct material, and 131 for section 109 components and materials. Thirteen nations received U.S. shipments of special nuclear material under major export licenses during the year, four nations received major quantities of source material, and two nations received one reactor facility each. No licenses were issued during the period for the export of large quantities of plutonium.

Export Consultations with Executive Branch

The NRC was consulted in 1982 on transactions with potential proliferation implications, including four agreements for cooperation, 9 nuclear technology transfers, 19 reprocessing retransfer requests, and 136 Department of Commerce-licensed nuclear-related exports. As usual, the NRC gave primary attention to reviewing whether the proposed action would conform with statutory criteria and nonproliferation policy, to the provisions for spent fuel disposition in new agreements for cooperation, and to the fall-back safeguards provisions in case IAEA safeguards might cease to apply.

Retransfers for Reprocessing

NRC reviewed 19 requests to retransfer U.S.-supplied nuclear material for reprocessing from Japan, Spain, Sweden and Switzerland to EURATOM (France and the UK).

NRC was consulted in connection with the development of President Reagan's plutonium use policy announced in June 1982 which proposes to give U.S. close allies in EURATOM and Japan a predictable basis for the reprocessing of spent nuclear power reactor fuel subject to U.S. consent rights, and the use of plutonium derived from that fuel.

Reduced Enrichment Fuels

The NRC continued to monitor the Department of Energy's Reduced Enrichment in Research and Test Reactor (RERTR) program (see p. 115, 1981 Annual Report) and, in 1982, issued 5 export licenses for reduced-enrichment fuel to be installed and tested in foreign research reactors. As an indicator of its continuing support for this program, the NRC published an HEU policy statement in the Federal Register, which explains the Commission's desire to seek further reductions in the uses of HEU both here and abroad.

Export Rule Changes

In connection with Executive Branch efforts to implement the 1981 U.S./Australian Agreement on the Peaceful Uses of Nuclear Energy, NRC instituted a minor change to its export regulations (10 CFR Part 110) which provides for the notification of NRC when exports of Australian origin nuclear material are being planned. This change went into effect on October 6, 1982.

Further, NRC was consulted on a Proposed Rule amending 10 CFR Part 810 (technology transfers), to require case-by-case review of such transfers to non-nuclear weapons states not parties to the NPT (except those accepting full-scope safeguards or for which the Treaty of Tlatelolco is in effect) and other countries of proliferation concern.

NRC provided comments also on DOE's plans to revise Part 810 to incorporate the provisions of Section 127, 128 and 129 of the NNPA, as required.

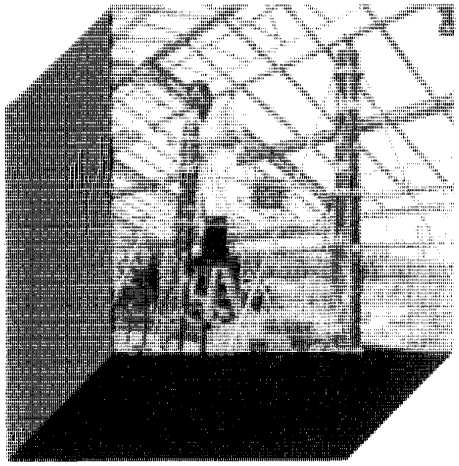
INTERNATIONAL SAFEGUARDS

During 1982, the Commission provided Congress with a report on its review of NRC export licensing responsibilities, reviewed the status of U.S. efforts to improve IAEA safeguards, and directed the staff to begin development of NRC recommendations for strengthening IAEA safeguards.

Other NRC efforts to improve international safeguards included continued cooperation with the Executive Branch in the following:

- participation in the U.S. Program of Technical Assistance to IAEA Safeguards,
- participation in the U.S. Action Plan to Upgrade IAEA Safeguards,
- cooperation with the IAEA in providing a training course on state systems of accounting for and control of nuclear material, and
- technical assistance to the IAEA in other safeguards-related areas.

In addition to these responsibilities, the NRC was involved in implementing the US/IAEA Safeguards Agreement; specifically in amending its regulations to permit the export of safeguards samples under the Agreement without an export license; and to permit NRC requests for certain types of information for any U.S. facility selected by the IAEA for the application of safeguards. The IAEA continued to apply safeguards at the Trojan and Rancho Seco power reactors and at the Exxon fuel fabrication facility in Richland, Washington. For a review of these activities, see Chapter 6 "Domestic Safeguards."



11 Nuclear Regulatory Research

The NRC's Office of Nuclear Regulatory Research provides the research information needed as part of the basis for sound understanding of regulatory issues and for establishing effective regulatory policies and practices to evaluate licensee proposals and activities. This mission is carried out by developing risk-assessment methods for evaluating regulatory issues and applying these methods to broad problem areas; by improving the understanding of phenomena necessary to analyze safety, safeguards, and environmental impact; and by identifying and defining means of improving the consistency and coherency of the level of protection provided by NRC regulations.

The office also has responsibility for developing and coordinating NRC standards—the regulations and guides governing licensed activities of the U.S. nuclear industry. A description of these standards is given in the box at the beginning of this chapter. Regulations produced by the NRC in 1982 are listed in Appendix 4. Regulatory guides are in Appendix 5.

Engineering Technology

MECHANICAL/STRUCTURAL ENGINEERING

NRC's mechanical/structural engineering research program provides information to support NRC safety reviews of nuclear power plants and fuel cycle facilities and the licensing decisions that result from them. It also provides the bases for NRC positions reflected in national standards and in NRC regulatory guides and regulations dealing with piping, pumps, valves, snubbers, vessels, containment buildings, concrete structures, and soil media in a wide range of conditions.

Seismic Research and Standards

NRC's *Seismic Safety Margins Research Program* aims at developing a better methodology for assessing the seismic safety of nuclear plants. Phase I of the program was completed in 1981 (see *1981 NRC Annual Report*, p. 117). In 1982, the methodology was used to analyze the seismic risk at the Zion plant for which the calculations were completed in September. Work initiated in 1982 included a simplified seismic risk methodology for generic use as well as a validation effort for the program.

Standard Problems for Structural Computer Codes. A program was initiated in 1982 to check analytical solutions for soil-structure interactions (SSIs) and structural responses to earthquakes of containment buildings and other structures. Current methods of analyzing the safety of reinforced concrete containments were reviewed and their limitations and range of applicability reported. At the end of the year, significant aspects of the SSI process were being identified and SSI analysis methods benchmarked, using data from the Electric Power Research Institute's (EPRI) SIMQUAKE tests and other data.

Fluid Systems and Components

Load Combinations. In cooperation with Westinghouse and its owners group, the impact of gross design and construction errors on a postulated double-ended guillotine break in the primary piping systems of reactors is being evaluated. The Advisory Committee on Reactor Safeguards (ACRS) will be asked to provide advice as to whether adequate research has been completed so that licensing decisions

REGULATIONS AND GUIDES

NRC standards are primarily of two types:

- Regulations, setting forth in Title 10, Chapter 1, of the Code of Federal Regulations requirements that must be met.
- Regulatory Guides, describing, primarily, methods acceptable to the NRC staff for implementing specific parts of the NRC's regulations.

When NRC proposes new or amended regulations, they are normally published in the *Federal Register* to allow interested citizens time for comment before they are adopted. This is required by the Administrative Procedure Act. Following the public comment period, the regulations are revised, as appropriate, to reflect the comments received. Once adopted by the NRC, they are published in the *Federal Register* in final form with the date they become effective. After that publication, rules are codified and included annually in the Code of Federal Regulations.

Some regulatory guides describe techniques used by the staff to evaluate specific situations. Others provide guidance to applicants concerning the information needed by the staff in its review of applications for permits and licenses. Many NRC guides refer to or endorse national standards (also called "consensus standards" or voluntary standards) that are developed by recognized national organizations, often with NRC participation. NRC makes use of a national standard in the regulatory process only after an independent review by the NRC staff and after public comment on NRC's planned use of the standard has been reviewed.

The NRC encourages comments and suggestions for improvements in regulatory guides and, before staff review is completed, issues them for comment to many individuals and organizations along with the value/impact statements which indicate the objectives of each guide, along with its expected effectiveness and impact.

To reduce the burden on the taxpayer, the NRC has an arrangement with the U. S. Government Printing Office to act as a consigned sales agent for certain of its publications, including regulatory guides. Draft guides issued for public comment continue to receive free distribution, but the active guides are sold. NRC licensees receive pertinent draft and active guides at no cost.

have improved bases for requirements for pipe whip restraints, asymmetric loss-of-coolant accidents (LOCAs), and load combination requirements for reactor internals and component supports.

NRC/EPRI Cooperative Seismic Research on Piping. A joint NRC/EPRI piping research effort was initiated in 1982 to test 3-dimensional piping in simulations of earthquake motion. The objectives are to improve the data base on pipe damping, provide experimental information for computer benchmarking, and evaluate the capacity and safety margins of piping designed to ASME rules.

Stiff Versus Flexible Piping. A reliability assessment of stiff versus flexible piping began in 1982 with cooperation from Duke Power. The work attempts to quantify how conservative seismic standards, which generally call for stiff piping and enhanced reliability against earthquakes, may also diminish its reliability during operating transients. The influences of design and NRC regulatory requirements, as well as the impact of snubber failure, on stiffness and reliability will be evaluated.

Pipe Program. This program was started in 1978 to study pipe whip and pipe impact requirements. Accomplishments in 1982 included completion of several projects: a draft report on the magnitude of steam/water flow from ruptured piping, a code (WIPS) for computing stresses resulting from various types of pipe impact conditions, and pipe-to-pipe impact tests to confirm adequacy of acceptance criteria. In 1983, the effort will be extended to evaluate the factor accounting for pipe-to-restraint rebound and to determine the hinge location of unrestrained ruptured pipes. Also, the WIPS code will be qualified for application in pipe-to-restraint studies.

Construction and Inservice Inspection Standards. NRC issued final and proposed amendments to update Section 50.55a, "Codes and Standards," of 10 CFR Part 50, incorporating the basic 1980 Code Edition as well as the addenda through the Winter 1981 addenda of the ASME Boiler and Pressure Vessel Code relating to nuclear power plant component design and inservice inspection.

Containment

Efforts concentrate on research to permit predicting the performance of containments under loadings beyond those for which they were designed. Both assessments of the risks posed by loads outside the design basis, such as hydrogen burns, and estimates of the effectiveness of proposed mitigative steps require an ability to predict how a containment will behave near failure. The work is part of the NRC Severe Accident Research Plan and treats three possible fail-

ure modes: (1) faulty valve operation, (2) materials failure in electrical penetrations due to high temperatures, and (3) failure of the containment structure due either to excessive local deformations at penetrations or to material failure. Reports were issued on the predicted response of containments to hydrogen burns (NUREG/CR-2897 and NUREG/CR-2898) and on options for performing experiments to determine containment capacity (NUREG/CR-2549). Models of steel containments, at a scale of about 1/30, were constructed, and experiments on these models are scheduled in 1983. A larger model, at about 1/10 in scale, will be fabricated and tested in 1983. A detailed program plan for experiments on the behavior of penetration seals, gaskets, and expansion bellows under severe accident conditions was initiated during the year.

Other containment research focused on the performance of reinforced concrete containments under seismic loads (two reports, NUREG/CR-2450 and NUREG/ CR-2451, were issued on this subject), the possibility of a buckling failure in steel containments, and evaluations of experience with measurements taken at nuclear plants under construction and in operation. Inservice inspection data on greased prestressing tendons were analyzed and published in NUREG/CR-2719. A review of reports of containment leak rate tests was begun to develop a basis for revising Appendix J to 10 CFR Part 50.

Research at Heissdampfreaktor (HDR). International cooperation continued at the HDR in Germany during 1982, with NRC funding dynamic tests of the steel containment and flood water storage tanks. The objective is to learn how dynamic structural parameters vary with levels and types of excitation. This will provide important information for designing reactor mechanical and electrical equipment. Results are expected in 1983.

Structural Research and Standards

Seismic Category I Structures. Work described in the *1981 NRC Annual Report* (see p. 119) continued in 1982 with the completion of small-scale 2-dimensional model tests defined in NUREG/CR-2347. Results will be published in 1983. The next phase has been modified to include testing of small-scale 3-dimensional structures, with the testing to start in 1983.

Concrete Anchors. The Hanford Engineering Development Laboratory submitted a draft report in September 1982 on a project to establish performance criteria (preload) that can be used in developing regulatory positions for the design, installation, and inservice inspection requirements for expansion anchor bolts.

Equipment Qualification

Safety and Relief Valves. The EPRI program of testing safety and relief valve capabilities was completed in 1982 (see *1981 NRC Annual Report*, p. 119). The NRC will review the test results and evaluate utility reports on plantspecific valve and piping systems and then identify codes and modeling techniques to confirm the adequacy of valves and piping and verify hydraulic load calculations.

Mechanical Equipment. An NRC research program was initiated in 1982 to provide technical bases for the confirmation of existing requirements and acceptance criteria for the dynamic (including seismic) and environmental qualification of mechanical equipment and the dynamic (including seismic) qualification of electrical equipment. This research will contribute to new industry standards for mechanical equipment qualification and to possible amendments to regulations.

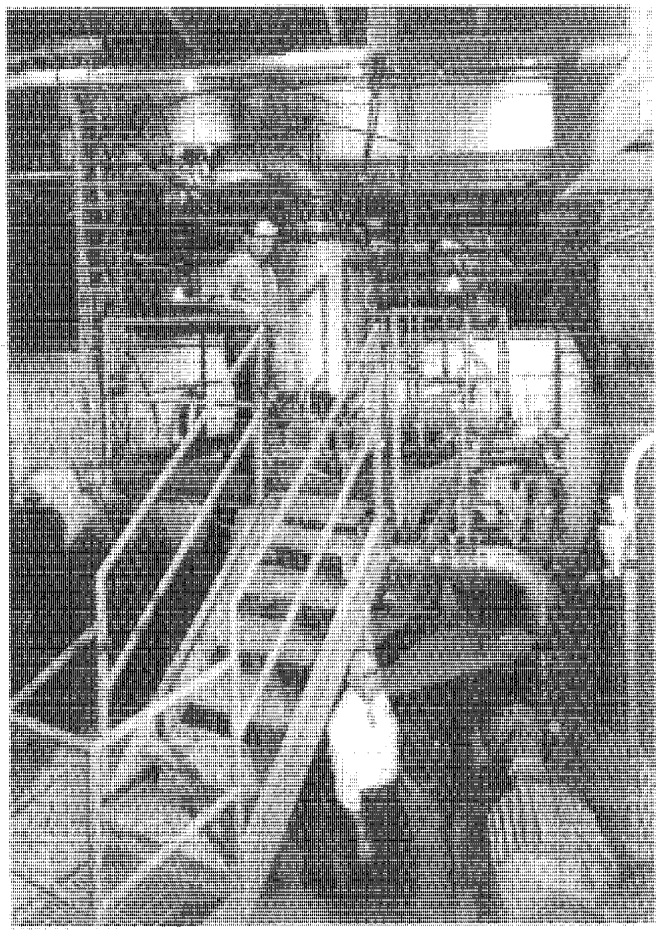
MATERIALS ENGINEERING

NRC's metallurgy and materials research program deals with the safety and serviceability of reactor pressure vessels, major piping, and steam generator tubing—components of a reactor's primary system. The program includes studies of fracture mechanics, operating environmental effects, and nondestructive examination techniques, and the development of guides and regulations covering them.

Fracture Mechanics

Fracture mechanics studies deal with phenomena such as thermal shock to reactor pressure vessels and earthquake and dynamic loadings on degraded piping, and with the development of methods for evaluating their impact.

Thermal Shock. The seventh thermal shock test at Oak Ridge National Laboratory (ORNL) (see *1981 NRC Annual Report*, p. 120) demonstrated that thermal stresses alone will not drive a crack through a pressure vessel wall. In 1982, plans were developed for three more thermal shock tests, and the material for these tests was procured. The eighth test, planned for early 1983, will investigate the behavior of relatively small flaws in reactor pressure walls and their propensity to "run long" when subjected to thermal shock. The ninth and tenth tests in the series will deal with the interaction of stainless steel vessel cladding and flaws of various shapes under thermal shock conditions. The first seven tests validated both the applicability of linear-elasticfracture-mechanics methodology and the efficiency of crack arrest and warm prestress under the thermal stresses



In 1982, plans for three more thermal shock tests in a continuing series at the Oak Ridge (Tenn.) National Laboratory's Thermal Shock facility were developed.

Seven tests have been run since the series began, with the last one indicating that thermal stresses alone will not crack a pressure vessel wall.

caused by large-break loss-of-coolant accidents. The next three tests will concentrate on the behavior of "real" geometry flaws under the same conditions.

Pressurized Thermal Shock. Under certain postulated accident conditions such as small-break loss-of-coolant accidents and main steam line breaches, among others, a reactor pressure vessel could experience cooling nearly as sudden as that caused by a large break, but without the loss of internal pressure. Researchers at ORNL continued to develop computer codes for use by NRC licensing reviewers in calculating heat transfer, thermal stress, and fracture mechanics for reactor pressure vessels and for probabilistic evaluations of vessel failure. Construction of the pressurized thermal shock test facility described in the *1981 NRC Annual Report* (p. 120) was undertaken in 1982, with completion planned for April 1983. The first test using the facility is planned for completion in September 1983. Two other tests will follow.

Elastic-Plastic Fracture Mechanics. Fracture of steel used in reactor pressure vessels and piping can occur brittlely, ductilely, or in combination. These phenomena and a wide variety of NRC research programs dealing with them have been described in detail over the past several years in NRC annual reports (see p. 229, 1979 report; p. 211, 1980 report; and p. 121, 1981 report).

In 1982, work continued at ORNL, David Taylor Naval Ship Research and Development Center, the U.S. Naval Academy, Materials Engineering Associates, and Battelle Columbus Laboratories on test techniques and data bases. Of particular note was the completion in 1982 of the Intermediate Test Vessel-8A experiment at ORNL. This experiment validated methodologies used in analyzing ductile tearing in thick-walled pressure vessels operating at reactor service temperatures. This work benefits NRC directly in license reviews in considerations such as reactor pressure vessel toughness, pressurized thermal shock, and leak-before-break in piping.

Fracture Toughness Requirements. In 1981, the NRC staff resolved the public comments that had been received on revisions to Appendix G, "Fracture Toughness Requirements," and Appendix H, "Reactor Vessel Material Surveillance Program Requirements," to 10 CFR Part 50 (see *1981 NRC Annual Report*, p. 120). Publication of the final rule is expected early in 1983.

Piping Fracture Mechanics. NRC's piping reliability programs on elasticplastic fracture mechanics analysis techniques, fracture toughness data base development, and degraded pipe tests (see *1981 NRC Annual Report*, p. 120) continued in 1982. Pipe tests completed at the David Taylor Naval Ship Research and Development Center in Annapolis, MD, validated the tearing instability concept for intermediate-sized structures. At Battelle Columbus Laboratories, new elastic-plastic fracture mechanics solutions were developed, and the next phase of piping research was scheduled to begin in 1983. It will deal with the capacity of degraded piping to withstand postulated accidents and transients and will evaluate further the suitability of elastic-plastic fracture mechanics techniques as predictive tools. At Lawrence Livermore National Laboratory, the computer code for determining the probability of pipe failures or leaks was validated against pipe cracking experience and was used to evaluate criteria for postulating pipe-break locations. In an effort to avoid costly duplication of work in this field, NRC eentered into several preliminary agreements with foreign research organizations to cooperate in piping research efforts.

Operating Environmental Effects

Work on environmental effects in 1982 included the following activities:

Irradiation Fracture Toughness and Dosimetry. Information is needed to be used in determining the maintenance of the structural integrity of operating pressure vessels under the unique environmental conditions found in nuclear power plants. These pressure vessels exhibit an aging phenomenon as a result of the reaction of the pressure vessel steel to the neutron fluence emanating from the reactor core. This phenomenon is characterized by a gradual reduction in the pressure vessel fracture toughness as time progresses. If this reduction in toughness were to become severe, a brittle fracture of the pressure vessel under postulated accident conditions would become a possibility. Research efforts to determine the relationship between fluence and reduction in fracture toughness has been under way for a number of years. Because of the time required to obtain irradiation effects, this program is part of a long-range effort. Significant accomplishments during 1982 included the attainment of fracture data for one type of pressure vessel steel as developed from an irradiated, full-thickness pressure vessel wall mockup, and the near completion of the study of the irradiation effect on the elastic-plastic fracture toughness for weld material typical of that found in some of our older reactor vessels. This work was carried out at ENSA, Inc., and at Materials Engineering Associates, Inc. A necessary part of determining the relationship between fluence and reduction in fracture toughness is the accurate measurement and experimental benchmarking of fluence calculational techniques. The NRC has been sponsoring this dosimetry work at ORNL, NBS, and the Hanford Engineering Development Laboratory and significant results have been achieved during 1982, reducing the uncertainty band in fluence calculations.

Environmentally Assisted Pipe Cracking. On the theory that high stresses, metallurgical condition, and the coolant environment under both normal and accident conditions can contribute to cracking of reactor pipes, the NRC in 1982 directed Argonne National Laboratory to begin new research on the effects of these variables on pipe cracking and on counter-measures.

Construction Standards. On April 13, 1982, NRC issued for public comment a proposed amendment to Section 50.55a, "Codes and Standards," of 10 CFR Part 50 dealing with the construction of nuclear power plants. The amendment would reference parts of the ASME Boiler and Pressure Vessel Code to include subsections for Classes 2 and 3 components that provide rules for the construction of certain safety systems and clarify existing regulations by removing obsolete provisions.

In April 1982, the NRC issued Revisions 19 to Guides 1.84 and 1.85, listing acceptable ASME Boiler and Pressure Vessel code cases and code cases annulled, revised, or reaffirmed since the inception of these guides. Revision 1 to Guide 1.147, listing another group of acceptable ASME Boiler and Pressure Vessel code cases, was issued in February 1982.

CHEMICAL ENGINEERING

NRC's chemical engineering research program covers a wide variety of research areas. Some of these are described in the summary that follows.

Decommissioning

The NRC continued to develop a decommissioning information base for lightwater reactors and other nuclear facilities in 1982, with five reports on decommissioning published during the year. They cover (1) nuclear research and test reactors (NUREG/CR-1756), (2) nuclear reactors at multiple-reactor stations (NUREG/CR-1755), (3) uranium hexafluoride conversion plants (NUREG/CR-1757), (4) termination surveys associated with decommissioning nuclear facilities (NUREG/CR-2241), and (5) evaluation of nuclear facility decommissioning projects (NUREG/CR-2522). Three other reports were nearing completion at year's end. Regulations concerning decommissioning and terminating licenses as well as a final generic environmental statement were still being developed.

NRC's continuing research projects to help develop decommissioning standards and guides produced an analysis of the measurements of radioactive contamination at the Pathfinder reactor in Sioux Falls, SD. Measurements of radioactive contamination at other LWR facilities were completed, and analysis of the samples was under way at year's end. Data needed to assess and evaluate methods, radiation exposure, and costs associated with decommissioning of retired nuclear facilities are being collected.

Spent Fuel Storage

Revision 4 to Guide 10.1, on compilation of reporting requirements for persons subject to NRC regulations, was issued in October 1981 to reflect the issuance of 10 CFR Part 72, "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation," as an effective rule. Minor amendments clarified the regulation in December 1981. Guide 3.48, providing the standard format and content for a safety analysis report for a dry storage independent spent fuel storage installa-

tion (ISFSI), and Guide 3.49, on the design of a water-basin-type ISFSI, were issued in October 1981 and December 1981, respectively. Guide 3.50, on preparing a license application to store spent fuel in an ISFSI, was issued in January 1982. A draft guide on the applicability of existing regulatory guides to the design and operation of an ISFSI was issued in November 1981, and the active guide (Guide 3.53) was issued in July 1982. Research was started to determine the effects of storing LWR fuel at an ISFSI in a dry environment at low temperatures. Both defective and intact BWR and PWR assemblies stored in both air and nonoxidizing atmospheres are being used.

Proposed Revision 2 to Guide 1.13, on the design basis for spent fuel storage facilities at nuclear power stations, was issued in December 1981. Research was completed on determining nuclide inventories and afterheats of LWR spent fuel to provide standardized information to applicants concerning longterm heat generation rates of power reactor spent fuel as a function of burnup and decay time.

Nuclear Criticality Safety

Revision 1 to Guide 3.1, on use of borosilicate-glass raschig rings as neutron absorbers in solutions of fissile material, was issued in January 1982.

Experiments to provide benchmark data on spent fuel storage, shipping configurations, and process geometries using low-enriched uranium oxide continued to provide data used to validate NRC methods of analyzing licensee criticality safety programs. Three reports (NUREG/CR-0796, Vol. 2, NUREG/CR-2709, and NUREG/CR-2500) evaluating criticality experiments with low-enriched uranium oxide were published in fiscal year 1982. A report (NUREG/CR-2223) evaluating the solid angle method used in nuclear criticality safety was also published.

Plant Safety

Guide 3.52, on standard format and content for the health and safety sections of license renewal applications for uranium fuel fabrication plants, was issued in July 1982. Proposed Revision 1 to Guide 3.15, on standard format and content of license applications for storage only of unirradiated reactor fuel and associated radioactive material, was issued in August 1982.

Effluent Treatment Systems

At the end of fiscal year 1982, measurements were nearing completion at the Brunswick Nuclear Generating Station in Southport, NC, to obtain radionuclide source term data for use with gaseous and liquid effluent models for LWR licensing. Similar measurements were completed at the Prairie Island Nuclear Generating Station in Red Wing, MN, and a report analyzing these results was being prepared for publication in 1983.

Hydrogen Control

In this program (see *1981 NRC Annual Report*, p. 122), means of preventing deflagrations and detonations and schemes for mitigating the effects of hydrogen burns in LWR plants are assessed. In 1982 such schemes as pre- and post-accident inerting, deliberate ignition coupled with water fogs and foams, and deliberate flaring of hydrogen from high point vents were being evaluated.

Fission Product Control

Most engineered-safety-feature (ESF) systems are likely to be functional for postulated accidents substantially more severe than current design basis accidents. However, there is a substantial variation in the effectiveness of fission product removal of various ESF systems under conditions exceeding their design basis. A program has been in progress to facilitate review and evaluation of fission product control systems behavior under severe accident conditions and in 1982 focused on collecting technical information and evaluating selected ESF systems.

ELECTRICAL ENGINEERING

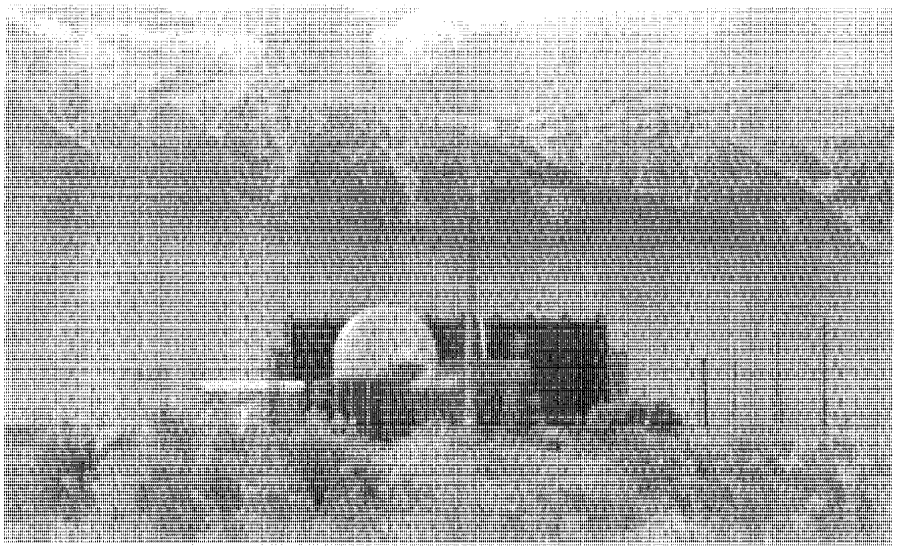
Qualification of Electric Equipment

A proposed rule, "Environmental Qualification of Electric Equipment for Nuclear Power Plants," was issued for public comment in January 1982. An ancillary regulatory guide (Revision 1 to Guide 1.89) was issued for public comment in February 1982.

Sandia National Laboratories continued its studies of accelerated aging, synergisms, and radiation effects in 1982 and expanded the research effort in qualification testing methodologies for specific kinds of equipment. The laboratory developed an interim code for calculating radiation levels at equipment locations in nuclear power plants. The tests in France continued as part of the joint U.S./French test series on the effects of oxygen depletion during LOCA qualification testing.

Plant Aging

NRC initiated a new, comprehensive aging program in 1982, with Sandia performing a scoping



The Loss-of-Fluid Test facility at DOE's Idaho National Engineering Laboratory has been the site of many NRC sponsored experiments simulating various types of reactor accidents. The NRC uses the results of LOFT tests to confirm, assess or improve computer codes used to predict nuclear plant behavior. A number of foreign nations also participate in the LOFT experiments.

study identifying plant aging mechanisms that may result in significant risks to public safety.

More than 300 persons participated in a workshop on nuclear power plant aging to assist NRC in developing the program. The participants included representatives from 75 utilities, various research and academic institutions, and national laboratories.

Fire Protection

Tests continued at Sandia for the purpose of providing an experimental basis for the requirements of separating the redundant trains of electric cables and equipment essential to safe shutdown. Research was also conducted to develop criteria for specifying design basis fires, detector locations, and extinguishing methods and substances and to develop a computer code to predict the progress of fires in nuclear power plants.

Accident Evaluation

EXPERIMENTAL PROGRAMS

NRC's experimental programs cover integral systems and separate effects tests needed to support the reactor licensing effort. The following sections describe this work.

Integral Systems Tests

The NRC has been the major source of support for the Loss-of-Fluid-Test (LOFT) and Semiscale PWR test facilities at the Idaho National Engineering Laboratory, although approximately 10 percent of LOFT support has come from foreign countries. Beginning early in 1983, the LOFT facility will be operated by DOE for a consortium of which NRC will be a member. A third facility—the Full Integral Simulation Test (FIST) BWR test facility—is supported almost equally by the NRC, the Electric Power Research Institute (EPRI), and the General Electric Company (GE).

LOFT. This is the largest-scale integral system used to simulate reactor accidents and the only such system powered by a nuclear core. Results from LOFT tests are used to assess and improve computer codes used by NRC and the nuclear industry to predict the behavior of commercial nuclear plants.

During 1982 the following tests were run in LOFT: (1) two anticipated transients without scram, the first initiated by a loss of feedwater, the second by a loss of off-site power; (2) a boron dilution operational transient; (3) six operational transients involving unexpected control rod withdrawal, recovery procedures in the event of a very small pipe break (including a steam generator tube rupture), and natural circulation in steam-water conditions; and (4) a large cold-leg break combined with a loss of off-site power, with a central bundle of prepressurized fuel. All test objectives were met.

As the year ended, plans for a final large-break LOCA test were being delayed to conform to the test schedule of the DOE-sponsored International LOFT Consortium.

Semiscale. During 1982, several tests and system hardware upgrades were completed on the Semiscale test facility. (For a description of the facility, see *1980 NRC Annual Report*, p. 198). The tests included scoping tests involving main steam line and feedwater line breaks, completion of an

intermediate-break series, and feed and bleed[1] cooldown of the primary coolant system following a loss of all feedwater. Studies were done to evaluate the feed and bleed test results against computer code predictions for the test, computer code predictions for a large PWR, and test results from previously performed LOFT loss-offeedwater tests. Another study on the issues and data needs involved in the 2 x 4 loop B&W PWR design examined the suitability of available test facilities for providing data on phenomena to be studied. The result was a task force to review the issues, data needs, and facilities and to determine which issues are essential from a licensing standpoint, as well as an economic standpoint, and which can be delayed. Modifications to Semiscale itself (so that it will more accurately represent a commercial PWR) included replacement of the intact loop primary system coolant pump and the primary coolant system pressurizer.

BWR FIST Facility. The FIST facility in San Jose, CA, is an upgrade of the two-loop test apparatus (see *1980 NRC Annual Report*, p. 199) to improve the simulation of various BWR transients. FIST, sponsored jointly by NRC, EPRI, and GE, is full height and uses a single, full-sized, electrically heated fuel bundle operating at typical BWR pressures and temperatures. During 1982, the facility was completed and shakedown tests begun.

BWR Countercurrent Flow Limit Refill/Reflood Program. This program was completed in 1982 with simulations of the late phases of a BWR LOCA transient and the production of code models for the BWR version of the TRAC code. (See the section on "Analytical Models.")

Separate Effects Experiments

NRC separate effects research continued at the FLECHT-SESET[2] facility shared with Westinghouse and EPRI. Acquisition of model development data for use in computer codes, the steam generator response study shared with Westinghouse and EPRI, and the international 2D/3D program were also part of the program.

FLECHT-SEASET. In 1982, a natural circulation system effects test facility was constructed to investigate single-phase, two-phase, and reflux natural circulation. Scheduled tests were completed, and the natural circulation data analysis will be completed early in 1983. Also completed were tests using a 163-rod blocked bundle to provide a data base for flow blockage and to assess the computer models for reflood. This ended all experiments carried out to address the steam cooling and flow blockage rule of Appendix K to 10 CFR Part 50. In addition, in 1983 a flow blockage model development task will be added to the program.

Thermal Fluid Mixing Tests. A joint EPRI/NRC program has been initiated to measure the degree of fluid mixing caused by the injection of emergency coolant into the reactor and to measure the vessel heat transfer to the thermally mixed fluid. Tests performed by Creare, Inc., in a 1/2-scale planar test section will produce data by October 1983 for use in developing and evaluating thermal fluid mixing and heat transfer models in response to the pressurized thermal shock question.

Model Development. Most NRC model development occurs at universities and is aimed at supplementing separate effects experiments, helping to interpret data from larger test programs, and developing correlations based on a new understanding of the phenomenology (see *1981 NRC Annual Report*, p. 124). In 1982 a new program at the University of Maryland was undertaken toward better understanding various system transients (loop oscillations, natural circulation interruption, etc.) common to Babcock and Wilcox reactors.

Steam Generator Response. A joint program involving NRC, Westinghouse, and EPRI was begun in 1982 to study the response of a large-scale steam generator to abnormal transient conditions. The facility to be used is the Westinghouse MB-2 steam generator, a full-height, 52-tube unit, complete with moisture separators and steam dryers. Tests will study heat transfer and fluid dynamics in main steam line breaks, steam generator tube ruptures, and loss-of-feedwater transients. The program is expected to produce data for upgrading the secondary side models used in the large PWR systems analysis computer codes.

2D/3D Program. The NRC has been participating in a joint research program with Germany and Japan since 1978 to study various aspects of PWR LOCAs. Germany and Japan build and operate test facilities while NRC furnishes advanced instrumentation and computer code analyses. The Japanese Atomic Energy Research Institute (JAERI) completed the forced-feed flooding test series in the Slab Core Test Facility. Preliminary analysis of the data indicates that the simulated reactor core with full height and full radius is effectively cooled and quenched even though the collapsed water level is below the top of the core. The radial variation in the power level is effectively mitigated by the cross flow between the core bundles, and temperatures and differential pressures in the reactor core are essentially uniform along the radial direction. In addi-

[1]Feed and bleed involves furnishing water to a PWR primary circuit using a high-pressure injection system combined with the relief of the primary circuit pressure by opening a power-operated relief valve.

[2]Full-Length Emergency Cooling heat Transfer-Separate Effects and System Effects Tests.

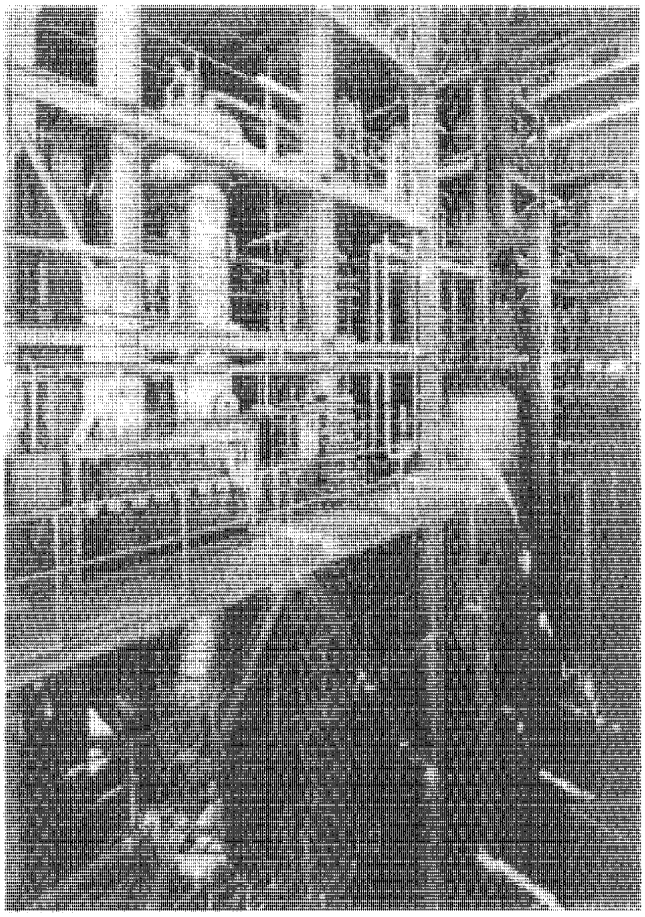
tion, the effect of partial (60%) flow blockage due to ballooning of fuel rods seems to be insignificant. The Federal Republic of Germany has started constructing the full-scale Upper Plenum Test Facility at Mannheim, planned for completion in September 1984. This facility will offer the opportunity to study, in full scale, de-entrainment of liquid in the upper plenum, ECC bypass, and the countercurrent flow limitation phenomenon in hot legs during small-break LOCAs.

FUEL BEHAVIOR RESEARCH

Severe Fuel Damage Program

In 1982, NRC's severe fuel damage program produced the initial results briefly described below.

Inpile PBF Test. The first inpile scoping test in the severe fuel damage (SFD) program was conducted in October 1982 in the Power Burst Facility (PBF) at the Idaho National Engineering Laboratory (INEL).



Under the 2D/3D program, the Japan Atomic Energy Research Institute built the Slab Core Test Facility shown here to study the full-scale ECC flow behavior in the radial and axial directions. This facility has 8 electrically-heated fuel bundles with about 2000 rods.

The objectives of the SFD scoping test were to measure hydrogen generation and the release of fission products, to characterize fuel and rod damage in terms of UO2 dissolution, relocation, and fragmentation, and to assess the coolability of a severely damaged test bundle.

A test bundle of 32 unirradiated PWR-design rods was subjected to a severe high-temperature transient similar to that which can occur with a continuous loss of coolant in the primary system. These conditions can uncover the core and overheat the exposed rods in high-pressure superheated steam. In this experiment, the bundle power was raised until a cladding surface temperature of 2400K (3840F) was reached. It appeared that much of the bundle remained intact, i.e., it had not collapsed into a rubble bed.

Severe Core Damage Analysis Package (SCDAP). The first version of a computer code (SCDAP) being developed at INEL was being assessed at year's end for its suitability to model the progression of core damage, including core heatup, core disruption and debris formation, debris heatup, and debris melting. In one assessment analyzing the TMI-2 accident, fuel melting was not predicted, even under the worst-case scenario.

Steam Explosions. During meetings held in May and June 1982 to discuss in-vessel steam explosions, the participants were unable to agree that in-vessel steam explosions leading to containment failure could be dismissed from further consideration. A plan to resolve the issue was being formulated at year's end.

Fission Product Release and Transport

This program develops models and obtains experimental data to determine the radiological source term that might be released from nuclear plants during severe accidents. It includes studies on radionuclide release from the fuel, its transport and depletion within the reactor coolant system, and its depletion within the containment vessel.

The research is used in developing reactor siting policy, emergency planning and response requirements, probabilistic risk assessment consequence calculational methods, and equipment qualification.

Fission Product Chemistry and Transport. The release of fission products at Three Mile Island Unit 2 was different from what would be predicted by licensing standards for siting reactors in that most of the iodine released during the accident appeared in the reactor coolant rather than in the containment atmosphere, and the tellurium release was notably small. Apparently there are significant mechanisms

that interrupt the transport of moderately volatile fission products within the reactor vessel after they have been released from the fuel.

NRC's high-temperature fission product chemistry and transport program at Sandia Laboratories develops data on the chemistry of fission products under accident conditions, including the collection of baseline thermodynamic and reactivity data for certain compounds of fission product elements. A facility is being built for the study of fission product chemistry in prototypic steam-hydrogen conditions. The interaction of fission products with reactor materials such as stainless steel will be examined in the new facility. Results will then be compared to the predictions of thermochemical models.

Fission Product Release. This ORNL program determines the magnitudes and chemical forms of fission products and aerosols released from commercial irradiated LWR fuel under elevated temperatures and conditions characteristic of severe fuel damage and core-melt accidents. Release rates over the temperature range of 1400 to 2400C will be measured. Fuel samples will include a range of heating rates and burnups. Three of the scheduled thirteen tests have been conducted, and measurements have been made at 1400, 1700, and 2000C in steam. The data indicate an increase in fission product release from 1400 to 1700C, but reach a constant value at 2000C.

TRAP-MELT. The TRAP-MELT verification test program was initiated at ORNL in April 1982 to conduct the tests needed concerning the deposition and transport of aerosols and fission products in severe accidents. Preliminary results from tests with iron oxide aerosols show that the rates of deposition and settling are significantly higher than predicted.

LOCA and Operational Transient Programs

Optran Tests. At the PBF in Idaho (see *1980 NRC Annual Report*, p. 203, and *1981 NRC Annual Report*, p. 125), the last two tests in the "4-year—40-test" program were completed. The first test simulated a BWR transient involving power peaks up to 350 kw/m over a 2-second time span (normal power levels are about 25 kw/m). The test used previously irradiated fuel rods. No rod leakage was detected. The second test involved a peak cladding surface temperature of 1070K over a 20-minute transient. The amount of cladding damage had not been determined at the end of the year, and the results of both tests were under study.

NRU Program. Two cladding ballooning tests (MT-3 and MT-4) and ten thermal-hydraulics tests were performed in the NRU reactor at Chalk River, Canada, using full-length 32-rod assemblies of nuclear-heated, commercially enriched fuel rods (see *1981 NRC Annual Report*, p. 125). Tests MT-3 and MT-4 were performed at nominal cladding rupture temperatures, but differed in heatup rates, to provide information on differences between ballooning caused by circumferential temperature gradients.

Multirod Burst Test (MRBT) Program. The final two cladding ballooning tests in the MRBT program (see *1981 NRC Annual Report*, p. 125) involved electrically heated 64-rod clusters from the same master lot of PWR Zircaloy cladding as was used in previous MRBT tests. The tests were performed at different cladding rupture temperatures.

Pellet-Cladding Interaction (PCI). Out-of-pile PCI experiments were performed at Battelle Pacific Northwest Laboratory using unirradiated cladding. Experiments using irradiated cladding are scheduled for 1983. In all such experiments, cladding deformation rates and magnitudes are monitored to provide data for use in calibrating a three-dimensional model. Related experiments at Argonne National Laboratory investigate deformation and fracture characteristics of cladding. Information from such tests is used to provide a failure criterion for cladding under specified loading conditions.

Fuel Code Assessment. Utility Associates International, under NRC contract, completed its acquisition, review, analysis, and processing of the EPRIsponsored power reactor fuel performance data to support subsequent evaluations of the FRAPCON fuel rod behavior code.

SEVERE ACCIDENT ASSESSMENT

Severe Accident Sequence Analysis (SASA) Program

The SASA research program focuses on possible sequences of events beyond design basis accidents to calculate how power reactors and operators can function in order to prevent or mitigate adverse consequences to both the plant and the public. Four national laboratories were involved in the SASA research program in 1982—Idaho, Los Alamos, Sandia, and Oak Ridge.

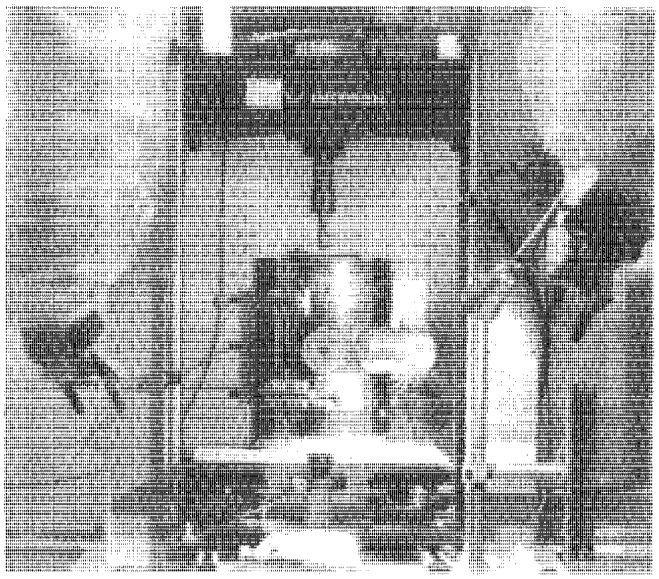
Three labs are investigating PWR accident sequences, with Los Alamos and Idaho analyzing the "front end" (up to core damage) and Sandia the "back end" (core damage through containment damage). Oak Ridge is focusing on BWR severe accident analyses, both front and back ends. Idaho is also considering BWR front-end transients using the RELAP5 code.

The Los Alamos program in 1982 included severe accident analyses for the B&W-designed Oconee plant and an analysis of decay heat removal. The Idaho program analyzes a severe accident involving the standardized Combustion Engineering (CE) CESSAR-80 plant design and the capability of CE plants to depressurize without power-operated relief valves. Oak Ridge is analyzing dominant severe accident sequences for the Browns Ferry Unit One BWR using a MARK I containment design. By the end of the year, studies had been completed on the small-break accidents for the Browns Ferry plant and pressure-suppression-pool modeling was in progress. Included in the completed portion was the work on fission product release and transport for the small-break sequence. Sandia was involved in a PWR containment management study. This study considers containment integrity and radiological consequences from severe accidents. The plants under study are Bellefonte (large dry containment), Watts Bar (ice condenser), and Surry (subatmospheric).

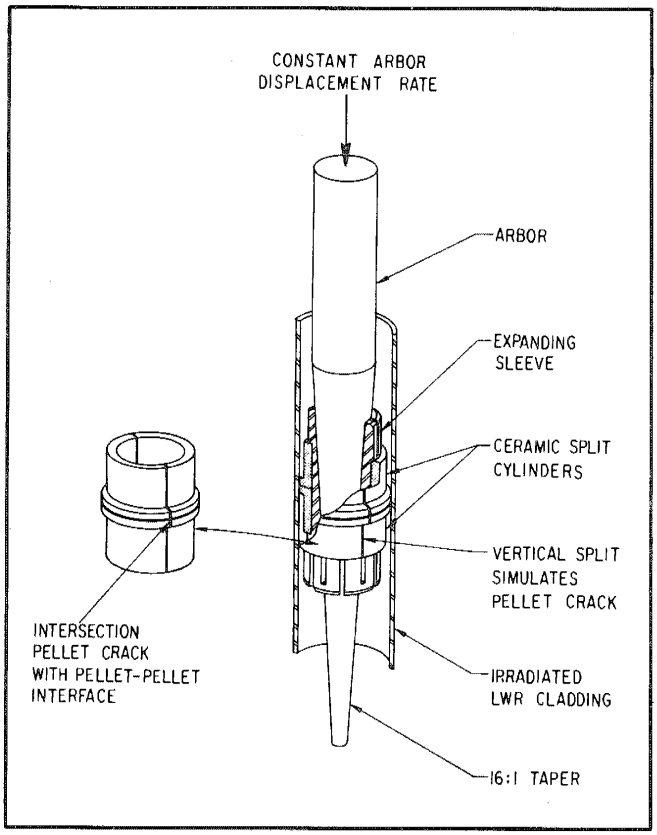
Hydrogen Program

The NRC hydrogen safety research program is aimed at assessing the threat posed by hydrogen burning in LWR containment buildings. This includes analysis of pressure and temperature loadings on the containment structure and on safety related equipment. The program includes experiments to better understand hydrogen combustion phenomena (e.g., flammability limits, flame acceleration, flame stability) and the development of analytical models to calculate these effects in containment. A significant body of work has been directed at assessing proposed mitigation schemes (deliberate ignition) and the need for and riskreduction benefits of advanced mitigation schemes (carbon dioxide inerting, water fogs or foams) or other systems.

In 1982 a new generic (to various containment types) hydrogen combustion code, HECTR, was developed and compared with several small-scale experiments. In 1983 it is expected that it will be further validated in a large-scale test at the Nevada Test Site sponsored by EPRI, the NRC, and several foreign governments. HECTR has been used in assessing the adequacy of the combustible gas control system at the Grand Gulf power station as part of the licensing review and is being used to assess the survivability of equipment for the Sequoyah plant. The latter application is one of providing informa-



NRC-sponsored pellet-cladding experiments were conducted at two laboratories during 1982. Shown here are two depictions of experiments at Argonne National Laboratory to study cladding deformation and fracture characteristics. The photo above shows the Instron testing machine used in mandrel loading tests of irradiated LWR cladding. The machine is installed in a low-level-radioactivity hot cell, and features — visible in this photo — two thermocouples to regulate specimen temperature, a flowmeter to regulate the flow of argon gas, a miniature floodlamp to illuminate the specimen, and, at top on either side, manipulator arms.



The schematic above shows the expanding mandrel used to mechanically stress the cladding. Two longitudinally split cylinders (left and in assembly) are mounted on the expanding steel sleeve to simulate a pellet-pellet interface intersected by a pellet crack. The small ridges at the interface simulate the hourglass geometry of a pellet after significant fuel burnup.

tion on the environment surrounding equipment during and after a burn. During 1983 several improvements are planned for the code and additional analysis will be performed to support regulatory actions.

Significant advancements toward a fuller understanding of the potential for flame acceleration and transition from deflagration to detonation were made in 1982. In 1983 this understanding of the phenomenon will be applied to research containment geometries—work that will be coupled with the advanced mitigation studies described above. In early 1983 a generic LWR hydrogen manual will also be published, with basic information on hydrogen behavior and control in LWRs, for use by operators and plant designers.

Core Melt Technology

The core melt technology program at Sandia features a large-capacity melt facility (200 to 500 kg of fuel and structural material). The facility features a complete redesign of the melt crucible and furnace geometry coupled with new temperature sensors to provide reliable spatial temperature distributions within the melt. Methods were developed for sustained heating of large melts and large thermite pours were made onto beds, with and without water present. The design and construction of equipment to study similar (but pressurized) pours was undertaken. Additional experiments to expand the data base on core-melt interactions will be conducted in 1983 at the Large-Melt Facility at Sandia.

A generic (all reactor types) computer program, CONTAIN, is being developed at Sandia to calculate the abnormal loads imposed on containments by severe accidents. The code considers all phenomena outside the primary system but within the containment complex and computes the character of the radiological source term in the event of containment failure. A draft user's manual was released in 1982, and tapes of the first version of the code have been given limited distribution for field testing.

Advanced Safety Technology

NRC's advanced safety technology research program (see *1981 NRC Annual Report*, pp. 128-131) on liquid metal fast breeder reactors (LMFBRs) and hightemperature gas-cooled reactors (HTGRs) produced the following results in 1982:

Liquid Metal Fast Breeder Reactors. Application of the COMMIX-1A code to in-vessel analysis of natural circulation tests in the Fast Flux Test Facility (FFTF) produced good agreement and substantial validation for the code. Invessel analyses of the Clinch River Breeder Reactor (CRBR) during natural circulation were being made at year's end. Brookhaven National Laboratory's Super System Code (SSC) simulates the thermal-hydraulic behavior of an entire nuclear plant. In 1982 the code was validated against data from the FFTF tests. The code was used extensively for review of the thermal-hydraulic performance and accident analysis of the CRBR licensing submittal. Los Alamos continued work on the SIMMER code in 1982 (see *1979 NRC Annual Report*, p. 234) with emphasis on evaluating accident consequences in the CRBR.

Two experiments on irradiated fuel disruption under LMFBR loss-of-flow (LOF) accident conditions were performed in the Annular Core Research Reactor at Sandia. These experiments are part of a 10-test matrix of a joint NRC/West German program. The NRC-sponsored experiments are for the LOF power histories of the CRBR heterogeneous core, and the German-sponsored experiments are for the LOF power histories of the German SNR-300 homogeneous core.

Tests on the chemical interactions between liquid sodium and different containment-type concretes showed that in some circumstances the reaction can be quite rapid. Although considerable understanding of the complicated chemistry involved has been developed, these interactions are not yet sufficiently understood for reliable prediction.

High-Temperature Gas-Cooled Reactors. In addition to its programs related to the Fort St. Vrain reactor in Colorado, NRC research has been addressing potential safety and licensing issues for a new generation of commercial HTGR plants defined by the industry in early 1982. NRC's most significant undertaking in this regard is the preliminary evaluation of siting source terms for an HTGR that will improve the staff's understanding of the likely siting suitability of a basically generic HTGR lead-plant design. The results of this study will be available in 1983 to form a basis for further research into safety margins for new generation HTGRs.

ANALYTICAL MODELS

Computer Codes

Best-estimate systems codes, component codes, and evaluation model computer codes provide three basic methods for analyzing nuclear power plant safety. Best-estimate systems codes offer a way to apply the results from reactor safety research to evaluations of accidents because their scope encompasses whole-reactor coolant systems. Component codes consider specific portions of a reactor coolant system, but in

greater detail. Evaluation model codes provide what are thought to be conservative analyses for use in independent audits of licensing calculations. All these codes assist in the resolution of licensing issues, and in 1982 that application was broadened as more was learned from the code improvement and assessment programs discussed below.

Code Improvement

In the area of the best-estimate codes, work continued on the following codes during fiscal year 1982: (1) TRAC-PF1/MOD1 is used to analyze system transients that require a complete simulation of PWR plant controls and balanceof-plant systems. It is also capable of analyzing LOCAs since it contains models similar to its predecessors, i.e., TRAC-PD2 and TRAC-PF1 codes. The development of the code will be completed early in 1983. (2) TRAC-BD1/MOD1 is used to analyze the same aspects of boiling water reactors. It will also be completed in 1983. (3) The COBRA-TF code analyzes flow blockage and rod-swelling effects upon the cooling of a fuel assembly. Development will be completed early in 1984. (4) The COBRA-CONTAINMENT code analyzes certain transient phenomena associated with steam/water blowdown into containment. Work started in fiscal year 1982. (5) The HMS code is designed to provide detailed best-estimate calculations for mixing hydrogen in containment. Work also started on this code in fiscal year 1982.

Code Assessment

Independent assessment of best-estimate systems codes provides information essential for evaluating margins of safety (see *1980 NRC Annual Report*, p. 206).

In 1982 the independent assessment of TRAC-PD2 was completed. This code is a large-break LOCA code with accurate calculational capability.

Assessment of TRAC-PF1, TRAC-BD1, and RELAP5/MOD1 codes continued during 1982 and will be completed in 1983.

Code Applications

TRAC-PWR codes (TRAC-PD2 and TRAC-PF1) and RELAP5/MOD1 code continued to address such licensing concerns as pumps on/off during small-break LOCAs, audit calculations for the Westinghouse RESAR-3S (Seabrook) and Babcock and Wilcox Midland plants, small-break LOCA recovery procedures in Babcock and Wilcox plants, and pressurized thermal shock. COBRA/TRAC was used again in 1982 to perform best-estimate calculations for a PWR equipped with an upper-headinjection system.

Risk Analysis

Since publication of the Reactor Safety Study (WASH-1400) in 1975, more than ten follow-on probabilistic assessments have been conducted on various U.S. plant designs and containments. These have ranged in scope from estimates of core melt probability to estimates of risks to the public. The NRC has recognized since 1975 that the probabilistic risk assessment (PRA) methodology had to be used with care because of the large uncertainties inherent in the analysis, and programs to enhance the PRA methodology have been carried on from the outset. While progress is being made and the program has provided useful insights on nuclear reactor safety, there remain significant uncertainties associated with the overall results of PRAs and there exists a wide spectrum of expert views on the capability of the PRA methodology to provide reliable estimates of the risk associated with the operation of nuclear reactors. The following sections provide a discussion of the 1982 activities to improve the PRA methodology.

RISK METHODOLOGY AND DATA DEVELOPMENT

During 1982, advances in risk methodology included the development of a means for evaluating plant operating procedures governing safety systems in both standby and operating phases and of methodologies for defining limiting conditions for operation and surveillance requirements, together with commoncause-failure screening. Case studies addressed the impact of plant shutdown on six operating plants. In addition, statistical techniques were expanded to include quantitative methods for handling uncertainty evaluations, including those for propagating uncertainties.

The NRC continued to analyze inplant maintenance/test data for reliability information on partial failures, failure causes, and time trends under a program designed to provide a detailed data base for specific pieces of plant equipment. Summaries of component failure data reported in licensee event reports (LERs) have been updated for pumps and valves. A data base covering a 5-year interval was developed for loss-of-coolant events. Failure mode, recovery actions, and consequences of these events are summarized.

REACTOR RISK

Interim Reliability Evaluation Program

Phase II of the Interim Reliability Evaluation Program (IREP) is nearing completion. (See *1980 NRC*

Annual Report, p. 219, for program description.) Reliability analyses of Arkansas Nuclear One Unit 1 and Browns Ferry Unit 1 were published in 1982, as were the procedures used in conducting these studies. The NRC expects to publish reports on the remaining two Phase II IREP studies by mid-1983. The results confirm earlier studies suggesting that transients and small loss-of-coolant accidents are important risk contributors. Also, support systems were found to contribute significantly to the sets of dominant accident sequences, either because of single failures that could disable one or more mitigating systems or because of their initiating plant transients. Human errors in response to accidents also were important risk contributors. It was found that consideration of operator recovery actions influences accident sequence frequency estimates, the list of accident sequences dominating core melt, and the set of dominant risk contributors. Accidents involving station blackout, reactor coolant pump seal leaks and ruptures, and loss-of-coolant accidents requiring manual initiation of coolant injection were found to be risk significant.

Under an NRC grant, the Institute of Electrical and Electronic Engineers and the American Nuclear Society coordinated the development of a procedures guide for probabilistic analysis of the safety of nuclear power plants. Early versions of this guide (NUREG/CR-2300) were issued for comment and peer review, and a final document reflecting the comments was published in 1982.

Risk Analysis Supporting Severe Accident Research Program

Three elements of the severe accident research program, described above, are accident sequence evaluations, computer code development including analysis of accident consequences to support risk assessment, and severe accident riskreduction analysis. These elements are described below:

Accident Sequence Evaluations. In 1982, NRC began to delineate generic light-water-reactor (LWR) accident sequences from several sources, including past risk assessments, the findings of the accident sequence precursor program, operational experience, and engineering judgments. The accident sequences will be used in evaluating nuclear safety and regulatory issues. Initially, the evaluations will be used as input to the severe accident research program to provide a basis for evaluating accident prevention and mitigation concepts as well as for performing value-impact assessments.

Computer Code Development to Support Risk Assessment. Work continued in 1982 on the development and application of computer codes used in risk studies to predict the physical processes occurring during severe LWR accidents. As a result of critical reviews of the MARCH code (released in 1980), work was undertaken to modify the code, and in late 1982 a revised version (MARCH-2) was released. This version more accurately models phenomena such as interactions between water and molten core materials and hydrogen combustion. In 1982, the NRC also released the computer code MATADOR, which is used with MARCH to predict the behavior (transport, deposition, etc.) of radioactive material in LWR containments.

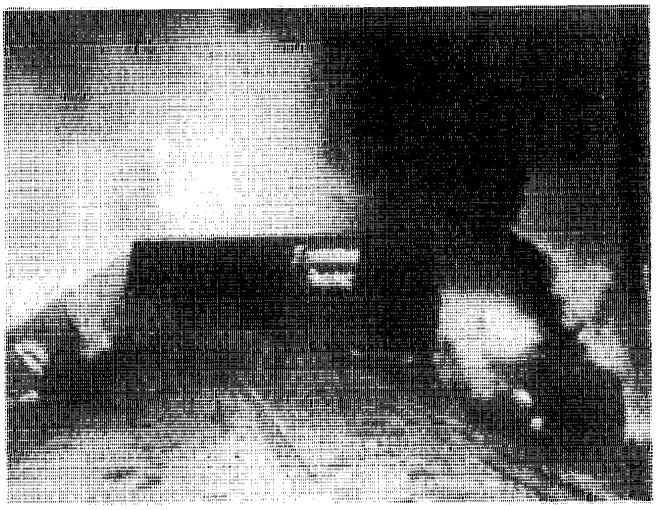
Accident Consequence Analysis. The NRC's computer code on Calculations of Reactor Accident Consequences, Version 2 (CRAC-2), was distributed worldwide in 1982, and a training course was conducted at Albuquerque, NM. CRAC-2 was used to calculate the consequences of a spectrum of accident scenarios at reactor sites in the United States. The results led to a better understanding of wide-ranging issues, including siting, emergency planning, safety goals, and the Price-Anderson Act. A critique of the health effects models used in CRAC-2 was completed at Harvard University, and a group of scientists was formed to revise the models. Studies of the potential benefit of improvised respiratory protection indicate that a common towel could reduce an inhalation dose by a factor of three to ten for 1-micron particles. An improved design for a dust mask bearing National Institute for Occupational Safety and Health (NIOSH) approval resulted from the latter research.

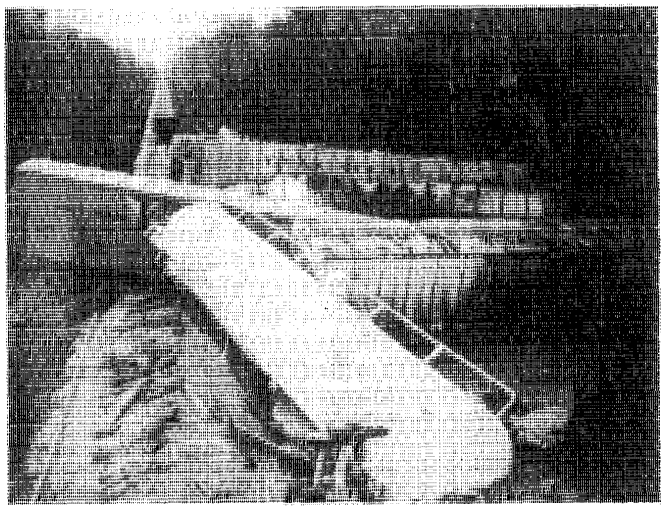
Severe Accident Risk-Reduction Analysis. During 1982, NRC's analysis of the value and cost of risk reduction associated with the prevention and mitigation of severe accidents continued in several areas. Studies of the value and impact of such features as filtered-vent containment systems and alternative decay heat removal systems were completed, and publication of the results is expected in early 1983.

Parallel to these studies of individual design features were value-impact studies of a broader spectrum of severe accident prevention and mitigation features. In this work, the results of the individual-feature analyses are being combined with studies of other features (and combinations of features) performing the same function. The first phase of this work, which provided an initial screening of the more promising features, was completed in 1982.

Precursor Analysis

Analysis of accident precursors was initiated as a result of a Lewis Committee finding that greater use should be made of operational experience data. In 1982, the Oak Ridge National Laboratory listed acci-





With the history of 175 very severe rail accidents and 500 accidents involving trucks as its statistical basis, the NRC continued its studies to determine the kinds of regulations it should adopt to govern the transportation of nuclear materials. Shown above are two examples of the rail accidents under study.

dents or incidents (taken from LERs for the years 1969-1979) considered significant to severe core damage risk. The report on the project describes the criteria used in selecting the LERs and shows how the selected LERs were then evaluated to determine the damage potential contribution by a method using event trees. The report indicates that the likelihood of severe core damage in that period may have been about ten times higher than that calculated in a "typical" risk analysis of a current (post-TMI) reactor. The accident precursor study is still under review and will be revised and improved in 1983.

Pressurized Thermal Shock

As part of its work on Unresolved Safety Issue A-49, "Pressurized Thermal Shock," the NRC began a study of the likelihood of reactor vessel failure due to overcooling transients and accidents. This probabilistic analysis of pressurized thermal shock at a representative pressurized water reactor will be completed in 1983.

TRANSPORTATION AND MATERIALS RISK

Transportation Safety Research

The transportation safety research program, as indicated in the *1981 NRC Annual Report* (see p. 132), continued toward its long-term objective of determining whether the modes of shipping radioactive materials should be governed by different sets of regulations.

As a basis for establishing such a determination, approximately 175 extremely severe rail accidents and 500 similar accidents involving trucks were analyzed. From these accidents, NRC may develop a set of package performance tests representing the environments associated with these occurrences. A similar process may be applied to marine and air transport modes.

Information obtained from research to establish a data base for assessing the potential consequences of explosive attacks on irradiated fuel shipments (see *1981 NRC Annual Report*, p. 132) provided the justification for a proposed rule change relaxing existing safeguards measures.

Under the shipping container structural integrity program, fracture toughness criteria for thick-wall steel and cast iron shipping containers were developed. These criteria will be the bases for a draft regulatory guide to be used in evaluating the integrity of such containers. A similar guide for thinwall steel containers was also developed.

Research undertaken in 1982 on criteria for fabricating shipping containers will continue through 1983 toward forming the bases for NRC positions on acceptable cask fabrication practices.

Fuel Cycle Risk Assessment

The NRC continued the effort to improve methods for determining the characteristics of radioactive material that could be released in fuel cycle facility accidents. The methods developed will be documented in a user-oriented accident analysis handbook that will include the step-by-step procedures for performing the evaluation and several illustrative examples.

Work in 1982 concentrated on accidents involving fires. Computer codes were developed specifying the characteristics of the aerosol generated by fire and the transport of the aerosol through ventilation systems to the environment. The codes are being compared with experimental data to assess their adequacy.

A report identifying the reference fuel cycles for non-reactor facilities and a literature search and computer compilation of existing risk and safety studies pertaining to these facilities were completed at year's end. This information was used in an assessment of risk methods from which the facilities can be ranked according to their risks to the public. This assessment, in turn, could be factored into appropriate studies to evaluate the value/impact of alternative regulatory actions toward minimizing both occupational and public risks from such facilities. An NRC staff peer review group continually reviews the products of this program.

Shipments Under General License

Since 1970, a general license to ship licensed radioactive material could be obtained as long as two conditions were met: (1) the shipment is made in packages that meet the standards of 10 CFR Part 71 and (2) the package is authorized for use by another licensee. One condition of the license—that requiring the user to have a copy of "...all documents referred to in the license"—was amended in 1982 to require only those documents relating to the use and maintenance of the packaging and to preshipment activities. The amendment should result in a substantial reduction in the number of documents without sacrificing safety.

Radioactive Consumer Products Reports

Licensed distributors of smoke detectors and other consumer products containing small quantities of radioactive material are required to report annually the numbers of products distributed. The requirement provides a means of collecting information about the extent of the use of products whose users have been exempted from regulatory controls. At the end of 1982, a rulemaking action was under way to reduce the administrative burdens of the requirement without significantly reducing the value of the reports.

REGULATORY ANALYSIS

The regulatory analysis program analyzes the output from the regulatory research program and, based on this analysis, identifies and implements regulation changes or changes in regulatory practice needed to improve safety or eliminate unnecessary regulatory constraints. Insights gained from regulatory analysis are used to assess the regulatory relevance of existing research and identify the need, if any, for additional research.

Improved procedures and methodologies are being developed to identify and weigh the costs and benefits of proposed regulatory actions, existing regulations are being systematically reviewed, and alternative regulatory approaches are being evaluated.

Facility Operations

HUMAN FACTORS

NRC's human factors research concentrates on human factors systems engineering, human reliability, plant procedures, and plant personnel staffing, training, and qualifications to support regulatory needs in applying human factors engineering to nuclear facilities. Key programs in 1982 included human engineering, quality assurance, and emergency preparedness research and standards, described below:

Human Engineering

Human factors publications issued during the year included, among others, recommendations on methods and practices of specifying and verifying performance characteristics of simulators (NUREG/CR-2353, Vol. II); a control room task analysis pilot study for pressurized water reactors (NUREG/CR-2598); a job analysis of the maintenance mechanic position for the nuclear power plant maintenance reliability model (NUREG/CR-2669) and of the maintenance mechanic and instrument and control technician supervisors (NUREG/CR-2668); a task analysis for operations technicians at independent spent fuel storage installations (NUREG/CR-2712); a feasibility study of using licensee event reports for a statistical assessment of the effect of overtime and shift work on operator error (NUREG-0872); a survey of methods for improving operator acceptance of computerized aids (NUREG/CR-2586); an initial quantification of the human error associated with specific instrument and control system components in licensed nuclear power plants (NUREG/CR-2416); a procedure for conducting a human reliability analysis for nuclear power plants (NUREG/CR-2254); an analysis of the critical human factors issues in nuclear power regulation and a recommended comprehensive human factors long-range plan developed by

the Human Factors Society (NUREG/CR-2833); and a study of advanced display system alarms (NUREG/CR-2776).

Two proposed regulations were issued for public comment during 1982. The first would require upgrading control room staffing requirements for licensed nuclear power plants. The second would require licensees to ensure that personnel with unescorted access to the protected area are fit for duty. A draft guide establishing training and certification guidelines for independent spent fuel storage installation operators was issued in March 1982.

Quality Assurance

Research and standards efforts in the area of quality assurance (QA) in 1982 continued to concentrate on improving regulatory criteria for establishing QA programs at nuclear facilities. These efforts included work on a final rule concerning the reporting of changes to QA programs for nuclear power plants, a proposed rule to clarify the relationship between Appendices A and B to 10 CFR Part 50 with respect to QA requirements, and an update of QA guidance for the design, construction, and operation of nuclear power plants.

The NRC completed a NASA/NRC interagency agreement to apply a Kennedy Space Center methodology of system analysis to a nuclear plant-specific safety system. The purposes are to determine whether the NASA methodology applies to nuclear power plant systems and to provide generic guidelines for nuclear safety/ reliability analyses, as appropriate.

During 1982, research addressing management performance appraisals of licensed nuclear power facilities produced an evaluation of performance appraisal reports and a proposal for improving the Systematic Assessment of Licensee Performance (SALP) management inspection process. Late in 1982 new research was begun to more clearly identify the nuclear power plant structures, systems, and components that are important to safety as an aid in developing guidance for applying graded QA program requirements.

Emergency Preparedness

NRC emergency preparedness research and standards activities aid in developing, upgrading, or clarifying regulatory guides and regulations for nuclear power plants and certain fuel cycle and material licensees.

In December 1981, the Commission published a proposed rule change that would clarify (1) that emergency preparedness exercises are part of pre-operational inspections and are thus required prior to operation above 5 percent of rated power, but are not required for a Licensing Board, Appeal Board, or Commission licensing decisions and (2) that, for issuance of operating licenses authorizing only fuel loading and low power operation (up to 5 percent of rated power), no NRC or Federal Emergency Management Agency (FEMA) review, findings, and determinations concerning the state or adequacy of offsite emergency preparedness are necessary. The final regulations were published on July 13, 1982. In December 1981, the Commission also proposed a rule change to Section 50.54 of 10 CFR Part 50 to implement the provisions of Section 201 of the NRC's 1980 Fiscal Year Authorization Act in light of the existing requirement that licensees notify the NRC of certain "significant events" specified in the NRC regulations. Under the proposed rule, every operating license for a nuclear power reactor would require that licensees immediately notify the NRC of any significant event set forth in Section 50.72 of 10 CFR Part 50. The NRC also proposed to clarify the list of reportable significant events in Section 50.72. In March 1982, the agency also issued a proposed Revision 1 to Guide 2.6, on emergency planning for research and test reactors.

INSTRUMENTATION AND CONTROL

NRC research in instrumentation and control evaluates the safety of plant control, protection, and other related systems; performance and failure modes of individual instruments and electrical system hardware; diagnostic needs and equipment capabilities; and technological advances in safety systems. Several research projects were started in 1982. At the Idaho National Engineering Laboratory (INEL), new efforts were initiated to assess the safety implications of using microprocessor-based safety systems, to determine and verify the performance requirements for isolation devices between safety and other systems and to develop the technical basis for related regulatory guides, and to evaluate currently available, online reactor coolant water radiation monitors and associated methodology for the early detection of failed fuel in operating reactors. At Brookhaven (BNL), a project was initiated to develop criteria and methodology to establish the technical basis for a regulatory guide on the graded classification of instrument and control systems important to safety. At Oak Ridge (ORNL), researchers undertook an evaluation of techniques for remote, in situ detection of changes in pressure measurement system response times.

Continuing research projects provided further insight into fundamental safety issues in 1982. (See *1981 NRC Annual Report*, p. 136.) The ORNL

study of the safety implications of control systems and plant dynamics produced a plant model of the Oconee Unit 1 reactor, the first of several such models. The related effort at Sandia identified computer codes suitable for evaluating the effects of failures in plant electrical systems. Another study at Sandia to evaluate alarm and annunciator systems was described in a report on the state of the art and methods for upgrading annunciator systems.

The project at INEL for plant instrumentation performance evaluation has produced a document to categorize and augment the requirements of Guide 1.97. The component assessment project at Sandia has issued a report on the use of terminal blocks in nuclear power plants.

In the ORNL project on noise surveillance and diagnostics techniques, a continuous noise measurement system was used for the first fuel load at the TVA Sequoyah Unit 1 reactor to obtain baseline noise signatures. Abnormal operating condition noise data from LOFT tests were also obtained for possible use in detecting anomalies at nuclear power plants.

Guide 1.68.3 on preoperational testing of instrument and control air systems was issued in March 1982. An effort has been initiated to prepare Revision 3 to Guide 1.97 on instrumentation needed following an accident. This revision will use technical input from the above-mentioned research on plant instrumentation performance evaluation.

OCCUPATIONAL RADIATION PROTECTION

Health Physics Measurements

A major goal of NRC's occupational radiation protection research program continues to be the improvement of health physics measurements that serve as the basis for determining worker exposure to radiation. In 1982 NRC signed an interagency agreement with the National Bureau of Standards (NBS) to develop an NBS National Voluntary Laboratory Accreditation Program for processors of personnel dosimeters. Placement of dosimeters to best determine head and extremity doses for occupationally exposed workers poses significant problems, and a research plan was developed to provide guidance to licensees on this matter.

A joint NRC/DOE contract for testing a standard for bioassay laboratory performance resulted in a detailed design for the initial, voluntary testing of a number of laboratories. To implement the program, the NBS provided radioactivity samples for use in the tests. A lung and a whole-body phantom (model) were developed to evaluate whole-body-counting capability.

A technical assistance contract with the Idaho National Engineering Laboratory for evaluating and improving radiological air sampling methods saw the completion during 1982 of a field testing program for personal (lapel) air samplers. A regulatory guide on the use and limitations of these devices will be developed reflecting the results of this research.

The NRC and DOE established a jointly funded and managed contract to study the capability of commercial health physics instruments to meet the requirements of a new draft ANSI standard on instrument performance. Design of the testing laboratory and test protocol had been accomplished by year's end.

Other research contracts were awarded to improve measurements of beta radiation, including studies of instrumentation, dosimetry, and field practices; to provide for the establishment of national beta-radiation standards; to determine the capabilities of health physics survey instruments to measure the dose equivalent index rate; and to characterize the low- and high-energy photon spectra at commercial nuclear plants. Neutron dosimeter response studies were performed at commercial nuclear plants and at the NBS. A report on neutron dosimeter performance at nuclear power plants was published as NUREG/CR-2233.

Radiation Protection Training and Personnel Qualifications

In September 1982 the NRC published a safety training manual entitled "Working Safely in Gamma Radiography" (NUREG/BR-0024) for use in the training of industrial radiographers. It includes chapters on the basic properties of radiation, radiation measuring instruments, special hazards of radiography, general health risks of radiation exposure, safe working practices, and factors that lead to accidents.

A draft guide on the qualifications for the radiation safety officer in a large-scale non-fuel-cycle radionuclide program was published in April 1982.

A technical assistance contract with Brookhaven National Laboratory was established to perform a job and skills analysis to improve the performance of nuclear reactor health physics technicians. The study is expected to assist the NRC staff in preparing guidance on developing and evaluating training programs for health physics technicians.

A draft report was prepared in 1982 on disease incidence rates from hazardous industrial substances other than radiation. It will be used in direct comparisons of radiation risks to similar occupational risks and to update guidance to licensees concerning the instruction of workers.

Respiratory Protection

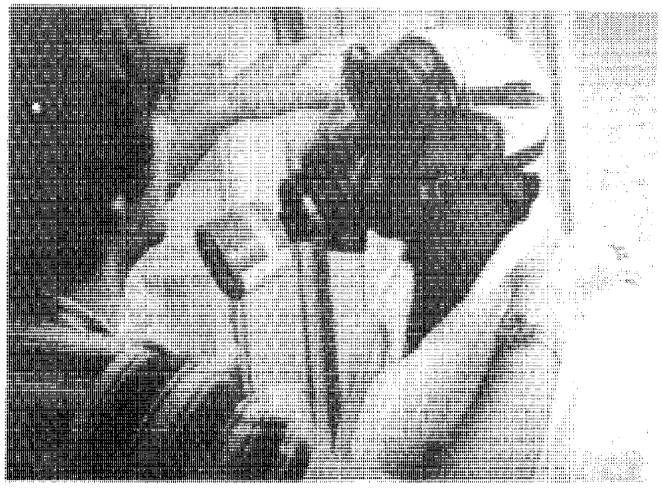
Manuals covering respiratory protection in emergencies were drafted for each affected type of licensee and for the most likely emergency situations. The Los Alamos National Laboratory assisted the NRC in evaluating the protection provided by several new devices, and a study plan was completed to evaluate the protection provided by the respirators worn in the workplace. Other work included the transfer of instrumentation, an instruction manual, and relevant acceptance criteria to the National Institute for Occupational Safety and Health to enable them to test and certify, for NRC, sorbent canisters for protection against radioiodines.

Licensing Guidance

Proposed Revision 1 to Guide 10.9, on preparing applications for licenses to use gamma irradiators, was issued in April 1982. The revision provides additional information to licensees on how to improve fire protection programs and shielding-water chemistry to avoid problems unique to the presence of intense radioactive sources in a pool-storage-type gamma irradiator.

Certification of Industrial Radiographers

An advance notice of proposed rulemaking was published and a series of public meetings were conducted on the certification of industrial radiographers. A literature review of occupational licensing applied to industrial radiography was published (NUREG/CR-2088).



A worker has his respirator checked for fit and operability before entering a hazardous environment. Work performed for NRC by the Los Alamos National Laboratory helps assure that this equipment will provide the best possible protection.

Radiation Protection and ALARA Implementation

A revised proposed Revision 4 to Guide 8.8, containing information relevant to ensuring that occupational radiation exposures at nuclear power plants will be as low as is reasonably achievable, was issued in May 1982. This proposed revision incorporates numerous new references intended to assist licensees in improving their radiation protection programs.

SAFEGUARDS

Discussion of research and standards activities in safeguards is found in Chapter 5, "Domestic Safeguards."

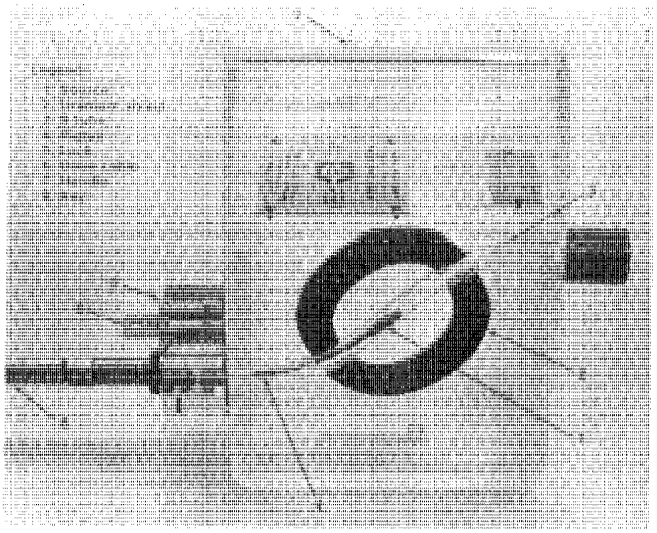
Siting, Health, and Waste Management

SITING AND ENVIRONMENT

Activities in NRC's siting and environmental research program during 1982 included the following:

Site Safety

Technical support work for the rulemaking on Reactor Siting Criteria (see *1980 NRC Annual Report*,



As part of its new Safety Training Manual for Industrial Radiographers, NRC published this demonstration model of a portable gamma radiography camera.

p. 186) continued in 1982, but, because revised source-term estimates are being developed and the safety goal is entering an evaluation period, all work has ceased to await completion of the preliminary safety goal. Two technical reports were published and three were nearing completion to document the work completed.

As part of the technical support work for the siting rule, research was conducted to assess the possibility of establishing standoff distances from nuclear power plants to certain man-related activities. Reports nearing completion evaluate the hazards of aircraft to nuclear power plants, accidents involving hazardous materials, and dam failures. Research also continued on postlicensing population density and land-use changes in the vicinity of nuclear power plant sites to aid in the forecasting of small-area demographic and land-use changes.

A research program initiated in 1982 deals with the significance of aquatic biofouling problems in safety-related and fire protection systems that circulate raw cooling water at nuclear power plants.

Socioeconomic Impact

A study is under way to provide guidance on the most cost-effective means of developing or improving methods of estimating the socioeconomic impacts of nuclear power plants. An effort is also under way to transfer NRC's "State Level Electricity Demand" forecasting model to the States to assist them in developing their own demand forecasting capabilities.

Other new activities in this area included work to revise the CONCEPT/OMCOST code, which estimates capital and nonfuel operating costs of nuclear power plants by incorporating the effects of new TMI-related safety regulations, and a study to develop methods for placing environmental impacts in a cost-benefit framework and thereby to improve the accuracy of NRC's cost-benefit analyses and financial reviews.

Impacts On Aquatic Resources

Two annual reports (NUREG-0423 and -2674) and five topical reports (NUREG/ CR-1830, -2230, -2553, -2562, and -2563) were published in 1982 on two completed Oak Ridge aquatic projects. The reports provide the staff with analytical methods and computer codes for evaluating the cost/benefit impacts of power plants on aquatic organisms. The University of Washington published two related reports (NUREG/CR-2436 and -2624) on modeling aquatic ecosystems in order to provide better predictive tools for assessing potential power plant impacts.

Environmental Radiation Standards

Guide 3.51 for calculating the radiation dose from airborne effluents released from uranium mills was issued in March 1982. Also issued was a technical report (NUREG-0859) specifying licensing procedures and schedules for evaluating compliance with the environmental radiation standards established by the Environmental Protection Agency in 40 CFR Part 190.

Proposed revisions to Subpart E of 10 CFR Part 140 that revise the criteria for an extraordinary nuclear occurrence (ENO) determination were developed and presented to the Commission.[3] These criteria would reduce the dose criterion for "substantial releases" from 20 rem to 5 rem, making them consistent with proposed Protective Action Guides issued by the Environmental Protection Agency and the Food and Drug Administration. The requirement for "objective clinical evidence of radiation injury" would also be eliminated. Instead, a "population dose criterion" would be employed as a surrogate for radiation injury. In addition, the types of damages considered would be restricted to those that are readily enumerated. At the end of the year, the Commission had the proposed revision under review.

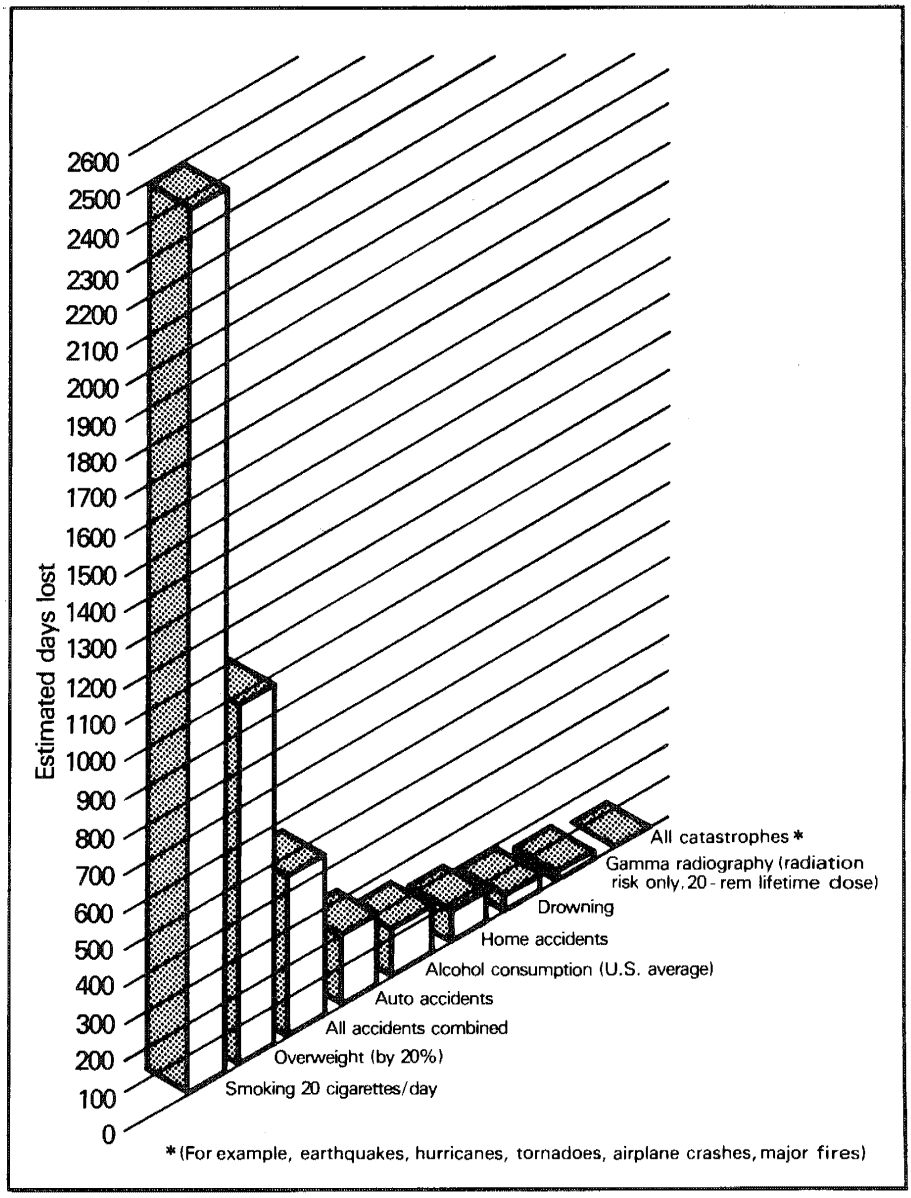
HEALTH EFFECTS

The NRC health effects research program includes research on radionuclide metabolism, dosimetry, and health effects to obtain data required for more accurate risk assessments and for the development of standards to ensure that NRC regulations protect the public and workers from ionizing radiation and radioactive materials produced or used by NRC licensees. Major activities in 1982 are described below:

Radionuclide Metabolism

A final report (NUREG/CR-2268) on studies of the metabolism and toxicology of uranium hexafluoride (UF6) and its hydrolysis products was published. It describes numerous experiments using rats and dogs exposed by inhalation, injection, and intratracheal instillation that provided biological data necessary for establishing a bioassay program for workers exposed to UF6. While additional studies are needed,

[3]An extraordinary nuclear occurrence (ENO) is a term used to indicate a nuclear accident that results in both substantial releases of radioactive materials and substantial damage to property and/or injury to members of the general public. Whether a nuclear accident can be considered to be an extraordinary nuclear occurrence is determined by the NRC according to predetermined criteria contained in the Commission's regulations.



The risks faced by workers in such nuclear-related activity as industrial radiography are compared on this graph to other common risks. The bar-graph is taken from the new NRC Safety Training Manual for Industrial Radiographers.

the use of urinary glucose, along with, or instead of, urinary protein appeared most advantageous for evaluating worker exposures.

Continuing projects during 1982 included radiation dose pattern studies in animals exposed to mixed oxides and yellowcake products; followup studies of uranium mill workers to determine the biological half-life of uranium in the lung; and metabolic studies with monkeys to complete the biologic models for the early elimination and transfer rates of strontium and americium.

Dosimetry

Exposure protocols were completed in the study of large populations of mice to determine the relative biological effectiveness of neutrons for inducing cancer and changes in genetic cells that occur at various occupational exposure levels (see *1981 NRC Annual Report*, p. 139). The mice will live out their normal life-spans so that survival times and tumor incidences can be determined. Most of the genetic testing has been completed and the analysis of the data is under way.

Health Effects Risk Assessments

The Argonne National Laboratory, under NRC contract, developed a Simulation Package for Assessing Health Risks (SPAHR), which is a demographic model capable of performing health risk projections for populations living in or near areas of possible radioactive and nonradioactive effluents. The model il-

lustrates that the interaction of such factors as age at the time of exposure, competing risks from other causes of death, and fertility patterns, as well as other demographic considerations, are important ir predicting future levels of excess mortality and morbidity from various pollutants. The program will allow more detailed, site-specific calculations to be made for radiological risk assessments at individual reactors.

Radiation Protection Standards

The NRC staff has been developing a major revision of the Commission's basic radiation protection standards (10 CFR Part 20) (see *1981 NRC Annual Report*, p. 140). The revision would implement certain recommendations contained in the International Commission on Radiological Protection (ICRP) Publication 26, would update the annual limits of intake and derived air concentrations of radionuclides based on data in ICRP Publications 30 and 32, and would reflect developments in the principles that underlie radiation protection and recent advances in related sciences. Publication of a formal notice of proposed rulemaking is anticipated in 1983.

Medical Radiation Protection Standards

The NRC in 1982 initiated a major revision of its regulations governing human uses of byproduct material (10 CFR Part 35) toward simplifying the licensing process for medical uses of radioisotopes, clarifying and consolidating medical regulatory requirements, and improving quality assurance and records management in the medical industry. The agency also amended its present Part 35 regulation to change the name, function, and membership of the former Medical Isotopes Committee. The name has been changed to Radiation Safety Committee and the function of the committee changed to delete the medical review of proposals and to emphasize the radiation safety aspects. The new Radiation Safety Committee will consist of at least (1) an authorized user for each type of use permitted by the license, (2) a representative of the hospital nursing staff, (3) a representative of the hospital management, and (4) the hospital radiation safety officer. Also published during the year was a proposed regulation to permit the exception from certain regulatory requirements for the use of Tc-99m pentetate sodium as an aerosol for lung function studies.

WASTE MANAGEMENT

NRC's waste management research assesses, tests, and improves measurement and prediction methods; confirms data bases; and develops regulatory standards to support the licensing of facilities and methods for the disposal and management of high-level nuclear wastes, low-level wastes, and wastes from uranium recovery operations.

High-Level Waste

High-Level Waste

The NRC's high-level-waste (HLW) research program involved studies to assess the performance of proposed waste forms, container materials, and engineered barriers and to assess the capability of hydrological and geochemical processes to control radionuclide release. In 1982, work on the development of technical criteria for HLW repositories through rulemaking (Subpart E of 10 CFR Part 60) continued, and a major effort was begun to predict the long-term behavior of both waste forms and waste containers. This was supplemented by a second effort directed specifically at titanium alloy containers.

Work on developing geochemical information used to predict the behavior of radionuclides that may escape the waste packages included the study of the mineral chemistry of backfill and of the radionuclide movement in host rock and other studies of geomechanics and hydrology. These efforts were aimed at determining uncertainties in risk assessment and long-term collective dose effects.

Low-Level Waste

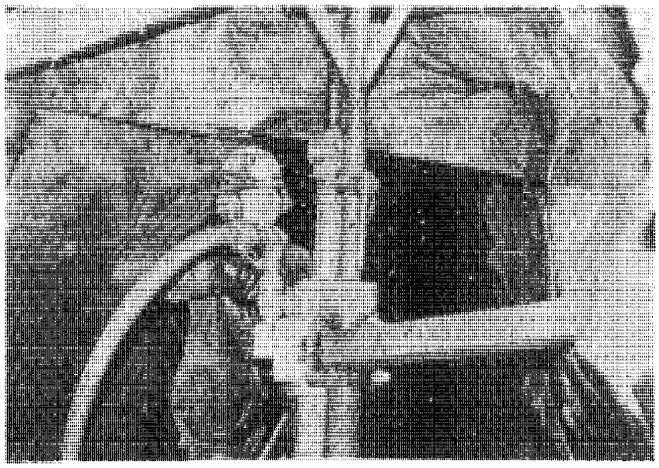
Under the NRC's low-level-waste (LLW) research program, projects relating to the chemical and mechanical stability of low-level wastes and a specialized project to provide the basis for a regulatory guide on management of low-level wastes were continued. New projects in 1982 addressed the solidification and disposal of wastes from the normal operation of nuclear power plants and from the decontamination of reactor components, with emphasis on maintaining the mechanical and chemical stability of the waste form. Activities were also under way at year's end to study the mobility of various radionuclides associated with low-level wastes and to improve models for predicting pathways for their potential migration to man.

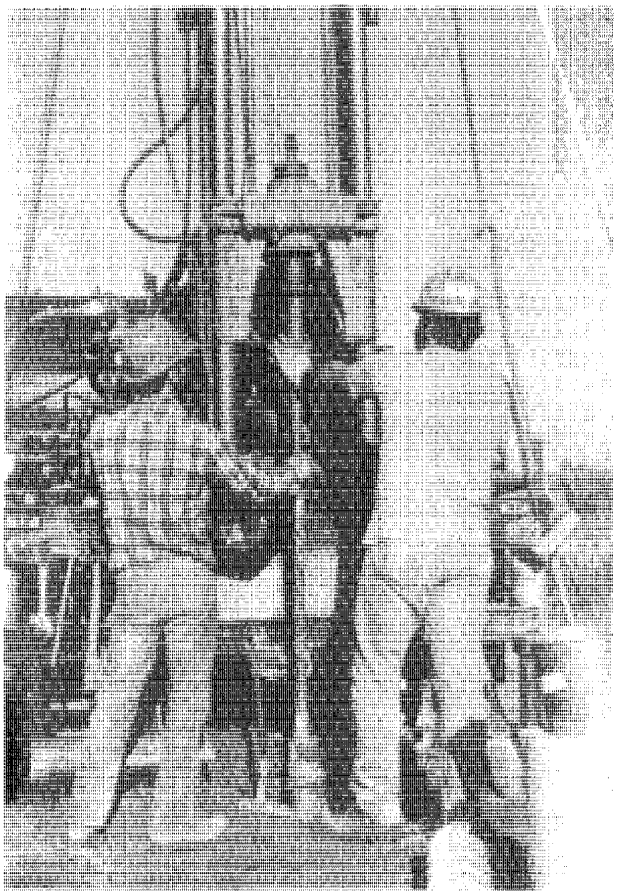
Efforts continued on the management of LLW sites, including work on trench cap design, on the statistics of monitoring radionuclide migration, and on research related to the behavior of radionuclides in existing LLW sites such as Maxey Flats, KY.

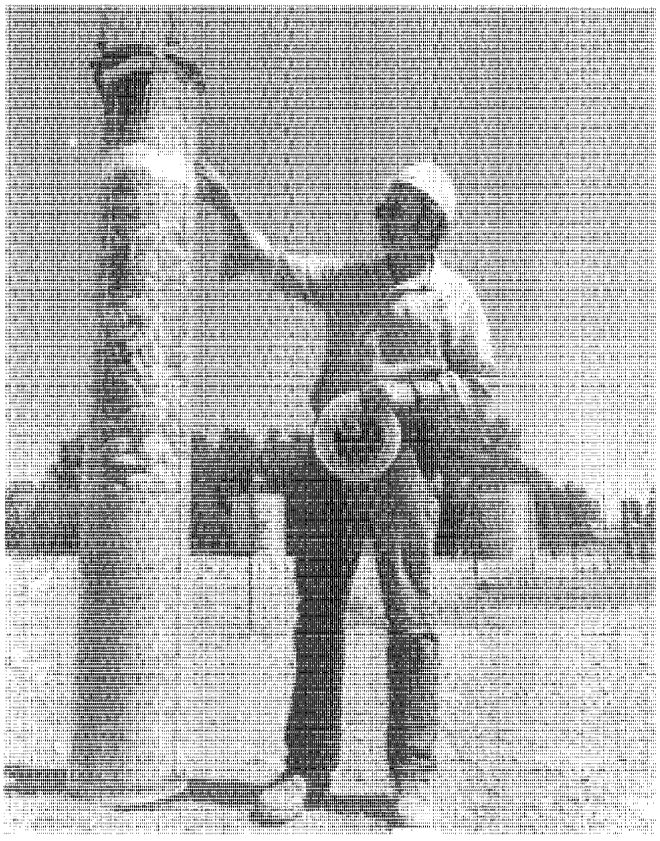
Uranium Recovery

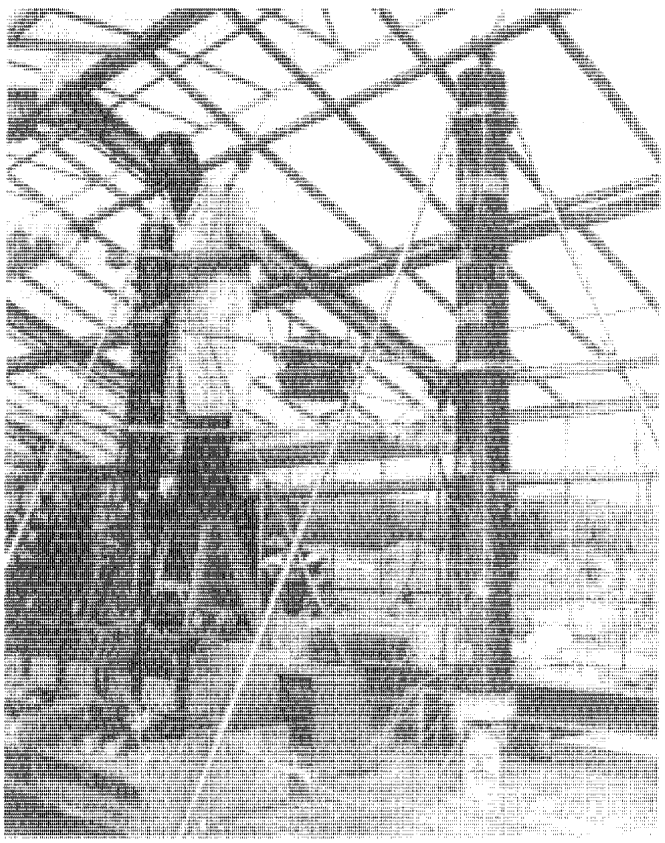
Uranium Recovery

Major activities in NRC's uranium recovery research program in 1982 included studies on the installation of riprap ("rock armor") and other materi-









Some indication of the extent of NRC-sponsored research in the field of waste management and disposal is given above. At top left, drilling operations are being carried out in a mine in the Patagonia Mountains of Arizona. The work is being conducted by the University of Arizona to study unsaturated zones for possible use for high-level waste storage. At top right, a researcher at the Los Alamos National Laboratory examines a lysimeter in which clay and cobbles have been placed to test their effectiveness in capping off low-level waste disposal trenches against root or rodent penetration. Bottom right is another Los Alamos low-level waste study to determine the chemical changes that can occur as water from a low-level disposal trench passes through the soil. Lower left shows drilling operations funded by NRC at West Valley, N.Y., as part of hydrogeologic investigations and monitoring of the NRC-licensed waste burial area.

als for long-term protection of stabilized tailings; tailings dewatering technology; the possibility of immobilizing radionuclides in tailings by neutralization; interim stabilization of tailings retention systems; and the efficacy of using covers for radon containment in tailings. Other studies addressed underground leachate movements and the behavior of leaching solutions during in situ solution mining. The studies showed that, for solution mining, it is important not only to avoid contaminating aquifers with leaching solutions but also to treat the depleted ore body to eliminate toxic compounds and, to the extent possible, to restore the conditions of the ore zone to its undisturbed state.

EARTH SCIENCES

Geology and Seismology

During 1982 the NRC research program in geology and seismology was assessed in detail and redirected. The three principal geologic and seismologic contributors to uncertainty in seismic hazard analysis are the seismic zoning (location and magnitude of earthquakes), attenuation of seismic waves, and sitespecific response. The redirected seismology program addresses seismic zoning through seismic networks and places new emphasis on understanding earthquake source parameters, propagation characteristics, strong ground motion, and sitespecific spectra studies. The geology program addresses the problem of seismic zoning through neotectonic studies addressing the causes of seismicity in the eastern United States.

Two very significant earthquakes—one near Miramichi, New Brunswick, and the other near Gaza, NH—occurred in January 1982. These will add considerably to knowledge of strong ground motion in the East. Both earthquakes and their aftershock sequences produced a suite of strong motion records with high accelerations (some in excess of 0.5g) at moderate-to-high frequencies (15-to-20 Hz). Little damage was caused by the earthquakes. However, the data will have significant impact on the problem of "effective" acceleration in that there is presently uncertainty as to whether maximum peak acceleration is the best predictor of damage to nuclear power plants.

A seismic hazard characterization program for the eastern United States was initiated. This probabilistic study is a spinoff from the systematic evaluation program and seismic safety margins research program.

As a result of these and other research programs, reports were published concerning the regional geology of New England and the New Madrid region, and concerning earthquakes in other parts of the eastern United States.

Hydrology

The research program provides information to develop more realistic hydrologic models for facility siting. The research efforts to study unsaturated flow and transport through fractured rock, to monitor hurricane surges along the Florida coast (NUREG/CR-2555), and to study the hydrologic and geologic phenomena affecting radionuclide transport at West Valley, NY (NUREG/CR-2381 and NUREG/CR-2862) have all shown steady progress. (See *1981 NRC Annual Report*, p. 141.)

In research related to reactor licensing, an evaluation of ultimate heat sink cooling pond models was started. Guidelines for identifying cooling pond design flaws will be provided. Another study was undertaken to evaluate hydrogeologic siting factors with respect to ground-water interdictive techniques that might be necessary in the event of a severe accident.

Meteorology

Under NRC's atmospheric sciences research program to provide information for the evaluation of dispersion models, the NRC sponsored the Shoreline Environment Atmospheric Dispersion Experiment (SEADEX) between May 28 and June 8, 1982, on the shore of Lake Michigan in northeastern Wisconsin. Nine tests involving releases of tracer material over periods of four to nine hours were made, and the tracer plume pathways were monitored by ground samplers, radar-tracked balloons, and laser-equipped aircraft. The data collected are currently being evaluated. Other reports on research programs concerned meteorological aspects of emergency response planning, dispersion of effluents, extreme snow and ice loads, occurrence of extreme winds, and tornadoes and waterspouts.

IAEA REACTOR SAFETY STANDARDS

The NRC continued to coordinate U.S. technical activities associated with the IAEA Nuclear Safety Standards (NUSS) program to develop safety codes of practice and safety guides for nuclear power plants. The codes and guides provide a basis for national regulation by developing countries of the design, construction, and operation of these plants. In 1982, three safety guides were forwarded through the Senior Advisory Group and Technical Review Committees to the Director General of the IAEA. Working groups prepared two draft guides and some 55 of the 56 planned IAEA safety guides were undergoing review at year's end with the NRC research staff coordinating the reviews within the U.S. (see *1980 NRC Annual Report*, p. 196.)

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Proceedings and Litigation

As part of its 1982 effort to improve the licensing process the Nuclear Regulatory Commission adopted several rules regarding the scope of operating license proceedings. On March 26, the Commission published an amendment to its rules of practice which provided that, for National Environmental Policy Act (NEPA) purposes, need for power and alternative energy source issues would no longer be considered. Under the Commission's NEPA responsibilities, these issues are resolved in the construction permit proceeding. The Commission also determined that consideration of these issues would be unlikely to alter the NEPA cost-benefit balance at the operating license stage.

On March 31, the Commission modified its regulations to eliminate review of the financial qualifications of utilities applying for construction permits or operating licenses for production or utilization facilities (primarily nuclear power plants). This action was taken because there was no demonstrable link between public health and safety concerns and a utility's ability to make the requisite financial showing. The Commission was considering rules regarding the financing of decommissioning such facilities in a generic decommissioning rulemaking at year's end.

On July 13, the Commission amended its regulations to make clear that the review of offsite emergency preparedness plans and the conduct of emergency preparedness exercises would not be required before a license is issued to load fuel and conduct low-power tests at power reactors. The rule change was warranted by the low risk of low-power operations, the advantage of conducting such exercises when plant operating procedures and staffing are closer to completion, and the continued review of onsite emergency preparedness prior to the issuance of a low-power license.

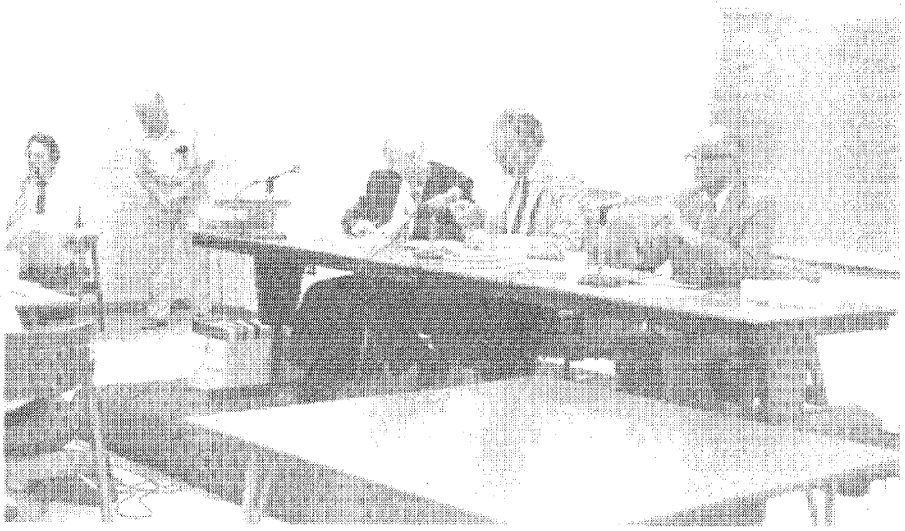
ATOMIC SAFETY AND LICENSING BOARD PANEL

The Atomic Energy Act of 1954 requires a public hearing on every application for a construction permit for a nuclear power plant or related facility. The opportunity for a public hearing also occurs prior to issuance of an operating license or license amendment. Boards composed of three administrative judges drawn from the Atomic Safety and Licensing Board Panel (ASLBP) perform the Commission's hearing function and render initial decisions on a variety of licensing and enforcement matters. The hearings are the Commission's principal public forum for individuals and organizations to voice their interest in a particular licensing or enforcement issue before an independent tribunal.

Prior to issuing a construction permit the NRC also must determine whether the activities licensed by it would create or maintain a situation inconsistent with antitrust laws, and a hearing is provided in these cases, as well.

On September 30, 1982, the ASLBP included 24 permanent and 32 part-time administrative judges drawn from various professions. There were 20 lawyers, 17 environmental scientists, 9 engineers, 7 physicists, 1 medical doctor, 1 economist and 1 chemist. (See Appendix 2 for the names of board members.) Assignment to a licensing board depends on the issues involved in the proceeding and the experience, achievement and independ of the judges. A board generally consists of a lawyer-chairman, a nuclear engineer or reactor physicist and an environmental scientist.

The hearing on a particular application for a nuclear facility license may be divided into two phases—one concerning the health, safety, common defense and security aspects of the application, as re-



Boards drawn from the NRC's independent Atomic Safety and Licensing Board Panel (ASLBP), conducted some 346 days of hearings in 1982, including 68 days of prehearing conferences. Shown here is a licensing board in action during a prehearing conference on the Clinch River Breeder Reactor. The conference was held at Oak Ridge, Tenn., in August 1982.

quired by the Atomic Energy Act; the other concerning the environmental considerations required by the National Environmental Policy Act (NEPA). There also may be a separate hearing on antitrust matters. Separate initial decisions on these matters may be issued. Boards also often treat especially complex technical issues and the emergency preparedness planning aspects of operating license applications in separate initial decisions.

Administration

The dramatic increase in panel workload that has followed Commission resolution of TMI-related issues continued in 1982 to present the ASLBP with a heavy docket of contested licensing proceedings. Administrative efforts in 1981 to meet this demand continued through the past year, with the addition of five law clerks to the panel staff to provide research and writing assistance. Administrative support also was enhanced by the installation of word processing equipment; consolidation of the joint ASLBP/ASLAP library under the direction of a professional law librarian; installation of the automated legal reserach system, LEXIS; and complete reorganization of the docket room. Computerization of travel and timekeeping also was completed, and a computerized hearing status report recommended by the Government Accounting Office was established. Further development of this internal management report in 1983 will generate useful information not previously available.

The Caseload

During 1982, Licensing Boards conducted 76 proceedings involving nuclear power plants and other nuclear facilities with a construction value well in excess of $80 billion. About one-third of the proceedings were completed. Some 346 days of hearings were held comprising 278 days of trial and 68 days of prehearing conferences. Twenty-seven proceedings were closed, twelve new cases were opened and two were received on remand. The operation of nine power units was authorized, including full-power operation for Three Mile Island Unit 1. Actual restart of the unit was under Commission review at the end of 1982.

Hearing Procedure

The growing ASLBP caseload combined with increasing public awareness and involvement in the licensing process has made effective hearing management essential to the timely completion of licensing decisions. Prehearing conferences are used to review and refine proposed contentions, define the scope of relevant discovery, and develop realistic hearing schedules. More than two-thirds of the contentions filed in operating license proceedings in 1982 were resolved prior to hearing, and the average age of operating licenses on the docket was reduced from 36.2 to 31.3 months. No one operating license has been delayed by the hearing process, yet fundamental fairness to all parties was assured.

Highlights of Proceedings

Extensive public interest and involvement in nuclear power plant licensing decisions was manifested in a number of important board proceedings during 1982. In *Shoreham* (N.Y.), for example, the Licensing Board conducted 84 days of hearings, covering a broad range of environmental and safety issues and

making substantial progress toward a decision in 1983. The *Indian Point* (N.Y.) special proceeding initiated pursuant to Commission order also commenced during the year with a wide variety of citizens groups, public interest organizations and governmental entities participating. Following Commission clarification of hearing objectives and procedures in September, the Board formulated the specific issues to be litigated, and hearings will resume early in 1983.

Three Mile Island

On July 28, 1982, the Licensing Board issued its final partial initial decision concerning the restart of the Three Mile Island Unit 1 reactor which has been out of operation since before the 1979 accident at Unit 2. The Board acted on the report of a Special Master it had appointed to investigate the issue of alleged cheating on NRC licensing examinations. The Board decided that the cheating problem was a limited one; that there was no evidence that the large majority of TMI-1 operators lacked competence or integrity; that the operators had been retested under controlled conditions; and that there was no evidence of management involvement in cheating.

The Board did find, however, that the utility had been negligent in its examination, training instruction, quality assurance procedures and operators' licensing certification procedures. The Board decision would impose sanctions and other conditions relating to the training program. With those sanctions and conditions (subsequently modified by the Commission) the Board concluded that all issues had been resolved in favor of restarting the unit. The Board also recommended an investigation into the circumstances of a 1979 certification for license renewal of the TMI-2 manager of operations because representations made in that certification were materially and knowingly false. The Commission adopted this recommendation.

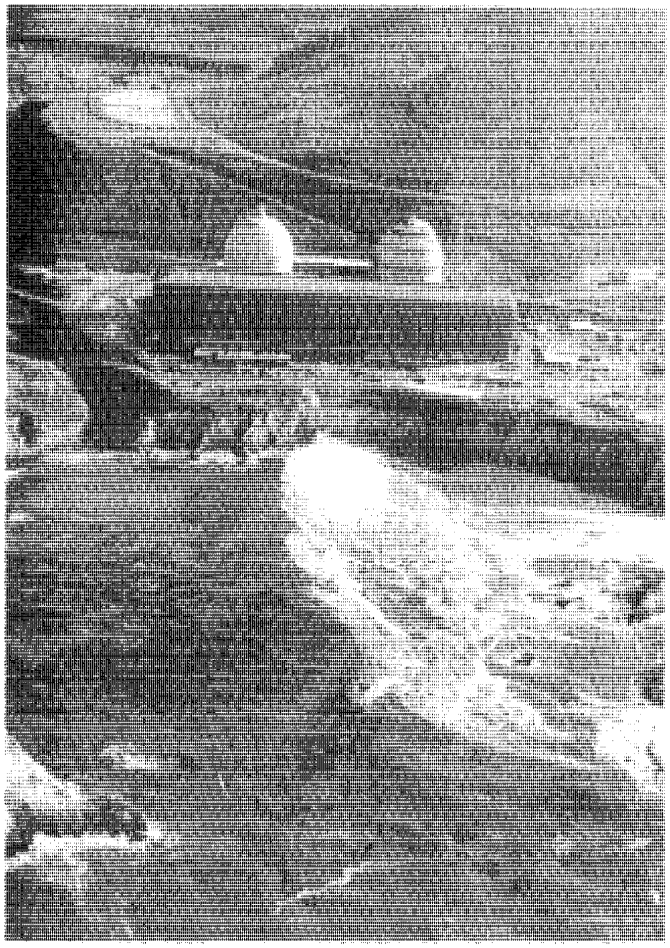
Operating Licenses

The following were among the noteworthy initial decisions authorizing operation of nine nuclear power plants during 1982:

In *San Onofre* (Cal.), a partial initial decision authorized the issuance of a fuel loading and low-power license for Unit 2. The Board resolved complex and sharply contested seismic issues including determination of a "safe shutdown earthquake" and related ground motion for San Onofre. Twenty-five days of testimony and cross-examination of 28 expert witnesses generated some 7,000 pages of transcript.

In a second partial initial decision issued in June 1982, the Board resolved emergency planning issues for San Onofre, largely in the applicant's favor, and authorized issuance of full-power licenses for Units 2 and 3, subject to certain conditions. The Board conclude there were deficiencies in emergency planning which, if corrected prior to or during the initial phase of full-power operations, would not pose a danger to public health or safety.

In *Diablo Canyon* (Cal.) the Licensing Board's initial decision resolved disputes in favor of issuing a full-power operating license, holding that emergency planning deficiences alleged by the intervenors were not proved; that the applicant's onsite, state and local emergency plans and preparedness did comply with Commission requirements; and that other contentions failed to raise any issue requiring a change in the classfication of various reactor system components. The Board noted, however, that its decision only resolved the disputed issues and did not alter



NRC's Atomic Safety and Licensing Board held that emergency plans and preparedness affecting the Diablo Canyon nuclear plant in California were in compliance with NRC requirements. Other issues remained unresolved, however, and the previously issued power testing license remained suspended.

the Commission s previously ordered suspension of Diablo's low-power testing license, or the Commission-established reverification program.

Other Licensing Board decisions authorized full-power operating licenses for the *Susquehanna* (Pa.), *Virgil C. Summer* (S.C.), *Waterford* (La.), *Enrico Fermi* (Mich.), and *Palo Verde*, Unit 1 (Ariz.) nuclear power plants. In *Susquehanna*, the Board said certain school evacuation and municipal emergency response plans for the plant vicinity had to be complete before a license could be issued. The Board decision in *Summer* was contingent on continued seismic monitoring at the plant through 1983 and on completion of a seismic safety margin confirmation program for plant equipment and components.

In proceedings concerning the *William H. Zimmer* Nuclear Power Station (Ohio), the Licensing Board's initial decision resolved most contentions in the applicant's favor and imposed five conditions with respect to offsite emergency planning. However, the Board could not identify a clear course of corrective action, and it declined to authorize full-power operation of the Zimmer Station pending resolution of problems related to evacuation plans for Clermont County, Ohio, and Campbell County, Kentucky; availability of volunteers within the plume exposure emergency planning zone, and the evacuation of schools. The Board authorized low-power operation of the facility but required that all offsite emergency planning matters be resolved prior to operation in excess of five percent of the plant's rated power.

Manufacturing License

In *Floating Nuclear Power Plants*, a Licensing Board for the first time authorized the issuance of a manufacturing license for standardized plants. The license will permit Offshore Power Systems, Inc., to construct eight floating nuclear plants through the end of 1999 at its Blount Island facility near Jacksonville, Florida.

Construction Permits

During 1982, Licensing Boards authorized the withdrawal of applications for construction permits for the Allens Creek Nuclear Generating Station (Tex.) and for the three-unit Perkins Nuclear Station which was to have been constructed by Duke Power Company in North Carolina. In the *Perkins* proceeding the combined intervenors opposing Duke's request moved for an order dismissing the Perkins' application with prejudice and for the payment of attorney fees. Intervenors argued Duke should never be permitted to construct a facility similar to that proposed at the Perkins site or any similar sites. The Board rejected the intervenors' claims.

In *Bailly* (Ill.) the Licensing Board issued a final Memorandum and Order terminating the proceeding involving an application to extend the completion date of a construction permit previously issued to the applicant. The termination was conditioned upon the applicant's implementing a site restoration plan under NRC supervision, with the parties to the proceeding afforded some rights of inspection and testing at the site.

Antitrust

On March 24, 1982, the Board granted the joint motion of applicants and intervenors to dismiss the *St. Lucie* 2 (Fla.) antitrust proceeding. It held that the withdrawal of the parties subsequent to the execution of a comprehensive settlement agreement, together with the withdrawal of the Attorney General of the United States, had deprived the Board of any further jurisdiction under the antitrust provisions of the Atomic Energy Act.

Civil Penalty

In *Met Lab, Inc.* the presiding administrative law judge approved a settlement agreement remitting the monetary penalty previously assessed, but requiring the licensee to follow specified procedures designed to prevent its personnel from receiving excessive doses of radiation. Thus, the settlement approved by the judge substituted one form of sanction for another.

ATOMIC SAFETY AND LICENSING APPEAL BOARDS

Atomic Safety and Licensing Appeal Boards, consisting of three members each, perform review functions for the Commission's in facility licensing proceedings and others the Commission may specifiy. Unless the Commission decides to review an appeal board decision, that decision becomes the final agency order and is subject only to judicial review in a Federal court of appeals. The board for each proceeding from among the members of the Atomic Safety and Licensing Appeal Panel (ASLAP) by the panel chairman. (See Appendix 2 for ASLAP membership of the panel.)

Since the appeal boards are the only Commission body to which parties disagreeing with licensing board decisions can appeal as a matter of right, they invariably rule on a wide variety of technical, legal and other matters. The more significant appeal board decisions of fiscal year 1982 are highlighted below.

Public Health, Safety and Security

The appeal board was asked to rule on a matter involving *Seabrook* (N.H.). In an earlier decision, the appeal board evaluated the seismic design of the plant and found it adequate. Subsequently, the Commission found that determination deficient and sent the matter back to the appeal board for further hearing and consideration. The appeal board took additional evidence and upon reconsideration issued a decision which adhered to its earlier determination. That decision marks the end of the Seabrook construction permit proceedings.

In *McGuire* (N.C.), the principal question before the appeal board related to the facility's hydrogen mitigation and control system in the event of a loss-of-coolant-accident at the plant. Upon review, the board found that the system could be operated without endangering the health and safety of the public during the period the utility and the Commission were continuing to explore the adequacy of the system and possible long-term alternatives to it.

The *North Anna* (Va.) proceeding dealt with the likelihood that a broken generator turbine disc would strike and damage safety-related components of the facility. After examining at length the cause of disc cracking (brittle fracture and stress corrosion), the appeal board found that full-power operation of the plant's two units would not pose an undue risk to the public health and safety, provided certain monitoring and inspection procedures were followed.

Three Mile Island, Unit No. 2 (Pa.) raised still another kind of safety issue: the extent to which hazards posed by the proximity of the Harrisburg International Airport to the plant's site were adequately incorporated into the plant's design. The narrow question before the appeal board was whether the probability of an aircraft weighting over 200,000 pounds (heavy aircraft) striking the plant was less than 1 in 10 million per year. Under Commission guidelines, a plant need not be designed against the hazards of such a crash given such a low probability. The appeal board reviewed the probability analyses performed by the utility and the Commission's staff showing that the probability of such a crash was within the guidelines. After conducting additional evidentiary hearings on the question itself, the appeal board concluded that the analyses were adequately conducted on the basis of the data at hand but conditioned any future restart of Unit No. 2 on an updated analysis using data current at that time. (The appeal board recognized that Unit No. 2 has been out of operation since its 1979 accident and that there is no prospect of its return to operation in the near future.) In issuing its decision, the appeal board noted the applicability of the same aircraft crash issue to the undamaged Unit No. 1. This unit has remained shut down since the 1979 accident to the Unit 2. Restarting it is under active consideration.

In the *Diablo Canyon* (Cal.) operating license proceeding, the principal subject of appellate concern was the security plan for the plant. Following a closed evidentiary hearing, the appeal board issued upholding the plan. Because that decision contained numerous details of the security plan, the board withheld the decision from public disclosure but issued a summary that set out its conclusion. Subsequently, the Commission made public an expurgated version of the detailed appeal board decision.

Environmental Matters

Environmental issues were the focus of several procedures before the appeal board. In *Peach Bottom* (Pa.) the appeal board was concerned with the final phase of a consolidated proceeding to determine the environmental effects of fuel-cycle releases for that plant, as well as for the Three Mile Island, Unit No. 2 (Pa.) and Hope Creek (N.J.) facilities. Earlier, the appeal board determined, after an evidentiary hearing, the amount of radon which will be released in the mining and milling of the uranium required to fuel each of the facilities. Following that decision, the appeal board called upon intervenors to demonstrate the existence of a need to hold further hearings on the health effects which would be produced by the determined amount of radon releases.

In *Turkey Point* (Fla.) the appeal board was confronted with the question of whether the National Environmental Policy Act (NEPA) required the consideration of alternatives such as energy conservation and solar energy in order to continue plant operation before the utility could be permitted to repair the plant's steam generation tubes. The board ruled that while those alternatives may be appropriate subjects for examination in connection with a construction permit application, they need not be considered in the context of sanctioning repairs to an already operating plant.

In *Browns Ferry* (Ala.), the licensing board had denied requests for hearing on an application for an amendment to the operating license for the plant to permit it to store low-level waste onsite. The persons seeking the hearing claimed that the licensee's requested storage amendment was only the first step in an overall plan of waste storage, volume reduction, and solidification, possibly including waste incineration. The licensing board disagreed, ruling that the storage plan had "independent utility" and could be reviewed independently under NEPA. The appeal board reversed the licensing board on the grounds that the present record contained insufficient evidence on which to make the "independent utility" determination, and returned the matter to the licens-

ing board to await additional information before deciding the question. Due to developments which occurred after the appeal board's decision, the Commission vacated the appeal board decision and returned the case to the appeal board for further action.

Requests to Halt Construction or Operation

Parties dissatisfied with a licensing board decision often call upon the appeal board to stay its effectiveness pending full appeal board review of that decision or other action. In *San Onofre* (Cal.), the appeal board considered requests for stays of two licensing board decisions. One authorized a low-power operating license for the plant; the other authorized a full-power license. The first request, based on alleged errors in the licensing board's decision, was concerned with the ability of crucial power plant systems to withstand the most severe earthquake that might affect the plant during its operating lifetime (safe shutdown earthquake). The appeal board found the stay request unjustified and denied it. The second stay request claimed that deficiencies in the facility's emergency plan precluded its full-power operation. After a review of the plan, the appeal board denied the request on the basis that reasonable assurance existed that operation of the plant during the time necessary to decide the emergency planning issues on appeal would not endanger the public health and safety.

Midland (Mich.), was concerned with the claim of an intervenor who sought to halt further construction of the plant on the ground that no consideration had been given to the potential effects on the plant of an electromagnetic pulse (EMP) ostensibly generated from the high altitude detonation of a nuclear weapon. In upholding the licensing board's decision denying the claim, the appeal board agreed with the result but not for the reasons given by the licensing board.

Withdrawal of Application

In *Fulton* (Pa.,) the applicant sought permission to withdraw, without prejudice, its application for construction of a high temperature gas-cooled reactor at the Fulton site. The licensing board dismissed the application "with prejudice" because several years after the construction permit application had been filed, the applicant sought an early site review without having a firm plan to construct a facility at that site. The appeal board, however, found this reason inadequate to support a dismissal "with prejudice." It ruled that no positive action against the applicant was warranted as long as the early site review was sought in good faith.

In another proceeding, *North Coast* (Puerto Rico), the licensing board had granted, over intervenors' objections, the applicant's request to withdraw without prejudice its application to construct the North Coast facility. The appeal board agreed with the licensing board's action. It ruled that a dismissal with prejudice is a severe and unusual sanction and should be reserved for applicants who compromise or abuse the integrity of the adjudicatory process and substantially prejudice other parties or the public interest.

Intervention Petitions

In *St. Lucie* (Fla.), intervention in an operating license proceeding for that plant was sought to resolve antitrust issues with respect to a settlement being negotiated in an ongoing construction permit antitrust hearing involving the St. Lucie facility. The licensing board denied the intervention request for lack of jurisdiction because it raised solely antitrust concerns. The appeal board agreed that the licensing board was without jurisdiction to grant the request, but for a different reason namely, that because an antitrust hearing on the construction permit was still underway, an antitrust hearing at the operating license stage could not be held. The same petitioner subsequently sought to intervene in the on-going antitrust hearing. The licensing board denied the petition, in part because it was untimely. The appeal board affirmed the denial on the ground that the petitioner failed to explain how the activities under the St. Lucie 2 license would have an anti-competitive effect on petitioner's generating facility.

In another case, the appeal board in *Allens Creek* (Tex.) agreed with the trial board's decision. Intervention had been sought in that construction permit proceeding on the issue of whether the applicant was financially qualified to build the facility. The appeal board did not find this to be a proper issue in view of the Commission's earlier action in removing financial qualification questions from licensing proceedings.

Catawba (S.C.) involved the question of whether and under what conditions the licensing board could conditionally admit certain contentions of an intervenor seeking admittance to the operating license proceeding. The appeal board ruled that contentions that are not specifically pled may not be admitted, conditionally or otherwise. The appeal board held further that, in the situation where non-existence or public unavailability of relevant documents makes it impossible to file a timely and specific contention, a licensing board must allow the contention to be filed once the documentation becomes available. At year's end The Commission had the matter under review.

Palisades (Mich.) was a novel case in which a labor union requested a hearing on an order issued by the Director of Inspection and Enforcement (IE) restricting overtime work by member control room operators. The union claimed the order lacked a reasonable safety justification and was only part of the utility's "make peace" offer with the NRC. The licensing board denied the request on several grounds. On appeal, the appeal board decided that the union should receive a hearing as a discretionary matter. Afterwards, the union and the IE director settled the controversy. Thereafter the Commission vacated the decision on the ground of mootness.

Procedure and Practice

Important questions of hearing procedure and practice often require appeal board resolution.

Summer (S.C.) involved the question of when it might be appropriate for a licensing board to supplement the testimony of the parties on a technical issue with expert witnesses of its own. The appeal board ruled that this step should be taken only in that most extraordinary situation in which it clearly appears that the board cannot otherwise reach an informed decision on the issue involved.

In *South Texas* (Tex.) the appeal board disqualified a licensing board member for having created in a written statement the appearance of bias against one of the intervenors in the proceeding. Susbsequently, the Commission reversed the appeal board and reinstated the licensing board member on the ground that the statement did not stem from an "extra judicial" source and thus was not a legally-cognizable basis for disqualification.

In *Byron* (Ill.) the appeal board reversed and reinstated a licensing board's dismissal of an intervenor from the proceeding for "deliberate and willful" failure to comply with a discovery order. The appeal board noted that under Commission policy, dismissal is reserved only for severe instances of party failure to meet obligations. It noted that in selecting sanctions, licensing boards are to attempt to mitigate harm and bring about future compliance rather than punish. The appeal board found dismissal too severe a sanction.

In *Offshore Power Systems*, a proceeding on an application for a license to manufacture standardized nuclear plants at industrial locations, the question for appellate consideration was whether the licensing board's decision authorizing the issuance of such a license was subject to a special review ("immediate effectiveness review") by the appeal board before it could take effect. The appeal board analyzed the Commission's "immediate effectiveness" regulation and concluded that its requirements did not apply to the manufacturing licenses at issue.

COMMISSION DECISIONS

Some of the Commission's more significant decisions during fiscal year 1982 are discussed below. The Commission's actions on export licensing cases are discussed in Chapter 10.

Comanche Peak - Sua Sponte Review

In CLI-81-36, the Commission made clear that a licensing board's *sua sponte* authority to adjudicate issues not properly presented by parties was not intended to be used to control the course of a proceeding as a casemanagement tool. Rather, the Commission required a board to find under 10 CFR 2.760a "that a serious safety, environmental, or common defense and security matter exists" prior to invoking its *sua sponte* authority.

West Chicago Rare Earth Facility

In CLI-82-2, the Commission determined that neither NRC regulations, the Atomic Energy Act, nor Constitutional due process required a formal hearing be convened with regard to materials licensing actions. Instead, the Commission held that an informal proceeding was adequate to consider the petitions of the City of West Chicago, Illinois, for a formal hearing with regard to a request by Kerr-McGee Corporation to (a) amend its 10 CFR Part 40 materials license to permit it to demolish certain buildings at its now inactive West Chicago thorium ore milling facility, and (b) receive for temporary storage on-site a small quantity of thorium ore mill tailings. On the basis of the written submissions previously filed by the parties, the Commission determined, contrary to the City's assertion, that approval of the amendment prior to completion of a final environmental impact statement on the decommissioning of the West Chicago facility did not constitute segmentation in violation of the National Environmental Policy Act. Further, the Commission found the proposed Kerr-McGee activities were proper and declared the amendment should be made effective. Subsequently, Kerr-McGee submitted two addtional applications for amendements to permit demolition of buildings on-site. While these were under staff review, the City of West Chicago petitioned for a hearing prior to issuance of an amendment.

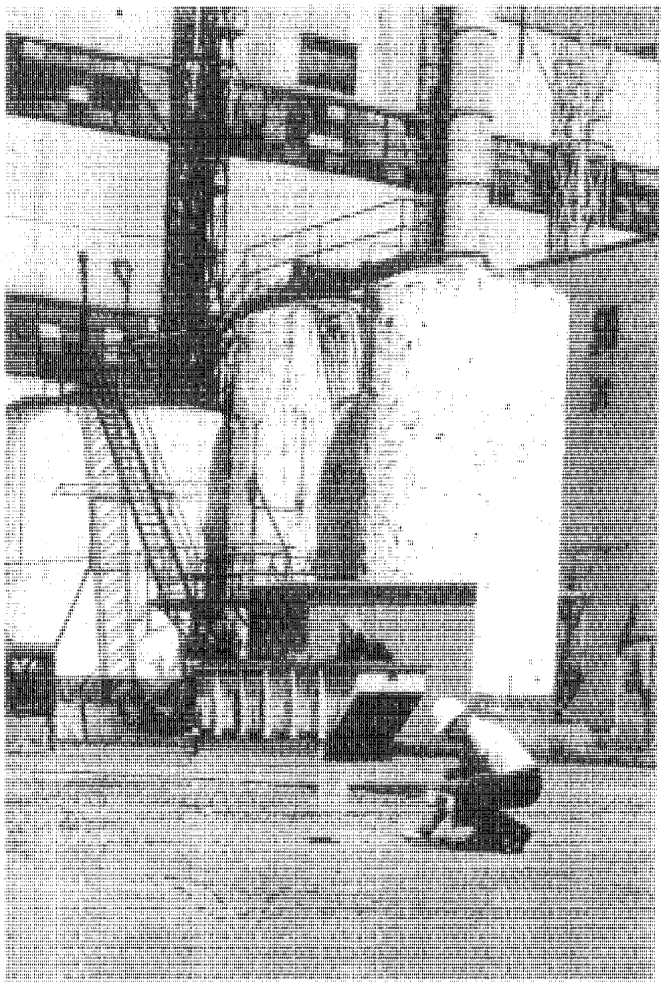
Clinch River Breeder Reactor

In CLI-82-23, the Commission issued an exemption pursuant to 10 CFR 50.12 authorizing the Department of Energy and its co-applicants Project Management Corporation and the Tennessee Valley

Authority to initiate site preparation activities for the Clinch River Breeder Reactor (CRBR). Among the exigent circumstances identified by the Commission as supporting the exemption were: (1) Presidential and Congressional statements indicating a national policy in favor of expeditious completion of the facility; (2) undue hardships caused by further delay, including loss of opportunity to transfer information early enough from CRBR to be useful to follow-on projects in the liquid metal fast breeder reactor (LMFBR) program and the loss of the cadre of experienced technical personnel to the LMFBR program; and (3) delay costs of at least $28 million per year.

WPPSS Nuclear Project Units 1 and 2

In CLI-82-29, the Commission interpreted section 185 of the Atomic Energy Act and 10 CFR _50.55 as limiting contentions in a construction permit extension proceeding to those that pertain to the permittee's asserted reasons for "good cause" for the delay in plant completion, or other reasons showing that the permittee does not have "good cause" for the delay. The Commission applied this interpretation to petitions for a hearing on the separate requests of Washington Public Power Supply System for the extension of the construction completion dates for two of the units being built at its site in Benton County, Washington and dismissed all but one joint contention as outside the scope of the proceeding. The remaining contention was referred by the Commission to the Chairman of the Atomic Safety and Licensing Board Panel for designation of a licensing board to determine whether the other hearing requirements outlined in 10 CFR 2.714 had been met and, if so, to conduct an appropriate proceeding under Subpart G of 10 CFR Part 2 and 10 CFR Part 50.



An effort by Kerr-McGee Corporation to obtain NRC permission to demolish certain buildings at its Rare Earth Facility in West Chicago, Ill. (Shown here), was the subject of continuing actions and counter-actions by the Commission and the city of West Chicago.

JUDICIAL REVIEW

Pending Cases*

Abbotts, et al. v. NRC (D.D.C. No. 77-624)

On April 11, 1977, John Abbotts, the Public Interest Research Group and the Natural Resources Defense Council brought this Freedom of Information Act suit challenging the NRC decision to withhold certain safeguards documents. The dispute has since been narrowed to two small portions of two documents specifically contesting the proper classification of "baseline threat level" information. Supplemental cross-motions for summary judgment have been pending since 1979, and the court must decide whether to review the documents in camera and whether there is a valid Exemption 1 claim by NRC.

**Alabama Power Company v. NRC* (11th Cir. Nos. 81-7547, et al.)

On July 8, 1981, Alabama Power Company sought review of ALAB-646, in which the Appeal Board held in part that the grant of an unconditioned license to petitioner to construct and/or operate the Joseph M. Farley Nuclear Plant, Units 1 and 2, would create or maintain a situation inconsistent with the antitrust laws. On December 6, 1982, the Eleventh Circuit upheld the NRC's determination and licensee conditions. The court found that section 105(c) of the Atomic Energy Act provided a basis for a "broad inquiry" into an applicant's conduct and that Congress did not intend the antitrust authority merely as a remedy for existing violations but as a means to limit prospective conduct that might or might not result in antitrust law violations. The utility has asked for rehearing.

*Those cases considered to be most significant to the agency are marked with asterisk.

American Mining Congress v. U.S.A. (10th Cir. No. 81-1566)

Kerr-McGee Nuclear Corp., et al. (10th Cir. No. 81-1569)

On May 22, 1981, Kerr-McGee Nuclear Corporation, Homestake Mining Company and American Mining Congress (AMC) filed petitions to review the amendment to Part 20 to incorporate explicitly the Environmental Protection Agency's (EPA) general environmental standards for uranium fuel cycle facilities including uranium mills. *See* 46 Fed. Reg. 18525 (March 25, 1980). They also seek review of the Commission's March 26, 1981 denial of their motion to reconsider or defer implementation of the EPA regulations at uranium mills pending a final decision on their motion to EPA to reconsider the regulations. The lawsuits have been in abeyance for over a year, pending EPA's resolution of AMC's petition to reopen the record and reconsider the general standards.

Applegate v. NRC (D.D.C. No. 82-1829)

On June 30, 1982, Thomas Applegate sued the NRC under the Freedom of Information Act, contending that the NRC improperly withheld certain documents and failed to identify others in response to his request for all records relating to the August, 1981 Office of Inspection and Audit report on the adequacy of the investigation at the Zimmer facility. The NRC filed an answer denying these allegations on July 30, 1982. The case is still pending and the NRC expects to file a dispositive motion in January, 1983.

Bellotti v. NRC (D.C. Cir. No. 82-1932)

On January 18, 1982, the NRC modified the license for Boston Edison Company's Pilgrim Station and imposed civil penalties for management control problems. The staff-ordered modification required the submission of a plan to correct these significant management deficiencies and contemplated that the correction process would occur over time with substantial staff review. On February 17, 1982 the Massachusetts Attorney General, Francis X. Bellotti, filed a petition for leave to intervene in the proceeding initiated by the order modifying the license. On August 13, 1982, the Attorney General challenged the Commission's July 30, 1982 order denying him a hearing in the Pilgrim enforcement matter. In that order, the Commission decided that Section 189a of the Atomic Energy Act does not provide a nondiscretionary right to a hearing on all issues related to an enforcement problem and that the Attorney General did not raise an issue within the scope of the NRC action. The case has been briefed and is awaiting argument.

Broome v. United States (D. Ut. No. C-82-078J)

On September 2, 1982, this lawsuit was filed under the Federal Tort Claims Act for damages associated with the death of plaintiff's husband. Plaintiff alleges her husband was killed as a result of the negligent driving of an NRC employee, also killed in the accident, who was driving a rented car on the way to an inspection site. The case may be settled without further proceedings. If it cannot be settled, the United States will answer and implead the rental car company and its insurer because the rental contract had a no-liability provision which is applicable here.

Broudy v. United States (C.D. Calif. No. 79-02626 LEW (GX))

Punnett v. Carter (E.D. Pa. No. 79-29)

Skinner v. United States (N.D. Calif. No. CA-79-1231-WAI)

Hinkie v. United States (E.D. Pa. No. 79-2340)

Runnels v. United States (D. Hawaii No. 79-0385)

Fountain v. United States (W.D. Ark. No. 80-5092)

Moffett v. United States (D.D.C. No. 81-3158)

Guarisco v. United States (N.D. Cal. C 82 4618)

These are a series of cases seeking money damages for injuries suffered as a result of the atomic weapons testing program. The principal defendant in the suits is the United States and the cases are being defended by the Department of Justice. The NRC was originally named as a co-defendant in each action. *Skinner* and *Runnels* have been dismissed. *Hinkie* is on interlocutory appeal in the Third Circuit on a threshold standing issue. In *Punnett* plaintiff's motion to compel the govenment to notify soldiers involved in the weapons testing program of potential risks of exposure was denied on March 30, 1979; the denial was later upheld by the Third Circuit and plaintiff has done nothing further. *Broudy* was dismissed on January 3, 1980 on the ground that no action will lie under the Federal Tort Claims Act for an injury which arises out of activity incident to military service. That decision was affirmed in part and reversed in part on appeal. The district court on remand has announced that it will find for the United States. In *Moffett* the United States has moved to dismiss and that motion is now pending. *Guarisco* was filed on August 30, 1982. In each case we have advised the Justice Department that NRC is not properly involved because NRC lacks authority over weapons testing. Accordingly, we will monitor the cases and assist the Justice Department but no longer carry these cases in our litigation statistics.

**Brown v. NRC* (D.C. Cir. No. 82-1549)

On May 17, 1982 the Governor of California, Jerry Brown challenged the NRC's Appeal Board decision approving the seismic design bases for the Diablo Canyon nuclear facility. The court on July 6, 1982 granted the NRC's motion to hold the case in abeyance pending the NRC's completion of administrative proceedings for either a low-power or full-power license for this facility. The NRC advises the

court at 60 day intervals of the status of the administrative proceedings.

**Brown v. NRC* (D.C. Cir. No. 81-2034)
San Luis Obispo Mothers for Peace, et al. v. NRC (D.C. Cir. No. 81-2035)

On September 21, 1981, petitioners the Governor of California (No. 81-2034) and joint intervenors in the Diablo Canyon proceeding (No. 81-2035) challenged the Commission's issuance of a low-power license for Diablo Canyon Unit 1. The court consolidated these cases on October 8, 1981, and on December 8, 1981 granted the NRC's motion to hold the case in abeyance pending completion of the administrative proceedings. We advise the court at 60-day intervals of the status of the administrative proceedings.

Burstein v. NRC (5th Cir. No. 82-3685)

This case is Ms. Burstein's November 16, 1982 appeal to the 5th Circuit of the district court's dismissal of her complaint to enjoin licensing of Waterford III. The appeal will be briefed in 1983.

Carolina Power & Light Co. v. NRC (4th Cir. No. 82-1055)

On February 1, 1982, Carolina Power & Light Co. challenged the Commission's final rule on interim requirements related to hydrogen control, citing its disagreement with the need for imposition of the rule's hydrogen recombiner capability requirements upon boiling water reactors. On February 22, 1982, the parties filed a joint petition to extend the time for filing the administrative record for 120 days because of the ongoing efforts to settle the litigation. On February 26, 1982, the Fourth Circuit removed the case from the active docket and closed it without prejudice to its reinstatement by any party. The Commission is considering a request by petitioner for an exemption from the rule's requirement.

**City of West Chicago v. NRC, et al.* (N.D. Ill. No. 81-C-5743) (appeal 7th Cir. No. 82-1684, *consolidated with* 7th Cir. No. 82-1575)

The City of West Chicago filed this lawsuit on October 14, 1981 in the District Court to enjoin an NRC license amendment for Kerr-McGee's thorium ore milling facility in West Chicago. The City also asked the court to require the NRC, within a time certain, to rule on a pending Kerr-McGee decommissioning plan and to complete its environmental impact statement for the facility. On April 5, 1982, the District Court granted the NRC's motion to dismiss this lawsuit because of a lack of subject matter jurisdiction. 542 F. Supp. 13. The City appealed to the Seventh Circuit on April 23, 1982 (No. 82-1684). This appeal was consolidated with *City of West Chicago v. NRC* (7th Cir. No. 82-1575) on May 21, 1982.

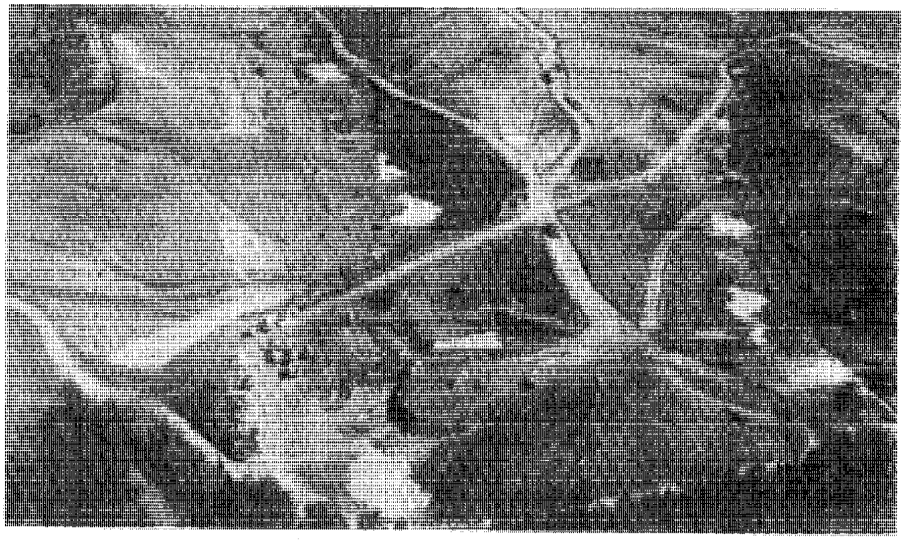
In No. 82-1575, filed on April 8, 1982, the City seeks review of the NRC's denial of its petition for a formal hearing on the license amendment allowing Kerr-McGee to demolish certain structures at its West Chicago Rare Earth Facility and to receive contaminated soil from the West Chicago area. Oral argument was held on November 8 and the case is now under consideration.

City of West Chicago v. NRC (N.C. Ill. No. 82 C 0842) (FOIA)

On February 12, 1982, the City of West Chicago instituted this lawsuit under the Freedom of Information Act to compel disclosure of a draft environmental statement concerning the decommissioning of the Kerr-McGee Corporation's West Chicago Rare Earth Facility. The NRC denied the request because disclosure of that predecisional document would inhibit the agency's deliberative process (5 U.S. 552(b)(5)). On September 22, Judge Will granted the NRC's motion for summary judgment for most of the document but ordered three sections made available for *in camera* inspection. 547 F. Supp. 740. The parties have been discussing ways in which to bring this lawsuit to a close without the need for such an inspection.

**Coalition for the Environment v. NRC* (D.C. Cir. No. 77-1905) (Callaway)
Lloyd Harbor Study Group v. NRC (D.C. Cir. 73-2266) (Shoreham)
Nelson Aeshliman v. NRC (D.C. Cir. No. 73-1776 & 1867) (Midland)
Natural Resources Defense Council v. NRC (D.C. Cir. No. 74-1385) (Vermont Yankee)
New England Coalition on Nuclear Pollution v. NRC (1st Cir. No. 76-1525) (Seabrook)

These lawsuits challenge on uranium fuel cycle grounds ("Table S-3") the construction permits for Callaway, Shoreham, Midland, and Seabrook and the operating license for Vermont Yankee. Briefing in these cases was held in abeyance pending the D.C. Circuit's decision in the fuel cycle rulemaking cases. *Natural Resources Defense Council v. NRC* (D.C. Cir. No. 74-1586 and consolidated cases). The D.C. Circuit invalidated the NRC's rules in that case on April 27, 1982. On August 16, 1982 the D.C. Circuit entered orders in each of its four cases. In *Vermont Yankee* it gave the parties until September 8, 1982 to show cause why the matter should not be remanded to the NRC. In the other cases the Court gave the petitioners until September 8 to show cause why the lawsuits should not be dismissed and the NRC allowed to comply with No. 74-1586 as part of the operating license proceeding now in progress at each facility. All parties responded and the D.C. Circuit is now considering these matters. On September 27, NRC filed its petition for writ of *certiorari* in the underlying dispute on the S-3 rules. That petition was granted November 29. *See NRC v. NRDC*, S.Ct. No. 82-545, *infra*. In the *Seabrook*



On August 5, 1982, the Commission granted a request from the agencies responsible for the Clinch River Breeder Reactor (CRBR) which permitted site preparation work to begin. This followed the completion of ASLB hearings on site suitability, and left to be addressed in another hearing considerations regarding the environmental impact on the proposed plant.

case, on October 25, 1982, the First Circuit has decided to hold the case in abeyance pending the Supreme Court's resolution of the legal issue or the D.C. Circuit's resolution of analogous cases. The NRC advises the court periodically on the status of the Supreme Court S-3 case and the other proceedings.

Consumers Power Co. v. NRC (D.C. Cir. No. 82-1575)

On May 24, 1982, Consumers Power Company challenged the NRC's property insurance regulation as applied to the Big Rock Point nuclear generating plant, arguing that the required insurance exceeds the value and reasonably expected cleanup costs for that facility. Petitioner subsequently filed a request for an administrative exemption with staff. Thereafter the court granted petitioner's request to extend the times for briefing pending completion of the administrative process. The NRC granted the company a limited exemption from the rule and expects this lawsuit will be dismissed by stipulation.

Dunn v. United States (W.D. Pa. No. 82-0437)
Amorose v. United States (W.D. Pa. No. 82-0438)

A number of alleged property owners near an inactive mill tailings site located in Canonsburg, Pennsylvania, sought declaratory and injunctive relief as well as damages against NRC and the Department of Energy. In No. 82-0437 plaintiffs seek (1) injunctive relief requiring the abatement of a public nuisance allegedly resulting from the presence of "residual radioactive materials" at the former site, (2) declaratory and mandamus relief for implementation of section 111 of the Uranium Mill Tailings Radiation Control Act (UMTRCA) concerning public participation in the required remedial action program, and (3) injunctive relief based on the defendant's alleged failure to develop an environmental statement concerning implementation of the UMTRCA remedial action program. In No. 82-0438 plaintiffs seek monetary damages for physical injuries and deprivation of peaceful use and enjoyment of their property. The Justice Department has primary responsibility for the defense of these lawsuits. On October 29, 1982, the court denied the government's motions to dismiss both actions, largely because the facts are complicated and the relationships among defendants were not clear to the court. Although the court dismissed "civil rights" claims because the United States is not a proper defendant, the court found the grant of the motions on other claims would be premature until further resolution of the facts. The cases are now in discovery.

Font v. County of Suffolk, et al. (M.D. Ala. No. 81-0019-S)

In 1981 Mr. Font sued the United States (NRC and DOE) and others, seeking $200 million in damages for adenocarcinoma which he alleges is causally connected to negligent regulation of a materials licensee in 1969. NRC and DOE moved to dismiss the case for lack of jurisdiction and for failure to exhaust remedies under the Federal Tort Claims Act. Plaintiff voluntarily dismissed his lawsuit and refiled his claim with DOE. This claim, however, only alleged NRC-related actions and was sent to the NRC. On February 12, 1982, the NRC denied this claim for lack of agency jurisdiction. Plaintiff re-filed the lawsuit on April 1, 1982, alleging the same NRC and DOE-related actions. NRC and DOE again moved to dismiss and the matter was heard by District Judge Hobbs on August 5, 1982. The Judge considered the motion one for summary judgment and twice ordered plaintiff to outline possible discovery. On November 12, the Judge granted the plaintiff's request to begin limited discovery and denied the motion to dismiss without comment. An answer has been filed and discovery has begun. Depending on the outcome of this phase, the case may be heard on

a renewed motion to dismiss and/or a motion for summary judgment.

Fried v. United States, et al. (N.D. Ill. No. 81C5387)

Plaintiff filed this Federal Tort Claims Act lawsuit against the United States, DOE, and NRC for injuries suffered in an industrial accident at Argonne National Laboratory. Plaintiff alleges that the accident was caused by negligent omissions on the part of the government and that the government wrongfully breached its non-delegable duty to control substances and extrahazardous activities on its property. The Department of Justice, which is handling the lawsuit, has moved to dismiss; or, in the alternative, for summary judgment because the United States, the only proper defendant under the Federal Tort Claims Act, owes no duty under Illinois law to plaintiff and because the United States is immune from this lawsuit because it is plaintiff's "statutory employer." Oral argument was heard on January 25, 1982. The court has not yet ruled on the motion.

Friends of the Earth v. NRC (9th Cir. No. 79-7311)

This lawsuit, filed March 19, 1980, sought review of the Commission's June 22, 1979 decision to restart Rancho Seco after it had completed various TMI-related modifications intended to enhance the reactor's ability to respond safely to feedwater transients. On July 5, 1979, the Ninth Circuit denied emergency relief (600 F. 2d 753), and on September 10, 1980, entered an order deferring action on the merits until completion of the then ongoing Licensing Board hearing. The Licensing Board issued its decision on May 15, 1981. No exceptions were filed, and the decision went before the Appeal Board for *sua sponte* review. On October 7, 1981, the Appeal Board directed the licensee and the NRC staff to supply additional information and analyses on the modifications in order for the Board to decide whether to order additional action. The Ninth Circuit has taken no further action, presumably awaiting completion of NRC review.

Frisby, Kaiser and Clary v. IRS, NRC and MSPB (D.C. Cir. No. 80-1442)

This lawsuit was brought on April 18, 1980 by employees of two federal agencies who had been dismissed from government service. The Merit Systems Protection Board re-opened the cases in light of the Board's decision in *Wells v. Harris* (MSPB No. RR-80-3) to allow a hearing officer to determine whether dismissal would have been proper under the standards for adverse actions of 5 U.S.C. Chapter 75 rather than under the Civil Service Reform Act of 1978 where an OPM-approved performance system had not yet been properly implemented. On reconsideration, the hearing officer upheld the removal of the NRC employee and the two other employees. Court proceedings had been held in abeyance pending completion of the administrative proceedings and the parties are now working to jointly dismiss this lawsuit.

General Electric v. NRC (D.C. Cir. No. 80-2496)
Prairies Alliance v. NRC (C.D. Ill. No. 80-2095)
General Electric v. NRC (C.D. Ill. No. 80-2244)

On May 7, 1980, the Prairie Alliance sued the NRC under the Freedom of Information Act (FOIA) to compel disclosure of the General Electric Nuclear Reactor Study known as the Reed Report. While that lawsuit was pending, on October 9, 1980 the Commission, on a 2-2 vote, was unable to muster a majority to claim any FOIA exemption for the report and hence ordered its release. The General Electric Company, on October 17, 1980, thereupon filed in the District of Columbia to enjoin release of the report and to require its return to General Electric. On October 31, 1980; Judge Aubrey Robinson transferred the case to Illinois where the *Prairie Alliance* case had been filed, and in the process enjoined the Commission from releasing the Reed Report pending disposition of the case by the court in Illinois. Motions for summary judgment have since been filed by G. E. and NRC. In addition G. E. is seeking discovery prior to a court ruling on NRC's summary judgment motion, and the NRC is seeking a protective order. The lawsuit in the D.C. Circuit has been held in abeyance pending the district court's decision, which has been pending for over a year.

General Public Utilities Corp, et al. v. U.S. (E.D. Pa. No. 81-4950)

On December 2, 1981, the owners and operators of the Three Mile Island Unit 2 nuclear facility sued the United States, alleging damages in excess of four billion dollars resulting from the accident at the facility. Plaintiff's theories of liability are that the United States, in its role as a regulator, violated statutory, regulatory or other self-imposed requirements, and failed to warn GPU of defects in the equipment, analyses, procedures and training, or, alternatively, failed to direct GPU to correct certain deficiencies. On March 5, 1982, the United States moved to dismiss because of a lack of subject matter jurisdiction and because the complaint fails to state a claim upon which relief can be granted. The motion was argued in October 1982. On November 24, 1982, District Judge Troutman denied the motion to dismiss on both the discretionary function and the misrepresentation exemptions to the Tort Claims Act. The judge, recognizing that these issues were close and important, certified an immediate appeal to the Third Circuit. The appeal will be filed shortly.

International Verbatim Reporters, Inc. (IVRI) v. United States (Ct. Cl. No. 458-80)

On August 27, 1980, IVRI sued the United States for breach of plaintiff's contract to provide stenographic reporting services. The Commission has counterclaimed for excess reproduction and procurement costs on the ground that the reporting company failed to provide adequate reporting services. The trial is now complete, and the parties have submitted briefs and proposed findings. The matter is under consideration.

Kepford v. NRC (D.C. Cir. Nos. 78-1160 & 78-2170)

In No. 78-1160, petitioner Chauncey Kepford brought suit on February 27, 1978 to stay operation of the Three Mile Island Unit 2 facility, primarily because of claimed unacceptable health impacts from radon-222 releases attributable to the mining and milling of uranium to fuel the plant. On March 8, 1978, the D.C. Circuit ordered the case held in abeyance pending completion of administrative proceedings. Those proceedings themselves were since interrupted by the March 1979 accident and are not yet complete.

Kepford v. NRC (D.C. Cir. No. 81-2111)

On October 19, 1981, petitioner Chauncey Kepford filed this petition to review an Appeal Board opinion addressing the environmental significance of radon-222 emissions from nuclear fuel cycle operations supporting commercial nuclear power plants. Because the Appeal Board has not yet reached a final determination, the court on November 2, 1981 granted petitioner's motion to hold this case in abeyance pending a final administrative decision.

**Kerr-McGee Nuclear Corp. v. NRC* (10th Cir. No. 80-2043)

Uranium Mining and Milling Council, et al. v. NRC (No. 80-2271)

Western Nuclear Corp. v. NRC (No. 80-2269)

United Nuclear Corp. v. NRC (No. 80-2043)

On October 3, 1980, Kerr-McGee, later joined by a number of other uranium milling companies, petitioned the Tenth Circuit to review the Commission's Uranium Mill Licensing Requirements. *See* 45 Fed. Reg. 65521 (Oct. 3, 1981). Petitioners challenged the Commission's regulations on a number of grounds, including alleged insignificance of the radon risk; asserted excessive cost of complying with the regulations and the NRC's mill tailings regulations in their entirety. 673 F. 2d 1124. On May 28, 1982, Kerr-McGee filed for rehearing. In the interim, Congress passed legislation which forbids the expenditure of funds to enforce the rules. On October 6, the Tenth Circuit vacated the judgment (but not its order) and granted rehearing *en banc*. The matter will be heard in 1983.

Lorion v. NRC (D.C.Cir. No. 82-1132)

Ms. Lorion filed a petiton on February 8, 1982 to review the NRC's decision denying her request that Turkey Point Unit 4 be shut down for a steam generator inspection. Ms Lorion alleges that the Commission acted unlawfully (1) in treating her letter requesting such action as a petition under 10 CFR 2.206 and (2) in denying her request. The NRC filed its brief in this case on June 14, 1982, arguing that Ms. Lorion has suffered no harm and that the Commission's actions were consistent with its regulations and all legal requirements. The case was argued in November 1982 and is under consideration.

**Natural Resources Defense Council (NRDC) v. NRC* (D.C. Cir. No. 82-1962) (Clinch River)

On August 19, 1982, NRDC sued to stay and to overturn the Commission's grant of an exemption to DOE and its coapplicants to initiate site preparation activities for the Clinch River Breeder Reactor demonstration project. The NRC opposed the motion for a stay on August 25, 1982. The court has not yet ruled on the motion to stay. NRDC also moved to stay site preparation activities in a separate proceeding to which the NRC is not a party in the District Court, Northern District of Georgia. The district court granted this motion on September 3. On September 9 the Eleventh Circuit granted a motion to expedite the appeal. The Eleventh Circuit subsequently reversed the District Court. On October 6, 1982, the D.C. Circuit denied the NRDC motion for a stay of the NRC exemption which authorized site preparation. The case was argued on November 24. On December 2, the D.C. Circuit vacated the order and instructed the Commission to hold and complete an adjudicatory hearing on the grant of the exemption by February 4, 1983. On December 7, the Court backtracked somewhat and replaced the December 2 opinion with directions for the NRC simply to reconsider whether an exemption for site preparation was warranted and to advise the Court by February 4 of the result of its reconsideration. In neither instance did the Court stay site preparation.

Natural Resources Defense Council v. NRC (D.C. Cir. Nos. 74-1586, 77-1448, 79-2131) (S-3)

State of New York v. NRC (D.C. Cir. No. 79-2110)

Nuclear Regulatory Commission v. NRDC, U.S.S.Ct. No. 545

These consolidated cases challenge three related versions of the Commission's uranium fuel cycle rule, which addressed the environmental impacts of off-site fuel cycle activities for the operation of a nuclear power plant. The rule sets out a table of values ("Table S-3") to be used in individual licensing proceedings as a starting point for evaluating the contribution of fuel cycle activities to the environmental impact of light water power reactors. The D.C. Cir-

cuit's consideration of these cases follows the Supreme Court's remand in *Vermont Yankee Nuclear Power Corp. v. NRC*, 435 U.S. 519 (1978).

On April 27, 1982, the D.C. Circuit issued an opinion invalidating the NRC's original, interim and final fuel cycle rules. 685 F. 2d 459. On June 11, 1982, the NRC and United States filed a motion for reconsideration with a suggestion for rehearing *en banc*. The court denied this motion on June 30, 1982. The NRC and United States petitioned the court to stay issuance of its mandate on July 7, 1982. A 30-day stay was granted September 1. The Solicitor General petitioned the Supreme Court for a writ of *certiorari* on September 27. The Supreme Court granted the NRC petition and consolidated the petition with those filed by Baltimore Gas and Electric, et al. and by Commonwealth Edison, *et al.* on November 29. 51 U.S.L.W. 3419.

New England Coalition on Nuclear Pollution, et al. v. NRC (D.C. Cir. No. 82-1581)

On July 25, 1982, petitioners, participants in a number of NRC proceedings who sought to raise financial qualifications contentions, challenged the NRC's final rule modifying the NRC's licensing review requirements on that issue. *See* 47 Fed. Reg. 13750 (March 31, 1982). The case has been briefed and awaits argument.

State of New York and State of Illinois v. NRC (S.D.N.Y. No. 79 Civ. 4568)

This lawsuit follows similar suits by the State of New York which sought to stop the air shipment of plutonium pending preparation of an environmental impact statement. Those earlier requests for injunctive relief were rejected. *See State of New York v. NRC*, 550 F.2d 745 (2d Cir. 1977). The current lawsuit challenges the adequacy of the NRC's environmental impact statement on the transportation of radioactive material (NUREG-0170). A voluntary stipulation of dismissal is currently being considered by all parties.

The Nuclear Control Institute v. NRC (D.D.C. No. 82-1476)

On May 28, 1982, the Nuclear Control Institute filed suit under the Freedom of Information Act (FOIA) seeking access to the "Morgan Report" and related agency records. The Commission had denied the request for these documents on February 26, 1982 under Exemption 1 of the FOIA because the documents contained classified national security information and their release could reasonably be expected to cause at least identifiable damage to the national security. On July 30, 1982, the United States moved for summary judgment. The United States also moved to file classified declarations in camera which explain why these documents are classified. Plaintiff filed a cross-motion for summary judgment on August 18. The court granted the motion for in camera inspection on August 18. Briefing is now complete. Plaintiff has requested oral argument.

**People Against Nuclear Energy v. NRC* (D.C. Cir. No. 81-1131)

NRC v. People Against Nuclear Energy (U.S.S.Ct. No. 82-358)

On February 3, 1981, petitioners sought review of the Commission's decision not to consider contentions regarding psychological stress in the adjudicatory proceeding considering the proposed restart of the Three Mile Island Unit 1 reactor. They contended that the Commission violated the Atomic Energy Act and NEPA by not hearing evidence on the issue and by not supplementing the pre-accident environmental impact statement for the reactor. The D.C. Circuit reversed the NRC, in a January 1982 short order and explained in a May 14, 1982 opinion that NEPA requires evaluation of the psychological effects of restarting TMI-1. 678 F.2d 222. The Court also held that "health and safety" under the Atomic Energy Act does not include psychological health. On November 1, 1982, the Supreme Court granted the NRC's petition for *certiorari*. 51 U.S.L.W. 3339.

Philadelphia Electric Co. v. NRC (D.C. Cir. No. 81-1049)

On January 16, 1981, petitioner Philadelphia Electric Co. filed this petition for review of the NRC's fire protection rule. It is being held in abeyance pending the conclusion of settlement negotiations between the applicant and the staff.

**Save the Valley v. NRC (6th Cir. No. 82-3148)*

On March 5, 1982, petitioner Save the Valley sued to overturn the Commission's denial of its request for a hearing concerning the enforcement decision to allow resumption of concrete construction at the Marble Hill facility. The NRC's position is that Section 189a of the Atomic Energy Act does not require an adudicatory hearing on the lifting of a suspension and that the NRC acted reasonably in declining to grant a discretionary hearing in this case. The case has been briefed and awaits argument.

**Sholly v. NRC, 651 F.2d 780* (D.C. Cir. 1980), *denial of reconsideration en banc*, 651 F.2d 792 (D.C. Cir. 1981), *cert. granted*, 451 U.S. 1016 (1981)

Petitioner in this lawsuit sought an injunction against the venting of Krypton-85 from the TMI-2 reactor building. In orders dated June 26, 27 and 28, the D.C. Circuit denied the requests for injunctive relief. In a companion case seeking essentially the same relief, *PANE v. NRC* (3d Cir. Nos. 80-1994 & 1995), the Third Circuit on July 10 transferred the cases to the D.C. Circuit for disposition. The cases were argued on the merits in September 1980.

On November 19, 1980, the D.C. Circuit declared illegal the Commission's refusal to hold hearings in connection with its approval of venting the Three Mile Island containment. The D.C. Circuit held that even where a license amendment involves no significant hazards consideration, an interested person who requests a hearing is entitled by Section 189a of the Atomic Energy Act to a hearing before the amendment becomes effective. The Court also held that the TMI-2 accident had essentially negated any authority in the TMI-2 operating license so that any action not authorized by the Commission's February 11 order establishing post-accident conditions for TMI-2 is a license amendment subject to Section 189a hearing requirements. The utility sought rehearing *en banc*. Four members of the court dissented from the denial of rehearing *en banc*, urging reconsideration of the panel's holding that the Commission may not dispense with an opportunity for a hearing prior to granting an amendment to a nuclear power plant operating license upon determining that the contemplated amendment entails no significant hazards consideration. The Supreme Court granted *certiorari* on May 26, 1981. The case is still awaiting argument before the Supreme Court. Congress has recently passed legislation that effectively moots the case.

Spotsylvania County v. NRC (D.C. Cir. No. 82-2145)

Louisa County v. NRC (D.C. Cir. No. 82-2146)

On September 27, 1982, Spotsylvania and Louisa Counties in Virginia filed petitions to review the NRC's July 28, 1982 order approving proposed routes for spent reactor fuel from VEPCO's Surry plant to its North Anna plant. Petitioners have filed 2.206 requests asking NRC to revoke its prior approval. The NRC has moved to hold the cases in abeyance and to consolidate them. Both motions were granted on October 29, 1982.

Sunflower Alliance v. NRC (6th Cir. No. 82-3563)

On September 13, petitioner challenged the NRC's policy statement which provides that, pending Supreme Court's resolution of the psychological stress issue in *NRC v. PANE*, supra, the NRC will not specifically analyze or litigate that issue in licensing proceedings. On December 8, the Sixth Circuit denied the NRC's motion to hold the case in abeyance pending the outcome of the Supreme Court case.

Trombetta v. NRC, et al. (E.D. Pa No. 82-2192)

Mr. Trombetta, *pro se*, sued the NRC, the NLRB, and the Labor Department and several private defendants concerning resolution of his claims he was fired from his job at the Calvert Cliffs plant for voicing safety complaints. The complaint is not clear and apparently seeks either (1) a remedy for his discharge or (2) a release or a "correction" of information about him under the FOIA. The U.S. Attorney's Office answered the complaint and the NRC is now seeking to clarify the exact nature of the action.

Union of Concerned Scientists v. NRC (D.C. Cir. No. 82-2000)

On August 26, 1982, petitioner filed this lawsuit to review the Commission's final rule which suspends the June 30, 1982 deadline for documentation and completion of environmental qualification of safety-related equipment as required by the Commission in its decision of May 27, 1982. Petitioner contends that this suspension violated the Atomic Energy Act and was promulgated without notice and opportunity for comment in violation of the Administrative Procedure Act. The case is now being briefed.

Union of Concerned Scientists v. NRC (D.C. Cir. No. 82-2053)

On September 10, 1982, the Union of Concerned Scientists (UCS) challenged NRC's July 1982 amendments to the emergency planning rules to permit (1) issuance of initial licensing decisions without the results of preparedness exercises and (2) staff authorization of low power operating licenses without any review of offsite emergency preparedness. 47 *Fed. Reg.* 30232 (July 13, 1982). The Attorney General of Massachusetts has intervened in the lawsuit. In October, UCS filed a petition for rulemaking in which it asked, in effect, that the NRC reconsider the exercise portion of the rule. Subsequent discussions confirmed that the exercise rule was the focus of the UCS lawsuit. *See* 47 *Fed. Reg.* 51889 (November 18, 1982). The parties agreed to hold this case in abeyance until March 1983 to allow the NRC time to act on the UCS petition. On December 8, the Court granted the motion.

Union of Concerned Scientists v. NRC (D.D.C. No. 82-3212)

In this FOIA lawsuit brought on November 10, 1982, the plaintiff treats as a denial the NRC's failure to complete action on plaintiff's request for documents concerning the NRC's decision to extend the compliance date for the environmental qualification rule. The NRC denied the allegations, and is completing administrative action.

United States v. New York City (S.D.N.Y. No. 76 Civ. 273)

On January 15, 1976, the NRC, DOE and DOT sought a judgment declaring a New York City health code provision dealing with transportation of nuclear materials through the city to be inconsistent with the federal statutory scheme governing transportation of hazardous materials. The government's request for a preliminary injunction against enforcement of the health code provision was denied on January 30, 1976 in view of the absence of DOT regulations un-

der the Hazardous Materials Transportation Act prohibiting such local ordinances. On April 4, 1978, DOT ruled that the New York City ordinance was not inconsistent with DOT's then existing statutory scheme and regulatory policy, but that a rulemaking would be held to consider what restrictions should be placed on local regulation of the routing of nuclear materials. The rulemaking was completed on January 19, 1981. 46 Fed. Reg. 52898. The City then challenged the rule. *City of New York v. DOT,* No. 81 Civ. 1778 (S.D.N.Y. April 1981). *See also State of Ohio v. DOT,* No. 81-1394 (N.D. Ohio Aug. 1981). On May 5, 1982 the New York District Court invalidated DOT's regulations insofar as they require New York City to permit truck transportation of spent fuel and other large quantity shipments of radioactive materials through densely populated areas. The court refused to enjoin application of the rule to other jurisdictions. 539 F. Supp. 1237. The government is considering whether to appeal. The lawsuit originally brought by the United States will remain pending until that suit is resolved.

West Michigan Environmental Action Council v. NRC (W.D. Mich. No. G-58-53)

Plaintiffs sought an injunction against the increased use of mixed-oxide fuel in Consumer Power's Big Rock Point power reactor. In June 1974 the court placed the case in abeyance pending the outcome of the GESMO proceeding. The utility has not pressed its application nor prepared the environmental report necessary to proceed with its application. On April 19, 1982, the NRC's motion to dismiss this lawsuit as moot was argued. The matter is still under consideration.

Won-Door Corp. v. United States (Ct. Claims No. 109-79L)

Won-Door sued the United States on March 20, 1979 for compensation for an alleged taking of its property by virtue of radon contamination from the adjoining Vitro uranium mill tailing site. The government answered, denying a taking, on June 11, 1979. On August 20, 1979 Judge Harkens stayed the proceeding at the request of the Department of Justice, which is handling defense of this action, to allow for settlement negotiations. Settlement negotiations are almost concluded, and we expect a final settlement agreement soon.

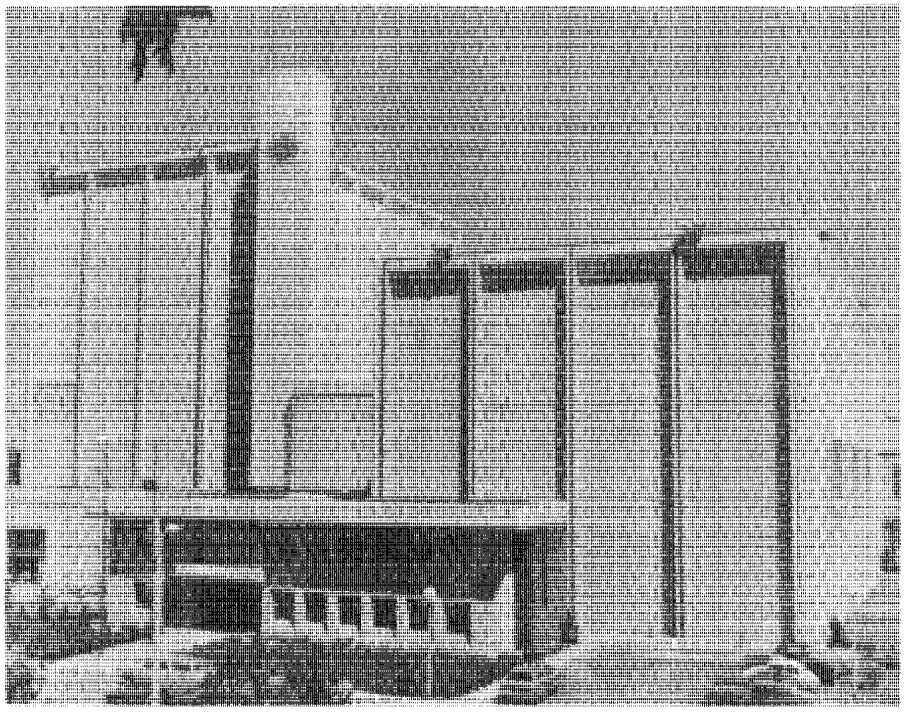
Closed Cases

Association of Community Organizations for Reform Now (ACORN) v. NRC (E.D. La. No. 82-1073)

On March 18, 1982, the Association of Community Organizations for Reform Now (ACORN) sued to block issuance of an operating license for the Waterford Unit 3 nuclear facility until NRC public hearings are held at night or on weekends so that working citizens can participate. In this case, the government was never served. On October 13, 1982, the court dismissed the complaint.

Bellotti v. NRC (D.D.C. No. 82-1991)

On July 15, 1982, the Attorney General of Massachusetts filed this lawsuit alleging that the Commis-



The Pilgrim plant in Massachusetts was the subject of a lawsuit filed against the NRC by the Attorney General of the Commonwealth. He had earlier filed a petition for a hearing in connection with a civil penalty issued by the NRC (see Chapter 8), and the Commission, in July 1982, denied the petition. The lawsuit was dismissed, but at the end of the report period, the Commission's denial of the petition was being challenged in court.

sion's failure to act on his petition for a hearing in the Pilgrim enforcement action caused him irreparable harm and seeking, in effect, that the court grant him intervention in the proceeding. The Commission denied the petition on July 30, 1982, and the parties consented to a voluntary dismissal of the lawsuit to which the court agreed on August 9. The Commission's denying his petition was then challenged in the D.C. Circuit Court of Appeals. *Bellotti v. NRC*, D.C. Cir. No. 82-1932 (filed August 13, 1982).

Burstein v. NRC (E.D. La. No. 82-2476)

Plaintiff Carole Burstein sued the NRC on June 14, 1982 to stop further consideration of an operating license for the Waterford Unit 3 nuclear facility until the NRC can demonstrate that nuclear waste can be stored safely and that plaintiff can be fully insured against any and all nuclear damage. Alternatively, plaintiff requested attorney's fees and money damages. The NRC's motion to dismiss alleging that plaintiff has failed to (1) exhaust administrative remedies and (2) show that she has been damaged was granted by the District Judge on October 27, 1982. An appeal was subsequently filed.

Carstens v. NRC (D.C. Cir. No. 82-1832)

On July 23, 1982, petitioner August Carstens moved the court to stay issuance of the operating license for the San Onofre Units 2 and 3 nuclear facilities, alleging that the NRC erred on a number of grounds in its finding that the seismic design basis for San Onofre was adequate. The NRC responded on July 27, 1982. On the same day the D.C. Circuit denied the motion for a stay and dismissed the case.

Central Electric Power Cooperative, Inc. v. NRC (4th Cir. No. 81-1785)

On August 21, 1981, Central Electric Power Cooperative, Inc. petitioned for review of the Commission's June 26, 1981 decision which declined to institute a Section 105(c) antitrust proceeding in connection with the operating license proceedings for the Virgil C. Summer nuclear power facility. Applicants South Carolina Electric & Gas Co. and South Carolina Public Service Authority intervened. Subsequently all parties agreed the proceeding should be dismissed, and on December 2, 1981, the Court dismissed this lawsuit.

Citizens Action for Safe Energy, et al. v. NRC (D.C. Cir. No. 80-1566)

This lawsuit, filed May 27, 1980, challenged the Appeal Board's decision in ALAB-587 which deferred further consideration of Class 9 accidents at Black Fox. Petitioners contended that NEPA requires the Commission to prepare a supplemental environmental impact statement to consider the consequences of Class 9 accidents. The NRC countered that catastrophic accidents were not reasonably foreseeable impacts for purposes of NEPA analysis. Plans to build Black Fox were subsequently cancelled, rendering this lawsuit moot. The D.C. Circuit ordered it dismissed on February 26, 1982.

**Common Cause v. NRC* (D.D.C. No. 80-2347) (appeal D.C. Cir. Nos. 81-1975 & 2002)

On September 15, 1980, Common Cause filed a Sunshine Act lawsuit against the NRC claiming that a July 18, 1980 Commission budget meeting was improperly closed to the public. Common Cause sought a transcript of the meeting and an injunction requiring that like meetings in the future be held in open session. On July 2, 1981, District Judge Curran ruled that the Commission had violated the Sunshine Act in closing the budget meeting. 517 F. Supp. 608. When the Commission thereafter closed a budget discussion covering its final deliberations on the FY 83 budget, Judge Curran on September 9 held that the Commission was in contempt of his July 2 order. 522 F. Supp. 457. The Commission appealed to the D.C. Circuit Court of Appeals, which stayed the District Court decision. The court vacated the District Court injunction and contempt finding, but ordered the Commission to release complete transcripts of the two budget meetings. The court held that the Sunshine Act did not protect budget meetings. It said that if Congress had intended a blanket exemption, it would have so stated, and neither Exemption 9(B) (discussion where premature disclosure could affect nongovernmental parties) nor Exemption 2 (matters related solely to internal practices of agency) nor Exemption 6 (personal privacy) apply here. 674 F.2d 921.

Connecticut Light and Power Co. v. NRC (D.C. Cir. No 81-1050/S.Ct. No. 81-2293)

On January 16, 1981, a number of utilities sought review of the Commission's final rule on fire protection, Part 50, Appendix R, 45 Fed. Reg. 76602 (Nov. 19, 1980). The utilities alleged that an adequate technical basis did not exist for those portions of the rule requiring licensees to install specific features to protect redundant equipment necessary for safe shutdown from being simultaneously disabled by a single fire, and for the requirement of an oil collection system for reactor coolant pumps. On March 16, 1982, the D.C. Circuit ruled in favor of the NRC. The court said that: (1) in light of the background of public discussions in this area, the notice proposing the fire protection program sufficiently identified the technical background of the rules to allow for meaningful comment; (2) the NRC was not obligated to renotice the final rules as significantly differing from the proposed rules because the final rules were a "logical outgrowth" of the rules as proposed and because with the exemption provision—under which a utility may show that alternative methods of fire protection provide equivalent protection to ones proposed by NRC—the prac-

tical impact of the final rules is very similar to what it would have been had the proposed rules gone into effect; (3) the NRC's 30-day comment period was reasonable; and (4) in light of the exemption procedure, the record provided sufficient support for adoption of the final rule. 673 F.2d 525. On October 4, the Supreme Court denied the utility's petition for writ of *certiorari*. 51 U.S.L.W. 3254.

Del-AWARE Unlimited, Inc., et al. v. Baldwin, et al. (E.D. Pa. No. 82-5115)

On November 18, Del-AWARE, an intervenor in the Limerick operating license proceeding sued the NRC, the Corps of Engineers, the Delaware River Basin Commission, Philadelphia Electric Co. and others to enjoin construction of a water division project. The project would provide increased flow for the Schuylkill River, which water is intended to provide coolant for the Limerick plant. The district judge conducted an extensive preliminary injunction hearing and, on December 15, granted the NRC's motion to dismiss it from the case.

Fairfield United Action v. NRC (D.C. Cir. No. 81-2042)

Petitioner on September 22, 1981 filed this lawsuit to review an Appeal Board decision which denied petitioner's untimely petition to intervene in the Virgil C. Summer nuclear power facility operating license proceeding. On April 28, 1982 the D.C. Circuit issued a two-page *per curiam* order upholding the NRC decision. On June 9, 1982, the Court denied petitioner's motion for reconsideration. 679 F.2d 261 (Table).

Ft. Pierce Utilities Authority v. NRC (D.C. Cir. No. 80-1099)

On January 21, 1980 the Ft. Pierce Utilities Authority filed a lawsuit challenging the Commission's decision not to institute at this time a Section 105a antitrust proceeding against the Florida Power and Light Company, an NRC licensee. The request had been prompted by a Fifth Circuit decision ruling that Florida Power and Light had conspired with Florida Power Company to divide the wholesale power market in Florida. The Commission reasoned that Section 105a was designed to supplement court ordered relief and that until the federal district court issued its decision it was unclear what supplementary relief from the Commission might be necessary. The case was argued January 9, 1981. Thereafter the federal district court lawsuit was settled. On September 29, 1981 the court granted the NRC's motion to hold this case in abeyance pending consideration by the NRC of the effect of that settlement. Subsequently the parties entered a joint stipulation to dismiss this case with prejudice, and the court on March 25, 1982 dismissed the case.

Honicker vs. NRC (D.C. Circ. No. 81-2006, U.S.S.Ct. No. 82-429)

Ms. Honicker filed this petition for review on September 14, 1981, seeking judicial review of the Commission's denial of her petition to close down virtually the entire nuclear industry. 46 Fed. Reg. 39573 (Aug. 4, 1981). The Court of Appeals cancelled oral argument and thereafter dismissed Ms. Honicker's petition for review without opinion on May 11, 1982. 679 F.2d 261 (Table). Ms. Honicker's petition for *certiorari* with the Supreme Court was denied on October 18, 1982. 51 U.S.L.W. 3287.

Horry County v. Myrtle Beach (U.S.D.C. S.C. Nos. 82-1125-0 & 82-1160-0)

The United States of America was a named defendant in this suit to quiet title filed May 13, 1982; suit was not brought against the NRC. Subsequent to a transfer of title of airport land in which the Civil Aeronautics Administration (CAA) had retained various interests on behalf of the United States, the CAA in 1953 quitclaimed all title for the United States to any rights in the real estate except for mineral rights involving "fissionable materials," i.e., uranium. Because the retention of interest was pre-Atomic Energy Act of 1954 boilerplate resulting from the then-prohibition on non-government ownership of fissionable materials, there was no federal basis for such a claim today. Accordingly, the case against the United States was dismissed on June 22, 1982.

Jaffer v. NRC (D. C. Circ. No. 82-1242)

On February 25, 1982, petitioner Joel Jaffer sought to proceed *in forma pauperis* to challenge the Commission's denial of his request for a hearing on the order confirming Florida Power & Light Company's commitment to comply with requirements related to the TMI Action Plan. The Commission denied this request because the petitioner did not allege any interest which would be adversely affected by imposition of the terms of the order and because he did not set forth with particularity the factors regarding his interest in the proceeding as required by 10 CFR 2.714. On March 16, 1982, the Commission opposed the motion to appeal *in forma pauperis* and cross-moved for summary affirmance of its decision. On July 6, the D.C. Circuit dismissed the appeal as frivolous.

Jaffer v. NRC (S.D.Fla. No. 82-0006-Civ-CA)

Petitioner Joel Jaffer sought to proceed *in forma pauperis* to review the Commission's issuance of license amendments to Florida Power and Light Co. to repair the steam generators at Turkey Point. The court denied leave to proceed and dismissed this lawsuit as frivolous on February 2, 1982. Reconsideration was denied on February 26, 1982. Subsequently a motion for leave to appeal *in forma*

pauperis was denied on May 20, 1982 as frivolous and not in good faith. Plaintiff did not pursue any further appeals.

Jaffer v. Brown and NRC (D.C. Cal. No. CV-81-4958-R(G)) (appeal 9th Cir. Nos. 82-5283, 5339, and others)

On September 22, 1981, plaintiff *pro se* Joel Jaffer sued to enjoin lowpower testing and operation at Diablo Canyon until the State Water Quality Control Board, then considering a Pacific Gas and Electric request to renew its discharge permit for the plant, ruled on the request. The NRC moved to dismiss on the grounds that plaintiff (1) lacked standing to use based on alleged inadequacies in the licensing process because he never participated in NRC proceedings; (2) failed to exhaust 10 CFR 2.206 remedies; and (3) failed to present a valid basis for relief. Plaintiff filed no written opposition to this motion, and on January 12, 1982, the magistrate dismissed the lawsuit. Plaintiff then filed several notices of appeal. On April 21, 1982, the NRC moved for a certification by the District Court that plaintiff's appeals were frivolous. On May 25, 1982, the District Judge granted the NRC motion. On July 23, 1982, the Ninth Circuit denied leave to appeal *in forma pauperis* and provided plaintiff until August 13 to pay the required docketing fee. Subsequently the appeals were dismissed for default.

Jaffer v. NRC (D.C. Circ. No. 81-8035/U.S.S.Ct. No. 81-6119)

On August 19, 1981, petitioner sought leave to proceed in *formai pauperis* to contest the Licensing Board opinion authorizing the issuance of two license amendments for the Turkey Point nuclear power plant steam generator repairs. On October 2, 1981, the court issued an order denying the motion as frivolous, holding that petitioner was not a party to the administrative proceedings and had no standing to file this petition for review. Petitioner's motion for rehearing *en banc* was denied on December 7, 1981. Petitioner filed for *certiorari* on November 18, 1981. NRC waived its right to respond to this petition and the Court declined review on March 23, 1982. 72 L.Ed.2d 145.

Jaffer v. Brown and NRC (9th Circ. No. 81-5878)

Petitioner Joel Jaffer on November 4, 1981 requested the court to issue a stay of the Diablo Canyon low-power license as part of his appeal of a denial of class action certification. The NRC opposed the request and cross-moved to dismiss the appeal, to the extent Jaffer sought relief with respect to the license, for lack of standing. On November 12, 1981, the Ninth Circuit dismissed the entire appeal for lack of jurisdiction on the ground that the order denying certification was not an appealable interlocutory order.

Kelly v. Hendrie, et al. (D.D.C. No. 79-1550)

On June 14, 1979, plaintiff sued the NRC alleging age and sex discrimination in her efforts to be promoted and retaliation as a result of initiating EEO proceedings. Plaintiff sought retroactive promotion and an injunction against discrimination. District court consideration was deferred pending resolution at the administrative level. An EEOC hearing examiner found that the NRC had discriminated on the basis of age, but did not find sex discrimination. The EEOC appellate level upheld these findings. Plaintiff dismissed her case with prejudice on June 16, 1982. Corrective personnel action is now being implemented.

Kertis v. United States (W.D. Pa. No. 77-1259)

On November 4, 1977, plaintiff sued the United State to recover damages for the death of her husband, who contracted leukemia after having been a worker in the Westinghouse Cheswick facility engaged in repair of Navy submarine pumps. Westinghouse held a byproduct license permitting it to possess a small amount of radioactive material incident to maintenance of Navy reactor components. On January 25, 1982, the United States moved for involuntary dismissal on the grounds that plaintiff has failed to diligently prosecute her case. The case was dismissed in May 1982.

Natural Resources Defense Council v. NRC (D.C. Circ. Nos. 80-1863 & 1964)

These lawsuits, filed July 28, 1980, seek review of two Commission orders involving the NFS Erwin facility. In No. 80-1863, NRDC challenged an interlocutory Commission order that granted NRDC a hearing on a proposed license amendment for the NFS Erwin facility but which was less adversary than petitioners sought. In No. 80-1864 NRDC challenged an immediately effective rule issued June 26, 1980 which amended the Commission's rules of procedures to incorporate the military function exception of the Administrative Procedure Act, and applied that adjudicatory exception to the ongoing license amendment proceeding for NFS Erwin. On June 11, 1982, the D. C. Circuit Court of Appeals decided these lawsuits in favor of the NRC. The court dismissed No. 80-1864 as moot. With regard to No. 80-1863, the court held that the Notice of Hearing was not a final order and accordingly not yet reviewable. 680 F.2d 810.

**New England Power Co. v. NRC* (1st Cir. NO. 81-1839)

On November 25, 1981, the New England Power Company and sixteen other utilities sued the NRC to review an amendment to 10 CFR 170.12, published at 46 Fed. Reg. 49573 (Oct. 7, 1981), which clarified the former regulation by specifying that the NRC has the authority to collect fees for reviewing

license applications even where no license is granted. The utilities contended that the imposition of fees is authorized only where the NRC review culminates in the issuance of a license; or alternatively, if such fees are authorized, that the NRC had no implementing regulations prior to the October 7, 1981 regulation. On July 19, 1982, the First Circuit found that a fee could be collected even if no license issued but that the NRC had failed to provide notice that it intended to charge fees for withdrawn applications. The court therefore held that the NRC could not collect these particular fees. 683 F.2d 12.

New York v. NRC (2d Cir. No. 75-4278)
Natural Resources Defense Council v. NRC (2d Cir. No. 75-4276)

These GESMO lawsuits have been pending before the Second Circuit ever since the Supreme Court, on January 16, 1978, vacated the court of appeals decision in *Natural Resources Defense Council v. NRC*, 539 F.2d 824 (1976) and remanded the case to the Second Circuit "to consider the question of mootness." On June 3, 1982, the Second Circuit dismissed these cases as moot.

Nuclear Fuel Services, Inc. v. NRC (D.C. Cir. No. 81-2114)

Nuclear Fuel Services filed this lawsuit on October 20, 1981, to vacate a license amendment for the West Valley reprocessing facility authorizing the temporary transfer of that facility to the Department of Energy because no hearing was held on the amendment. On February 19, 1982, at the request of petitioner, the court dismissed this lawsuit.

NRC v. Radiation Technology, Inc.*, (D.N.J. No. 80-2187) (appeal 3d Cir. No. 81-2975)

On July 15, 1980, the Commission sued Radiation Technology, Inc. to collect civil penalties for a series of infractions and deficiencies at defendant's Rockaway, N.J. facility. In an opinion issued August 6, 1981, the district court granted summary judgment in favor of the NRC and sustained the penalty on all but one item of noncompliance. 519 F. Supp. 1266. Based on a detailed review of the legislative history of Section 234 of the Atomic Energy Act and an analysis of similar statutory penalty provisions, the court concluded that a licensee was entitled to a trial *de novo* on the fact of violation. Thus, the findings of prior administrative hearings are not binding on the court and a licensees may litigate anew whether regulatory or statutory requirements were violated. However, the court held that the administrative record could and in this case did support entry of summary judgment in the agency's favor on most items of noncompliance.

Notwithstanding a licensee's right to a trial *de novo* on the fact of violation, the court abjured any authority to determine independently the amount of penalty. Finding that the imposition of sanctions involved the exercise of agency discretion, the court held that the Commission's assessment would be overturned only if unwarranted in law or without justification in fact. Finally the court upheld the constitutionality of "warrantless" NRC inspections; found NRC inspections to be reasonable at any time licensed material is in use; and read a licensee's "walk-around" rights under 10 CFR 19.14(b) as an accommodation to the licensee that in no way conditions the Commission's right to inspect.

Radiation Technology appealed this decision. On June 3, 1982, the appeal was dismissed.

**Potomac Alliance v. NRC* (D.C. Cir. No. 80-1862)

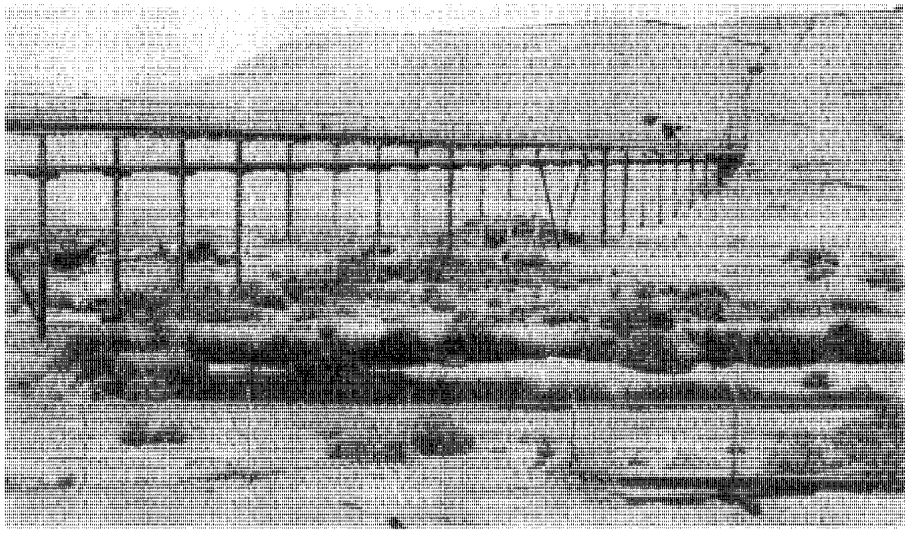
On August 28, 1980, the Potomac Alliance sought review of the Appeal Board's decision granting Virginia Electric Power Co. (VEPCO) an amendment to expand the capacity of its North Anna Unit 1 spent fuel pool. This case essentially presented the same situation as *State of Minnesota v. NRC*, 602 F.2d 412 (D.C. Cir. 1979) concerning the need to evaluate extended storage of fuel at the site after the plant's operating license expires. The NRC maintained that after the decision in *Minnesota* it could issue such licenses pending the outcome of the "Waste Confidence" proceeding, a generic proceeding to assess the availability of long-term storage. On June 20, 1982, the D. C. Circuit held that the NRC cannot indefinitely defer consideration of the impact of on-site spent fuel storage past license expiration dates while studying the outlook for waste disposal availability, but must reach a decision in the "Waste Confidence" proceeding by June 30, 1983. 682 F.2d 1036. This decision in effect affirms the Commission's policy of conducting individual spent fuel pool proceedings without consideration of extended on-site storage pending a formal generic determination of whether such alternatives to storage are likely to be available.

Riden v. NRC (7th Cir. No. 80-2793/U.S.S.Ct. No. 81-1652)

Petitioner filed this lawsuit on December 18, 1980 to review an order of the Merit Systems Protection Board sustaining the NRC decision to remove petitioner, a reactor inspector who was a candidate for assignment as a resident inspector. On January 9, 1982, the Seventh Circuit issued an order affirming the decision of the Merit System Protection Board. 676 F.2d 697. On March 5, 1982, petitioner filed for *certiorari* with the Supreme Court. The government filed a waiver of response on March 16, 1982. The Supreme Court denied the petition on April 5, 1982. 72 L.Ed.2d 176.

Riley v. NRC (D.C. Cir. No. 81-1326)

This lawsuit, filed March 23, 1981, questioned



Cases in which the handling of mill tailings and other radioactive waste materials from mining and milling operations proliferated over the past few years. Challenges to implementation of the Uranium Mill Tailings Radiation Control Act were raised in several Western states, as the tailings piles such as that shown here, continued to grow.

whether, under the PriceAnderson Act, the Nuclear Regulatory Commission is required to consider the existence of other forms of insurance maintained by licensees in determining the maximum amount of liability insurance available at reasonable cost and on reasonable terms from private sources. The Commission refused to amend its regulations to increase the amount of libability insurance required of operators of nuclear power plants by requiring the conversion of outstanding property insurance policies to liability insurance. On January 19, 1982, the D.C. Circuit upheld the Commission without opinion. 673 F.2d 552 (Table).

Rockford League of Women Voters v. NRC (7th Circ. No. 81-1772)

On May 15, 1981, the Rockford League filed a petition seeking review of the NRC's refusal under 10 CFR 2.206 to initiate a proceeding to modify, suspend or revoke the construction permit for the Byron Station pending resolution of all outstanding generic safety issues. On June 3, 1982, the Seventh Circuit issued an opinion upholding the Commission's actions. 679 F.2d 1218. The court first *sua sponte* raised the question of whether jurisdiction lies in the courts of appeals when the NRC denies a request for action under 10 CFR 2.206 and concluded that it does. As to the merits, the court held that the Commission could properly consider the safety concerns in the operating license hearings. It noted that requirement to hold an earlier hearing would not aid the petitioner if the Commission were going to act improperly.

Seacoast Anti-Pollution League v. NRC (D.C. Cir. No. 81-2146)

On October 28, 1981, the Seacoast Anti-Pollution League (SAPL) filed a petition to review an NRC decision denying SAPL's request to institute a proceeding under 10 CFR 2.206. The main issue raised by petitioner was whether the NRC abused its discretion in declining to institute a 2.206 proceeding to consider the issue of emergency preparedness at Seabrook prior to the operating license stage. Oral argument was held on May 28, 1982. On October 8, 1982, the court upheld the NRC's decision that construction should not be suspended and that a proceeding to consider emergency planning that would parallel the operating license proceeding should not be held. The court also followed the Seventh Circuit's decision in *Rockford League* and held that 2.206 denials are reviewable in the courts of appeals. 690 F.2d 1025.

Sizemore v. Georgia Power Co., et al. (S.D. Ga. No. 282-125)

This Federal Tort Claims Act case was filed on June 23, 1982, prior to exhausting administrative remedies, for the purpose of preserving the testimony of one of the plaintiffs who is not expected to survive through the beginning of trial. The compliant alleges that three individuals were exposed to harmful amounts of radiation while employed at the Hatch Nuclear Power Plant in Georgia and that all three contracted cancer as a direct result. On July 29, after the deposition of one plaintiff, the parties stipulated to a voluntary dismissal. Plaintiffs have filed an administrative claim with the agency.

Sunflower Coalition v. NRC, et al. (D. Col. Civil Action 81-66)

On January 19, 1981, Sunflower Coalition sued the NRC and the State of Colorado to (1) enforce the Uranium Mill Tailings Radiation Control Act (UMTRCA) requirement that a state must comply with the Act to the extent practicable prior to November 8, 1981, and (2) terminate Colorado's motions to dismiss this action with the District Court on April 3, 1981. The NRC motion was based on three theories: (1) that the plaintiff had not ex-

hausted administrative remedies, (2) that primary jurisdiction over plaintiff's complaint was in the NRC and (3) that review of any final agency action would properly be in the appeals courts rather than in federal district court. At oral argument in Denver on May 15, the judge ruled that primary jurisdiction was in the NRC and that plaintiff must file a petition with the NRC within twenty days of May 15 or its action would be dismissed. This plaintiff did. The NRC decided that Colorado was in compliance with UMTRCA and the agreement state programs and decided not to hold a hearing pursuant to section 274j of the Atomic Energy Act. The court, on renewed motions to dismiss, dismissed the action on March 3, 1982 for lack of subject matter jurisdiction. 534 F. Supp. 446.

**Susquehanna Valley Alliance v. Three Mile Island*, 485 F. Supp. 81 (M.D. Pa. 1979), *rev'd in part*, 619 F.2d 231 (3d Cir. 1980), *cert. denied sub nom. General Public Utilities Corp. v. Susquehanna Valley Alliance*, 449 U.S. 1096 (1981)

The Susquehanna Valley Alliance (SVA) brought this lawsuit on May 25, 1979, alleging that the Commission had approved the construction and operation of EPICOR-II, a demineralizing and filtration system design to decontaminate intermediate-level radioactive waste water resulting from the TMI acccident, and intended to allow discharge of the treated water into the Susquehanna River in violation of the Atomic Energy Act, the National Environmental Policy Act, the Clean Water Act and various provisions of the United States Constitution. On the same day and in response to a lawsuit raising virtually the same issues, (*City of Lancaster v. NRC* (D.D.C. No. 79-1368), the Commission issued a statement prohibiting the treatment or discharge of contaminated water, except for certain routine operational releases, until completion of an environmental assessment. On October 12, 1979, while the Commission was still considering EPICOR-II operation, the district court dismissed the complaint for lack of subject matter jurisdiction on the ground that SVA had failure to exhaust its administrative remedies. In March 1980, the Third Circuit reversed the dismissal of SVA's claims under NEPA, the Clean Water Act and the Constitution, but affirmed the dismissal of the Atomic Energy Act claim. A petition for writ of *certiorari*, filed by the utility, was denied January 12, 1981 with three justices dissenting.

On July 7, 1982, Judge Rambo approved a stipulation for dismissal of the lawsuit. The stipulation provides that the Susquehanna Valley Alliance shall receive copies of written correspondence between the NRC and the licensee "embodying, commenting on, reviewing, or analyzing proposals for the disposal of . . . accident-generated water" at TMI-2. In addition, any Commission order approving discharge into the Susquehanna River shall not be implemented for 45 days, exception an emergency situation.

Thot-Thompson v. McVeagh (D. Md. No. B-79-1703)

On August 16, 1979, plaintiff sued for damages alleged to be the result of certain statements made by defendant. The NRC position was that the defendant was acting within the scope of his employment with the NRC when he made the statements. The lawsuit was removed to the district court on September 13, 1979, and on August 18, 1980, the court denied the government's motion to dismiss. The Department of Justice then moved for summary judgment on January 21, 1981, which was granted on January 21, 1982.

Township of Lower Alloways Creek v. Public Service Electric & Gas Co. and NRC (3rd Cir. No. 81-2335)

On August 20, 1981, petitioner sought review of the Appeal Board's July 17, 1981 decision authorizing an amendment to expand the spent fuel storage capacity of the Salem Nuclear Generating Station, Unit 1, from 264 to 1,170 spent fuel assemblies, on the ground that an environmental impact statement is required for the NRC's policy of permitting long term storage at reactor sites through spent fuel pool expansion. The court denied the petition for review on August 27, 1982. 687 F.2d 732. The court assumed without deciding that an agency's determination not to prepare an environmental statement must be "reasonable under the circumstances," and that the NRC's decision was reasonable. The court held that in this particular case petitioner had failed to demonstrate specifically how and why the Commission's finding of "no significant impact" was somehow erroneous or unreasonable.

United Nuclear Corporation v. NRC (D.C. Cir. No. 82-1032)

On January 8, 1982, petitioner filed for review of the Commission's general license permitting persons in Agreement States who hold Agreement State Licenses for source material to also possess uranium mill tailings. On March 8, 1982, the court dismissed this case as moot because the Commission had revoked the general licenuse as unnecessary in light of the Stratton-Schmidt Amendment to the Energy and Water Development Appropriation Act (Title IV of Pub. L. No. 97-88).

United States v. Consolidated Edison Co. of New York (S.D.N.Y. No. 81 Civ. 4347)

On July 13, 1981, the United States and the Nuclear Regulatory Commission filed suit against Consolidated Edison of New York to collect $210,000 in civil penalties assessed by the Commission in March 1981. The penalty assessment against Con Edison followed the Nuclear Regulatory Commission's inves-

tigation of an incident of flooding, on October 17, 1980, of the containment at the Indian Point 2 Nuclear Power Plant in Buchanan, New York. The penalty was based upon a finding that Con Edison had failed to comply with certain conditions of its license and other requirements of the Commission. This lawsuit was settled on June 9, 1982 by payment of $185,000 by Con Edison and its consent to entry of three specific Security Level III violations on its record.

United States of America v. State of Washington, et al. (E.D. Wash. No. C-81-190) (appeal 9th Cir. Nos. 81-3454, 81-3461)

Washington State Building and Construction Trades Council, AFL-CIO, et al. v. Spellman, et al. (E.D. Wash. No. C-81-154) (appeal 9th Cir. Nos. 81-3453, 81-3460)

Two lawsuits, one by the Department of Justice filed April 13, 1981 on behalf of the excutive branch agencies, and one filed March 27, 1981 by private interests, were brought against the State of Washington challenging the constitutionality of Washington's Radioactive Waste Storage and Transportation Act of 1980. Effective July 1, 1982, that Act would have prohibited the new storage, disposal and transportation of non-medical radioactive waste within the State of Washington if such waste was generated or produced outside the State of Washington.

On June 26, 1981, Judge Robert J. McNichols, U.S. District Court, Eastern District of Washington, granted summary judgment for the United States and the other plaintiffs, holding the Washington State Radioactive Waste Storage and Transportation Act of 1980 unconstitutional and therefore unenforceable. 518 F. Supp. 928. Thus, the State's attempt to ban the storage, disposal and transportation of nonmedical, out-of-state radioactive waste as of July 1, 1981 was stopped. The State of Washington appealed to the Ninth Circuit Court of Appeals, which affirmed the District Court on August 17, 1982. 684 F.2d 627. The court held that the initiative (1) violates the supremacy clause because it seeks to regulate legitimate federal activity and to avoid the preemption of the Atomic Energy Act; (2) is not authorized under the low-level Waste Act because Washington does not yet belong to an approved compact and it bans all out-of-state wastes; and 93) violates the commerce clause.

Western Massachusetts Electric Co., et al. v. NRC (1st Cir. No. 82-1314)

Petitioners filed this lawsuit on April 5, 1982 to challenge the Commission's denial of petitioners' request for an exemption for the Haddam Neck and Millstone plants from the compliance date for installation of prompt public notification systems and around nuclear power plants. Petitioners filed their brief on June 9, 1982. The NRC brief was filed on July 16, 1982. The NRC brief took the position that denial of the exemption was reasonable agency action because the exemption request did not demonstrate any unique circumstances not contemplated by the Commission when it decided not to extned the compliance date beyond February 1, 1982. The brief also noted that petitioner's failure to achieve was not so obviously beyond its control that it should be immune from any possible enforcement action. The matter was set to be heard in October 1982. On October 5, 1982, the NRC staff concluded that no civil penalty would be imposed on the licensees in view of mitigating circumstances. The parties stipulated to the dismissal of this lawsuit which was approved by the court on October 6.

13

Management and Communication

During fiscal year 1982, the NRC expended 3,468 staff years of effort (full-time equivalent work years). Cost of operations was $459 million, compared with $421.2 million in fiscal year 1981. NRC Headquarters activities continued to be dispersed in 10 buildings located in the District of Columbia and Maryland. The agency made several major organizational changes, including establishment of a new Office of Investigations and consolidation of the Offices of the Controller and Management and Program Analysis into a new Office of Resource Management. NRC continued to stress its regionalization program in hiring policies and organizational shifts to reflect the broader responsibilities placed in the regions. This chapter describes the personnel, funding, and other essential management and administrative functions and actions of the NRC, as well as public communications activities.

STRENGTH AND STRUCTURE

Personnel Strength

In 1981 NRC began counting personnel in terms of "Full-Time Equivalent" (FTE) work years instead of the traditional method of counting end-of-year employment in full-time permanent positions. Under the FTE system, the Office of Management and Budget (OMB) allocated a ceiling to the agency of 3,325 staff years of effort by individuals with permanent, full-time appointments, and the equivalent of an additional 123 staff years for individuals with other types of appointments, such as temporary employees and consultants. This gave the agency a total ceiling of 3,448 staff years. The agency used a total of 3,468 staff years, about one-half of one percent over its FTE ceiling.

Sixty-six percent of NRC employees hold college degrees. More than one-third of these are masters degrees. Nearly 6 percent are professional (mostly law) degrees, and 18 percent are doctorates. Employees trained as scientists or engineers comprise more than half the agency's workforce.

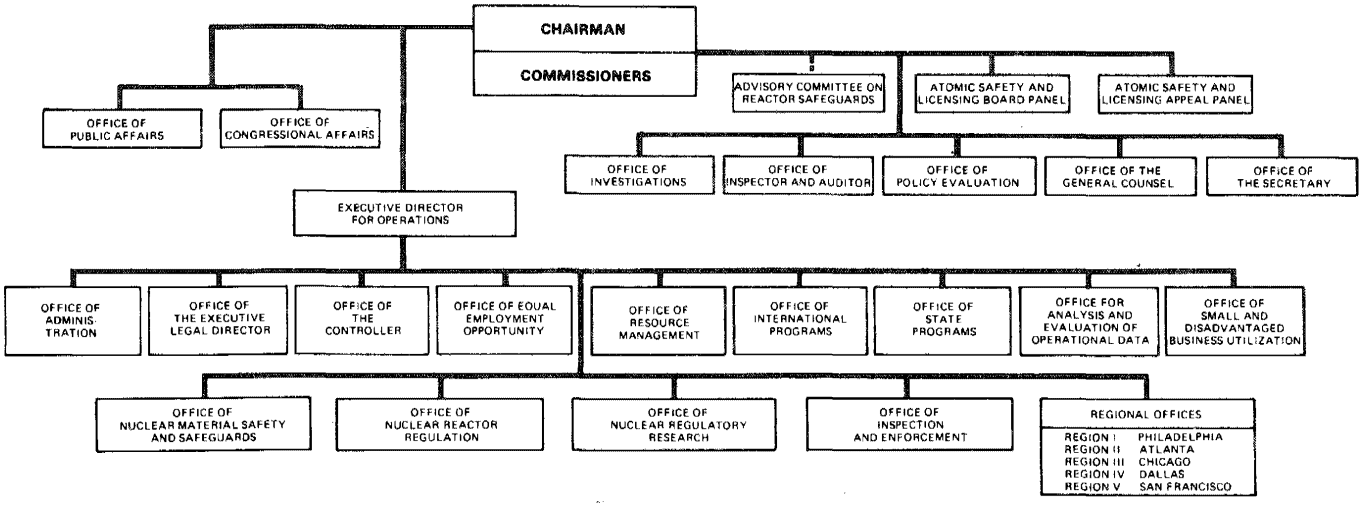
Commission and Director Changes

After Peter Bradford resigned on February 18, 1982, there were only four Commissioners. On May 15, 1982, James K. Asselstine was appointed a Commission member, and the Commission again reached its full strength of five members.

The following changes took place in the principal staff:

- In January 1982, Guy H. Cunningham was appointed Executive Legal Director. He succeeded Howard Shapar, who retired.
- In February 1982, Learned W. Barry became the Director of the newly formed Office of Resource Management while retaining his responsibilities as Controller.
- In August 1982, Patricia G. Norry was appointed Director, Office of Administration. She succeeded Daniel J. Donoghue, who retired.
- In August 1982, Jack W. Roe was appointed Deputy Executive Director for Operations. He succeeded E. Kevin Cornell who assumed the position of Technical Assistant to Commissioner Asselstine.
- In September 1982, John E. Zerbe was appointed Director of the Office of Policy Evaluation.

NRC ORGANIZATION



The Advisory Committee on Reactor Safeguards designated Paul G. Shewmon as its chairman for calendar year 1982.

Recruitment

During the first half of fiscal year 1982, a heavy emphasis was placed on hiring. In the second half, implementation of the NRC's regionalization program significantly reduced hiring activity in Headquarters as the recruitment emphasis shifted to employment opportunities in the Regional Offices.

Staff Reorganizations

The establishment of the Office of Investigations was one of the important organizational changes of 1982. Created to fill the need for a centralized and high-level focus on NRC investigations, the new office combines functions and resources previously dispersed among the Office of Inspection and Enforcement and the five regional offices. The new Office of Investigations is responsible for conducting, supervising, and controlling the quality of investigations of licensees and applicants, as well as their contractors and vendors. The Office is also charged with developing the policy, procedures, and standards for the conduct of all such investigations.

Other important changes included:

- Consolidating the Offices of the Controller and Management and Program Analysis into a new Office of Resource Management.
- Merging of the Offices of Small and Disadvantaged Business Utilization and Equal Employment Opportunity into an Office of Small and Disadvantaged Business Utilization/Civil Rights. This new office also incorporated the Federal Women's Program work previously located in the Office of Administration.
- Functional and organizational realignments in the Office of Inspection and Enforcement to improve its ability to carry out its revised role as a policy and oversight office.
- Reorganizations in the regional offices, principally in administrative areas, to reflect the broader responsibilities they have been assigned under the NRC regionalization program. (See Table 1.)
- Shifting from the Office of Nuclear Material Safety and Safeguards to the NRC Region IV Office in Dallas responsibility for operational tasks regarding regulation of uranium recovery from mill tailings, and the related establishment of the Uranium Recovery Field Office in Denver, Colo.

OFFICE OF INVESTIGATIONS

The Office of Investigations (OI) was established in 1982 to improve NRC's capability to perform thorough, timely and objective investigations. The office is responsible for the conduct, supervision and quality control of investigations of licensees, applicants, contractors or vendors undertaken at the request of the Commission, the Executive Director for Operations, Regional Administrators, other Office

Directors, or other investigations on OI's own initiative. This includes investigating all allegations of wrongdoing by individuals or organizations other than NRC employees and NRC contractors. For example, allegations regarding falsification of records, intimidation of quality control inspectors and deliberate violations of NRC regulations and requirements fall within the purview of OI.

OI formally commenced operations on July 19, 1982, with the transfer of the investigative staff from the Office of Inspection and Enforcement and from the five NRC Regional Offices to the Office of Investigations. OI consists of a Headquarters complement and five field offices. The field offices are collocated with, but are independent of, the five Regional Offices. They provide a centralized, Headquarters-oriented focus on NRC investigations.

OI develops policy, procedures and quality control standards for the conduct of all OI investigations and keeps the rest of the agency informed of matters under investigation as they affect safety matters. OI also keeps abreast of the NRC inspection program for licensees, permittees, and applicants, and their contractors or vendors, in order to advise the Commission, the Executive Director for Operations, and Regional Administrators of the need for formal investigations.

OI investigations are conducted by experienced investigative personnel who also maintain liaison with Federal, State and local law enforcement agencies. A program is being instituted to provide investigators with appropriate training and refresher courses.

NRC EMPLOYMENT PROFILE

	SEPTEMBER 30, 1982				SEPTEMBER 30, 1981			
	MEN		WOMEN		MEN		WOMEN	
	NON-MINORITY	MINORITY	NON-MINORITY	MINORITY	NON-MINORITY	MINORITY	NON-MINORITY	MINORITY
EXECUTIVE	5	0	0	0	5	0	0	0
SES	191	3	3	0	187	3	3	0
GS-18	1	1	0	0	1	1	0	0
GS-17	5	0	2	0	3	0	1	0
GS-16	29	1	1	0	13	1	2	0
GS-15	574	39	16	1	535	32	13	0
GS-14	657	94	40	7	599	79	25	5
GS-13	306	37	61	13	308	40	42	14
GS-12	125	14	70	16	130	21	63	6
GS-11	48	10	58	14	52	9	61	17
GS-1-10	92	32	577	172	118	34	560	172
OTHER*	21	9	2	0	25	8	0	0

*Employees whose salaries are set wage board, scientific & technical schd, or admin determination.

Table 1. NRC Headquarters Functions Planned for Regionalization

This table shows the NRC headquarters activities that were transferred to the regions in fiscal year 1982 and the transfers planned during fiscal years 1983 through 1985. The total number of operating reactor licensing actions will be distributed among the regions according to the nature of the actions pending and the capability of the various offices to handle them. In fiscal year 1984, licensing authority for six operating power plants in each region is planned for transfer to Regions I, II and III. In fiscal year 1985, licensing authority for six additional power plants in each of the five regions is planned for transfer.

	Function	*FY 1982*	*FY 1983*	*FY 1984*	*FY 1985*
1.	Operating Reactor licensing actions—technical review	364 All regions	400 All regions	500 All regions	615 All regions
2.	Licensing authority for operating power reactors[a/]	—	Region IV: 1 reactor	Regions I, II, III: 6 reactors per region; Region IV: 1 reactor	Regions I, II, III: 12 reactors per region; Region IV: 7 reactors; Region V: 6 reactors
3.	Licensing authority for TMI-2 cleanup[b/]	—	—	Region I	Region I
4.	Licensing authority for operating non-power reactors	—	All non-power reactors in Regions I, IV, V	All non-power reactors in all regions	All non-power reactors in all regions
5.	Licensing authority for new and renewal applications for non-power reactors	—	—	All non-power reactors in Regions I, IV, V	All non-power reactors in all regions
6.	Administer reactor operator license examinations (NRR)	Region III[c/]	Region II, III[c/]	All regions	All regions
7.	Uranium mill tailings (NMSS)	—	Region IV	Region IV	Region IV
8.	Authority to issue materials licenses (NMSS)	7 types of high volume licenses, Regions I, III	7 types of high volume licenses, Regions I, III	12 types of high volume licenses, All regions	12 types of high volume licenses, All regions
9.	Issue safeguards license amendments which do not decrease effectiveness for reactors and SNM facilities (NMSS)	—	Regions I, II	All regions	All regions
10.	Conduct transportion route surveys and review contingency plans for spent fuel and Category 1 SNM shipments (NMSS)	—	—	Region III	All regions
11.	Perform closeout surveys and termination of uranium fuel fabrication licenses (NMSS)	—	All regions	All regions	All regions

	Function	*FY 1982*	*FY 1983*	*FY 1984*	*FY 1985*
12.	Maintain oversight of 10 CFR 70 licenses for advanced fuel (Pu) plants for decontamination and decommissioning. (NMSS)	—	All regions	All regions	All regions
13.	Issue proposed civil penalties.[d/] (IE)	All regions	All regions	All regions	All regions
14.	Issue orders and make 10 CFR 2.206 decisions consistent with the transfer of licensing authority from NRR. (IE)	—	Regions I, IV, V	All regions	All regions
15.	Conduct special licensing activities for operating reactors after emergency preparedness appraisal and reports (IE)	—	All regions	All regions	All regions
16.	Observe and appraise the annual emergency preparedness exercises for operating reactors. (IE)	All regions[e/]	All regions[e/]	All regions	All regions
17.	Provide legal assistance consistent with the transfer of functions to review severity level III, proposed civil penalties, material licenses, mill tailings licenses, and reactor licensing. (ELD)	All regions	All regions	All regions	All regions
18.	Provide state agreement officer. (SP)	Regions II, IV	Regions I, II, IV, V	Regions I, II, IV, V	Regions I, II, IV, V
19.	Continue state liaison function.	All regions	All regions	All regions	All regions
20.	Perform license fee billings for materials licensing and inspection activities. (ADM)	—	Regions I, III	All regions	All regions
21.	Perform budget formulation/execution and management information reporting activities.	All regions	All regions	All regions	All regions
22.	Perform various administration	—	All regions	All regions	All regions

a/ NRR will retain licensing authority for certain types of operating power reactor licensing actions (e.g., pressurized thermal shock, steam generator inspection and repair, etc.).
b/ The transfer of this function remains uncertain until the licensee funding sources are confirmed and major core removal activities begin.
c/ NRR will provide for contract examiner assistance.
d/ With IE concurrence.
e/ With IE assistance.

EMPLOYEE - MANAGEMENT RELATIONS

Incentive Awards Program

NRC managers recognized the high quality of work performed by their staff members during the year by presenting 133 special achievement awards, 175 high quality performance increases, 54 certificates of appreciation, 2 meritorious executive rank awards, 37 SES bonuses, 3 distinguished service awards, 29 meritorious service awards, and 1 equal employment opportunity award. In addition, 4 NRC employees were rewarded for suggestions adopted by the agency.

Union Activity

On July 14, 1981, the three-year collective bargaining agreement negotiated between the NRC and the National Treasury Employees Union (NTEU) became effective. Training sessions were conducted to educate managers and supervisors about the 52 articles contained in the Agreement. By October 1, 1982, management had begun reviewing collective bargaining issues in preparation for the contract reopener in January 1983. This reopener allows each party to propose one new article and the amendment of not more than two current articles.

General Labor Relations

Approximately 245 grievances and 11 unfair labor practices were handled during the year. Negotiations were held on some 82 issues during the year.

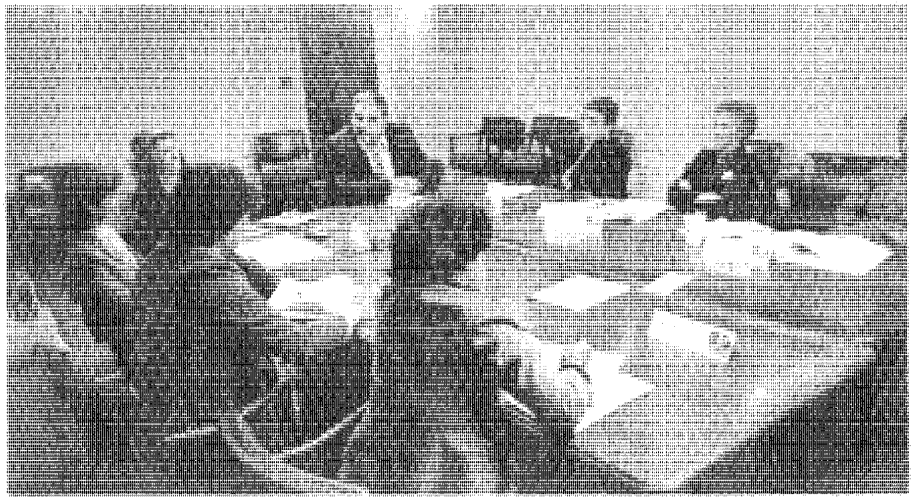
Personnel Directives

Management directives on several important personnel matters were published in the NRC Manual. A chapter on employment outlined policies and procedures for NRC's independent merit system in the excepted service. This independent merit system forms the basis for the NRC's continued agreement with the Office of Personnel Management for movement, under specified conditions, of personnel between the civil service system and the NRC. Other directives covered leave administration, hours of work, employee conduct, and performance appraisal. The agency's new non-SES performance appraisal system went into effect on October 1, 1981. The performance appraisal system for non-bargaining unit employees was revised to minimize differences with the system negotiated for bargaining unit employees.

Training and Development

A broad spectrum of NRC employees received training in both technical/ scientific and nontechnical areas. The objectives were to (1) help new employees orient themselves rapidly to NRC operations;

Mary Ellen Conmy of Bismarck, North Dakota, was Girls Nation's choice to serve as Chairman of the U.S. Nuclear Regulatory Commission during the July, 1982 Girls National meeting in Washington, D. C. Girls Nation is sponsored by the American Legion Auxiliary. Ms. Conmy is shown here with Dr. Nunzio J. Palladino, NRC Chairman.



NRC's Regional Federal Women's Program (FWP) Managers met with Victor Stello, Deputy Director for Regional Operations and Generic Requirements during a two-day Symposium on September 28-29 at NRC headquarters. Shown are Teresa Darden, Region I; Lucy Millines, Region II; Marcia Smith, Region III; Connie Latigo, Region IV; and Nellie Western, Region V. Also present is Ruth Anderson, FWP Manger, and Dr. Kathryn Bissell, assistant to Commissioner John Ahearne and Chair of the NRC Federal Women's Program Advisory Committee.

(2) help onboard professional employees stay current with technological and policy developments and with changing NRC regulations and requirements; (3) help all employees maintain and improve their job skills and performance; and (4) provide present and prospective supervisory and executive personnel with management development and training.

In addition, retraining was provided for employees affected by reassignments and organizational or mission changes. The NRC executive and management development program was designed to meet all requirements of the Civil Service Reform Act of 1978 and was implemented to provide relatively brief onsite training of immediate impact on the work place.

Civil Rights Program

The civil rights program continues to assure a climate for improved employee morale by promoting and maintaining EEO counseling activities, supporting advisory groups and providing general advice to agency officials on civil rights matters. In 1982, Chairman Palladino signed the Affirmative Action Plan for fiscal year 1982. The plan then was submitted to the Equal Employment Opportunity Commission. In addition, a new Labor Management - Equal Employment Opportunity Committee was created to address issues of interest in the EEO area and to futher support the EEO program.

Hiring goals in the professional occupations were assigned to each major office and regional office. Despite the hiring freeze and subsequent hiring restrictions, 38 women and 14 minority candidates were hired for professional positions.

Federal Women's Program

A "Salute to American Women" seminar was offered in celebration of National Women's History Week, March 7-13, 1982. Major subjects covered were (1) critical issues facing women today and in the future, (2) stress reduction and (3) self-esteem.

A two-day symposium for regional FWP managers was held in September 1982 at NRC Headquarters. The new emphasis on hiring at the regions greatly enhances the responsibility of FWP managers in monitoring the personnel system. Accordingly, the symposium focused on such activities as identifying systemic barriers to employment and advancement of women employees; devising strategies to eliminate barriers; and working with high level management to implement the strategies. In addition:

- A sexual harrassment training program is being developed and will be presented by the FWP Manager to NRC employees in fiscal year 1983.
- A new FWP Advisory Committee was formed on July 27, 1982 to provide advice and recommendations to the FWP manager.

Latest statistics show that women constitute 35.2 percent of the agency workforce and fill 86 percent of the positions at grade GG-8 and below. Women total 2.7 percent of supergrade and SES positions and 6.3 percent of GG-13 to GG-15 positions. At the GG-13 to GG-15 level women have made a steady increase since 1975 when they comprised only 1.8 percent. In 1980, this figure increased to 3.2 percent and in 1982 it reached 6.3 percent.

OFFICE OF SMALL AND DISADVANTAGED BUSINESS UTILIZATION/CIVIL RIGHTS

In February 1982, the Offices of Small and Disadvantaged Business Utilization, Equal Employment Opportunity (EEO) and the functions of the Federal

Women's Program were consolidated into a new Office of Small and Disadvantaged Business Utilization/ Civil Rights. Principal activities of the new office in each of its three program areas follow.

Small and Disadvantaged Business Utilization Program

In cooperation with the Division of Contracts, the following procurement preference and dollar thresholds were adopted:

- $50,447,000 for total prime contracts greater than $10,000
- $21,693,000 of this total for prime contract awards to small business
- $ 3,808,000 for Section 8(a) awards
- $ 1,068,000 for subcontracts awarded to small business
- $ 121,000 for subcontracts awarded to small and disadvantaged business

A workshop for representatives of 100 high technology companies among small, disadvantaged and women-owned businesses provided an opportunity for them to meet with the NRC division and branch personnel who generate the technical requirements that lead to the award of contracts. During the year 35 interviews were conducted with firms wanting to do business with NRC, and 11 follow-up meetings were arranged.

INSPECTION AND AUDIT

The Office of Inspector and Auditor (IA) conducts audits, investigations, and inspections to assure the effectiveness, efficiency and integrity of NRC operations. IA also serves as the agency's inspector general, although it is not statutorily structured as such, and functions as the liaison office with the General Accounting Office (GAO) and the Department of Justice (DOJ).

During 1982, IA continued its emphasis on eliminating fraud, waste, and inefficiency and on developing ways to improve its efforts in these areas. The office issued 9 audit reports containing 28 recommendations to improve the operations of various NRC programs and activities; 11 follow-up reports; and 13 reports of investigation. Four matters were referred to DOJ for review and possible criminal prosecution.

Some of the more important reports issued during 1982 are summarized below.

Relationship with INPO

Following the accident at TMI-2 the nuclear industry established the Institute of Nuclear Power Operations (INPO). Part of INPO's task was to evaluate nuclear utility operations, set standards for reactor operations, and disseminate information to the industry. The TMI Action Plan developed by NRC after the TMI accident called for NRC coordination with INPO in a number of areas. IA's March 26, 1982, report stated that the staff's efforts to develop a relationship with INPO generally had been good, but that they could benefit from clearer direction from management and better coordination within NRC.

Foreign Research Agreements

A February 25, 1982, report identified needed improvements in NRC's procedures for receiving, reviewing, and disseminating foreign reports. The report also discussed the need for a system to assure NRC that foreign funds are received in accordance with the agreements and that the safeguards for protecting proprietary foreign reports are adequate. The report resulted in noted improvements in NRC's procedures for receiving, reviewing, disseminating and safeguarding foreign reports.

Three Mile Island Action Plan

In a June 1981 audit, IA found that absence of management attention and inadequate coordination, control and follow-up by the NRC staff had slowed implementation of the TMI Action Plan. IA's June 17, 1982, follow-up report found that significant improvements had been made in managing of the action plan's implementation. Management responsibilities had been clarified; management was aware of the progress and problems associated with implementing the plan; management information systems had been put into place and were functioning; and interoffice coordination had improved.

Resident Inspection Program

A December 1979 IA report noted several problem areas in the resident inspection program. The report recommended establishing a management information system; uniform policies; an integrated inspection program; a formal career ladder for resident inspectors; and criteria for selecting resident inspectors. The report, issued when the resident inspection program was in a transitory state, also dealt with various administrative issues.

IA issued a follow-up report on July 9, 1982. It said substantial progress had been made implement-

ing the program and correcting many of the problems reported previously. This program has now evolved into the cornerstone of NRC's reactor inspection program, and the Chairman, in order to alleviate the financial hardships associated with relocating resident inspectors to individual nuclear facilities, forwarded a copy of the IA's follow-up report to Congress.

Resident Inspector Training

A December 1980 report noted that although NRC had a training program in place for resident inspectors, the program needed to become more uniform and comprehensive. IA's July 29, 1982 follow-up report indicated that NRC management had taken or was taking satisfactory action toward implementing the recommendations contained in the December 1980 report.

Data Processing Security

IA's final report in a series of audits to provide an overview of automatic data processing in NRC was issued on November 12, 1981.

The report disclosed that although the NRC had moved to implement a computer security program, the program that NRC established to protect sensitive data did not fully conform to the comprehensive security program established by the Office of Management and Budget. In the opinion of IA, the NRC computer systems were not adequately protected from disclosure, destruction or alteration of sensitive data. NRC has issued several new bulletins and operating procedures to correct some of the deficiencies. In addition, security surveys of some computer systems processing sensitive data already have been conducted.

Stratton Amendment

As a part of a waste audit report issued June 9, 1982, IA addressed the question of whether certain expenditures at particular Department of Energy laboratories violated the intent of the Stratton Amendment to NRC's 1982 appropriations bill. The amendment said:

> "... no funds appropriated to the Nuclear Regulatory Commission in this Act may be used to implement or enforce any portion of the Uranium Mill Licensing Requirements published as final rules at 45 *Federal Register* 65521 to 65538 on October 3, 1980..."

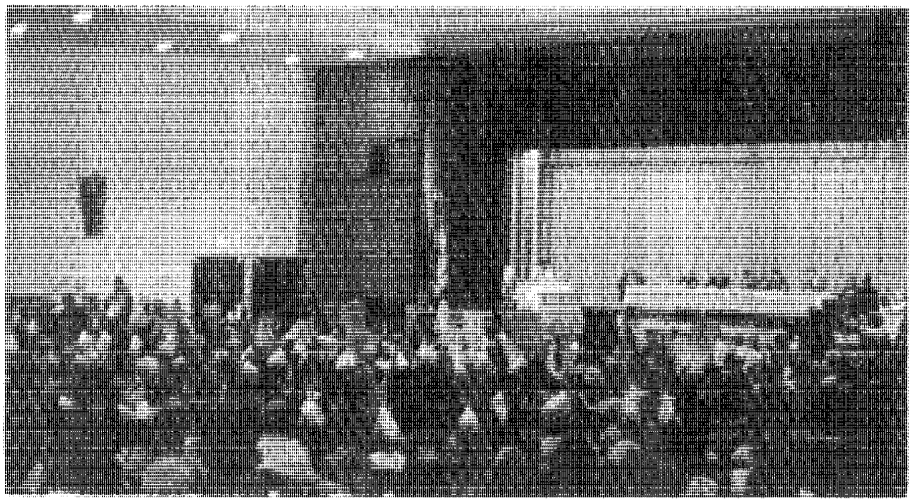
The Office of the General Counsel advised IA that the amendment did not appear to preclude NRC's expenditure of funds on research for the regulation of uranium mill tailings to the extent that such research supports NRC's preOctober 3, 1980, regulation of the uranium mill tailings. This amendment was to expire on September 30, 1982, but its provisions have been extended to include NRC's FY 1983 appropriations.

FUNDING AND BUDGET MATTERS

NRC resource charts and financial statements appear at the end of this chapter. These charts show allocations of personnel and funds to the various NRC activities for fiscal year 1982 and those projected for fiscal year 1983.

Projected staffing decreases for 1983 will occur primarily in the Office of Nuclear Regulatory Research and in some of the 11 Program Direction and Administration offices.

NRC total funding in 1983 is essentially the same as in 1982. There are, however, increases and de-



Community residents were invited to present their views to the NRC at a public hearing the Commission held on TMI-2 in Harrisburg, Pa. in November of 1982.

creases in certain programs. Increased funding will be required to obtain contractor technical assistance for the safety technology program. The funding will be used primarily to support technical resolution of generic issues and unresolved safety issues, and reliability and risk assessments of nuclear power plants. Increased research in reactor accident evaluation and mitigation as well as reactor and facility engineering will be conducted by contractors as part of efforts that were expanded following the TMI-2 accident. These efforts are geared toward understanding the behavior of damaged fuel and studying the integrity of primary reactor systems. There also will be increased funding to meet the immediate short-team research requirements necessary for licensing the Clinch River Breeder Reactor. The most significant decrease in 1983 will result from the completion of a major research effort, the NRC-supported safety testing program at the Loss-of-Fluid-Test (LOFT) facility.

Plans for future testing at the LOFT facility cali for a funding consortium that includes DOE, NRC and foreign countries. DOE will direct the consortium, and the NRC's costs will total $10 million a year for three years.

Project Management

NRC program offices contract with commercial sources and other Federal agencies, primarily DOE laboratories, for much of the research and technical assistance work that supports major programs. To obtain this outside support, standardized project management policies and procedures are followed. The project management system developed over the past eight years places major responsibility on an assigned NRC project manager. An active project manager training program consists of both formal courses and informal seminar programs. Project managers take full responsibility for all aspects of their project. They monitor and direct the technical aspects of the work as well as all financial and administrative matters.

To ensure that NRC projects are well developed and, within the financial constraints imposed, provide maximum benefit to NRC, each program office is required to coordinate its contractual efforts with other potential users and interested offices. To facilitate this function, the Safeguards Technical Assistance and Research Review Group, the Waste Management Review Group, and a Senior Contract Review Board (SCRB) have continued to examine and approve various projects which fall within their area of responsibility. Each group reviews project descriptive summaries and statements of work to assure that each project is well planned, supports NRC objectives, does not duplicate other work, and has fiscal integrity. All projects larger than $500,000 must be approved by the SCRB.

NRC Manual Chapter 1102, which governs NRC work performed by the DOE national laboratories, was revised in 1982 to include a standardized project proposal format (NRC Form 189) and explicit cost reporting procedures.

Efforts started in 1981 to revise the research coordination process were completed during 1982. This new procedure has simplified and standarized the licensing office endorsement process required of all new research work and brought about closer liaison between the program offices.

Contracting and Reimbursable Work

NRC programs are supported by substantial amounts of contractural effort for confirmatory research and technical assistance. As discussed previously under the Project Management section, this includes reimbursable arrangements with other Federal agencies and contracts with commercial sources. In 1982, approximately $270 million, or about 56 percent of the NRC's operating funds, was applied to such contractual support efforts. The DOE's share was approximately $235 million for work performed in its national laboratories and other facilities. This work included major regulatory research programs such as the Heavy Section Steel Technology program, Seismic Safety Margin Research Program and experiments at the LOFT, the Power Burst Facility, and the Semiscale Facility. (Specific research programs are described in Chapter 11.)

Contracts with commercial firms for technical assistance and research work (except work performed through DOE), as well as general purchases, are administered through the Division of Contracts, Office of Administration, in support of the responsible program offices. Such contracts totaled about $35 million during 1982.

Office of Resource Management

In 1982, the Office of the Controller and the Office of Management and Program Analysis were consolidated and reorganized into the Office of Resource Management (ORM). The new organization has provided the NRC with more efficient general and resource mangement assistance and allowed for a more effective use of staff resources.

With the additional transfer of word processing functions from the Office of Administration to ORM, the new Office of Resource Management has become the central point for automatic data processing (ADP) planning, development, software and equipment acquisitions, and word processing and management information functions.

Increased planning for long range and short term

Table 2. FY 1982 License Fee Collections

Fees	*Facilities*	*Materials*	*Total*
Applications	—	$ 284,000	$ 284,000
Construction Permits	$ 5,196,000	—	5,196,000
Operating Licenses	2,175,000	338,000	2,513,000
Amendments	—	712,000	712,000
Renewals	6,217,000	1,286,000	7,503,000
Inspection Fees	112,000	5,000	117,000
Special Projects	—	—	—
Totals	$13,700,000	$2,625,000	$16,325,000

needs, and increased management involvement in establishing priorities, also occurred in 1982. An ADP steering group and a user group were established to improve intra-agency communications and assist in determining user requirements. Emphasis also was placed on providing increased ADP support to the NRC Regional offices. The consolidation of ADP related functions, along with increased coordination with the Headquarters and Regional staff, is expected to continue to increase both the efficiency and effectiveness of ADP support to the NRC staff.

In late 1982, the Office of Resource Management established a cost analysis group to analyze costs licensees will incur as a result of proposed NRC regulatory requirements and assess the cost impact.

DOCUMENT CONTROL SYSTEM

In November 1981, Planning Reserach Corporation, Government Information System (PRC/GIS) was awarded a 2-year, $4 million contract to operate and maintain the NRC Document Control System (DCS) beginning in February 1982. In early 1982, the Office of Administration conducted a formal study to determine user requirements for a possible second-generation DCS. Included in the study were proposed objectives for second-generation system, assumptions about NRC's future mission and organization, and requirements analyses. The study recommended an evolutionary second generation system based on analysis of user requirements, operating experience with the existing DCS, and a review of alternative technologies. The Office of Resource Management endorsed the study in September 1982.

NRC LICENSE FEES

The NRC is authorized under Title V of the Independent Office Appropriation Act of 1952 to collect fees for processing applications, permits, licenses and approvals and routine health and safety and safeguards inspections.

Fees collected in fiscal year 1982 totaled $16.3 million (see Table 2). All license and inspection fees are sent to the Treasury as miscellaneous receipts.

The total collected since fees first were imposed in 1968 is $135.5 million. This figure excludes $6.5 million which was refunded to licensees because of a 1974 Supreme Court decision concerning annual fees. Also excluded was $1.9 million which has been refunded to licensees in those instances where actual costs were used to determine fees and the NRC learned that the review cost less than the fee prescribed by regulation.

The current schedule of fees, adopted March 23, 1978, provides that fees assessed for construction permits and operating licenses for power reactors will be based on actual staff time and contract costs expended to complete the review. Fees, though, are not to exceed certain upper limits established by the Commission. During fiscal year 1982, the Commission did not issue any construction permits. Five operating licenses were issued which were subject to the actual cost requirement. See Table 3 for a summary of costs and collections.

Court Decision

On July 19, 1982, the First Circuit Court of Appeals decided *New England Power v. NRC* concerning the assessment of fees for withdrawn applications. The Court held that the NRC may not bill applicants for the cost of reviewing withdrawn applications if the request for withdrawal was filed before November 6, 1981, the effective date of the Commission's rule on this matter. On August 16, 1982, the Commission decided not to pursue this matter any further. As a result, the Commission cancelled outstanding invoices totaling approximately $11 million for withdrawn applications filed between March 23, 1978 and November 6, 1981.

Table 3. Cost of OL Issuances in FY 1982

Operating Licenses	*Issue Date*	*Licensing Cost*	*Inspection Cost*	*Total Cost*	*Fees Paid*
San Onofre 2	02/16/82	$2,435,000	$482,000	$2,907,000	$1,024,500
LaSalle 1	04/17/82	—	—	—	1,024,500
Grand Gulf 1	06/16/82	—	—	—	1,024,500
Susquehanna 1	07/17/82	—	—	—	1,024,500
Summer 1	08/06/82	—	—	—	1,024,500

Although a partial power license was issued during the fiscal year, the total cost expended by the Commission for the review is not determined until the full (100 percent) power license has been issued.

PUBLIC COMMUNICATION

Public Information

Educational Seminars. The Nuclear Regulatory Commission's five regional offices initiated a second series of one-day workshops for reporters and editors from wire services, broadcast networks, news magazines and daily newspapers on the fundamentals of nuclear power reactors and the risks of exposure to radiation.

Consumer Affairs. The NRC's program for increasing public awareness and involvement in agency activities included a series of public meetings in Atlanta, Boston, Los Angeles and Chicago to receive comment on the Commission's proposed policy statement on safety goals for nuclear power plants. Three of the meetings were moderated by chapters of the League of Women Voters.

The consumer affairs program also exhibited and provided information on NRC programs at the Washington Monument Mall during opening-day ceremonies of National Consumers Week.

Press Releases. Press releases were issued announcing major Commission programs, public hearings, proposed fines against utilities and other agency actions. They were distributed to members of the news media as well as to the scientific community, universities and the general public.

Headquarters Public Document Room

The Nuclear Regulatory Commission maintains a public document (library) system throughout the United States in order that significant documents pertaining to nuclear power plants and nuclear materials can be available for inspection and reproduction by the public.

The principal Public Document Room (PDR) is located at 1717 H Street, N.W., Washington, D.C. The PDR collection consists of approximately 1,143,000 documents and adds an average of 334 new items each day. Documents available at the PDR include reports, written records of meetings (transcripts and/or meeting summaries), existing or proposed regulations, copies of licenses and/or their amendments, and technical, legal and limited administrative correspondence. The majority of these documents relate to the design, construction, operation and inspection of nuclear power plants and to the use, transport and disposal of nuclear materials, including waste.

During an average month, the PDR services 1,058 users, provides 1,423 documents in response to letters from the public, and retrieves 5,937 files or microfiche in response to requests from the public. More than 2.3 million pages of documents and 22,500 microfiche cards were purchased by the public from an on-site, contractor-operated reproduction facility during fiscal year 1982.

Staff librarians are available to help users define search strategies, employ reference tools, and locate and retrieve documents in specific files. Daily accession listings and other indexes also are available. When indexes are not appropriate or documentation cannot easily be drawn together, librarians can perform on-line computer searches of the PDR's machine-readable data base. This data base contains descriptive citations of all records submitted to the PDR after October 1978 and of principal licensing documents dated earlier.

Persons who want to use or obtain additional information regarding holdings, file organization, reference, reproduction services, and procedures of the PDR may call (202) 634-3274 or write to the U.S. Nuclear Regulatory Commission, Public Document Room, Washington, D.C. 20555. A "Public Document Room User's Guide" and "Public Document Room File Classification System" guide are available upon request. Guided tours of the facility and orientation/training for individuals or groups inter-

NRC Chairman Nunzio J. Palladino advocated a high degree of openness on the part of NRC officials, and set the example by making many public appearances in speeches and press conferences. He is shown here talking with the media in Harrisburg, Pa., following an all-day hearing on the restart of the undamaged Three Mile Island Unit I.

ested in using the facility can be arranged by appointment.

Local Public Document Rooms

Through its local public document room program, the NRC makes document collections available to the public near the sites of proposed and operating nuclear power plants. These collections contain information regarding the licensing, construction, operation, inspection, and regulation of nearby nuclear facilities. They include documents dealing with such matters as health and safety, safeguards, and environmental and antitrust considerations. Local public document room collections usually are located in university or public libraries that have copying facilities and are open to the public during the evening and on weekends. Currently, more than 130 local public document rooms (LPDRs) are in operation. (See Appendix 3 for a list of LPDR locations.)

Annual site visits to LPDR libraries are made to assure that collections are properly maintained and readily accessible to the public. In 1982 the NRC began an "awareness" program designed to inform the public about the existence and availability of documents at the local level. The program includes announcements in local newspapers and library newsletters and evening workshops at individual LPDR libraries. The workshops are open to the public, and trained NRC staff provides instruction in identifying, locating and retrieving information. A toll-free telephone number (1-800-638-8081) is available to library staffs and individuals who need rapid, convenient answers to questions about such topics as collection content, search strategies, use of reference tools and indices, and locating and retrieving information at LPDR sites. The LPDR branch staff in Bethesda, Md., operates this telephone service.

Other ongoing programs include providing financial assistance and micrographic support to LPDR libraries. Financial help is needed to defray the cost of maintaining collection and reference services provided for the NRC. Micrographic aid is necessary to provide microfiche reader-printers and storage cabinets, as well as selected NRC documents on microfiche. Providing LPDR libraries with a micrographic capability broadens the scope of collection content without unnecessarily adding to the libraries' limited shelf space. Information available at LPDRs in a microfiche format also includes NUREGs, Regulatory Guides, NRC issuances and the NRC's rules and regulations.

Publication Sales Program

After three years of operation, the NRC/Government Printing Office sales program is processing almost 700 requests a month for copies of NRC publications. Subscription services have expanded to include 37 different NRC publications and more than 13,000 subscribers in 1982. Sales of NRC publications accounted for approximately $1 million in recovered revenue for the U.S. Government during fiscal year 1982.

Comprehensive Records Schedule

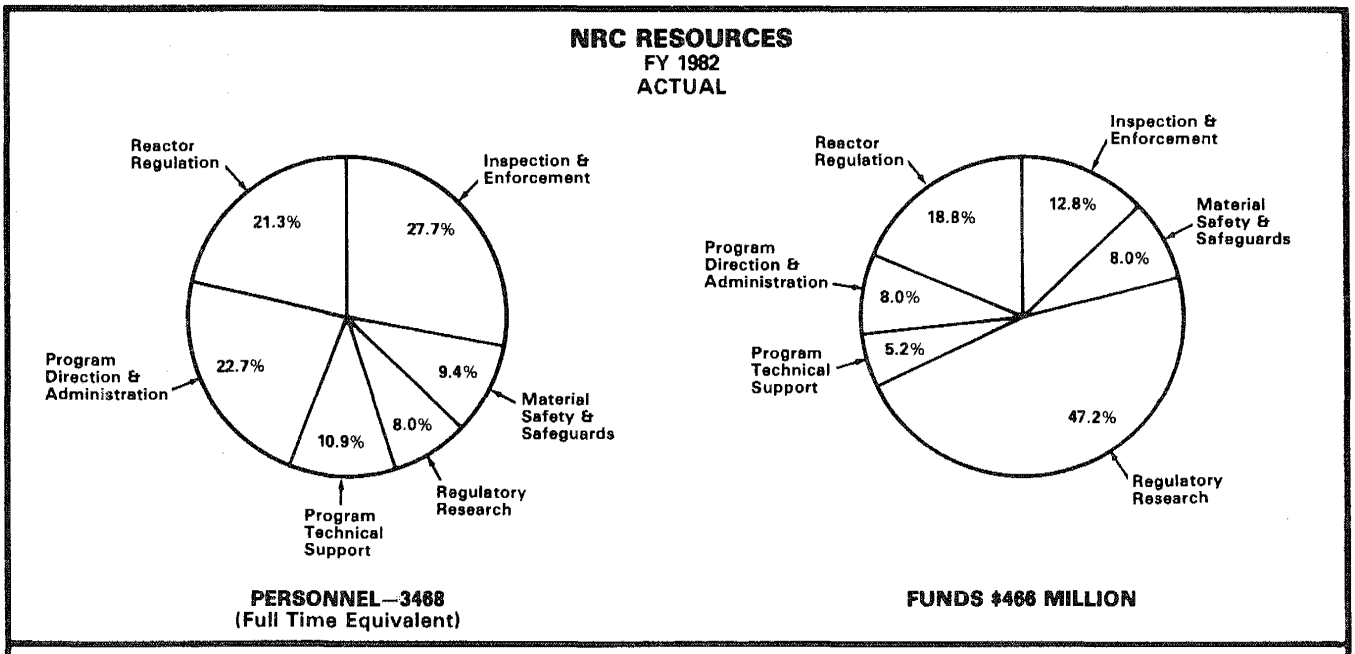
During 1982, the NRC obtained the approval of the Comptroller General and the U.S. Archivist for

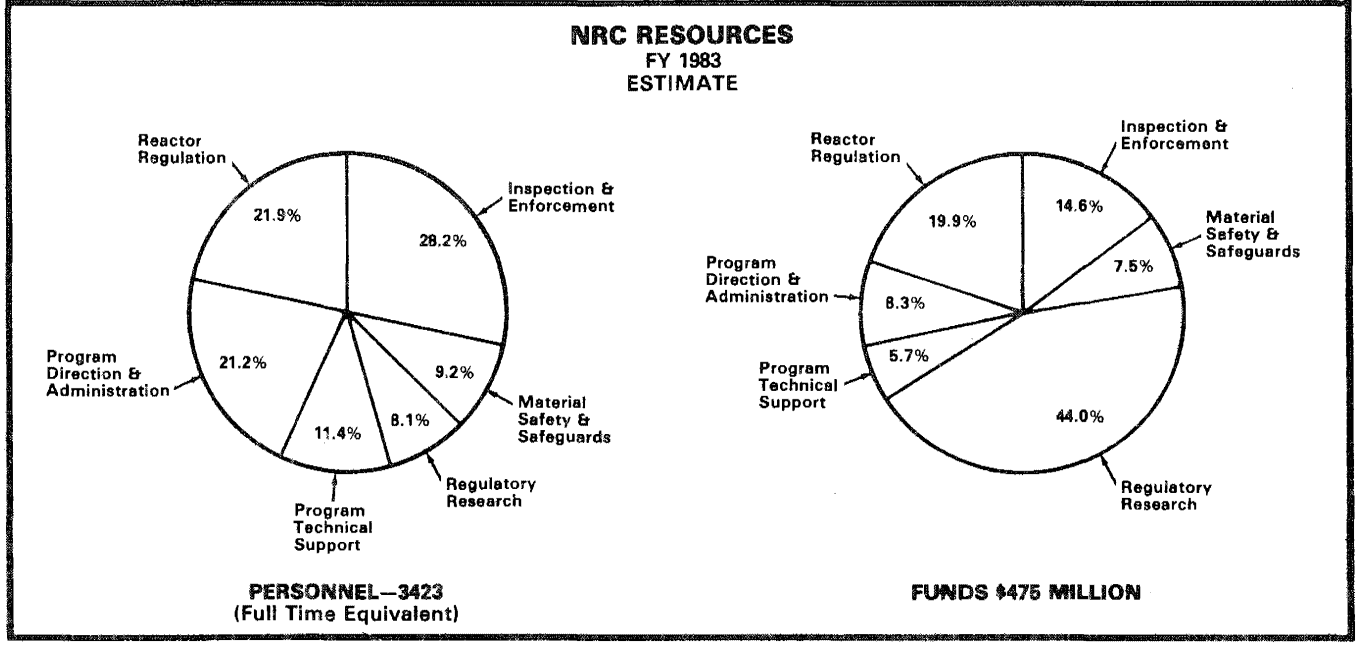
the first comprehensive schedule for the retention and disposition of government nuclear-related records in the United States. NRC issued the comprehensive records schedule as NUREG-0910.

Development of the comprehensive schedule was a major factor in the selection of R. Stephen Scott, Chief, Document Management Branch, as the 1982 recipient of the Everett O. Alldredge Award. The award recognizes the year's outstanding Federal Information Resources Manager.

Licensee Communications

In 1982, the NRC amended Title 10, Part 50, Section 4 of the Code of Federal Regulations and issued Generic Letter 82-14. These measures clarify NRC's reporting requirements and specify how applicants and licensees may submit microfilm in lieu of paper documents. In addition, the NRC centralized and automated the process for disseminating Bulletins, Circulars, Information Notices and Generic Letters to licensees.





FY 1981/1982 NRC Financial Statements

Balance Sheet (in thousands)

Assets	*September 30, 1982*	*September 30, 1981*
Cash:		
Appropriated Funds in U.S. Treasury	$ 215,300	$ 191,503
Other (Notes 1 & 3)	14,187	10,613
	229,487	202,116
Accounts Receivable:		
Federal Agencies	124	95
Miscellaneous Receipts - Note 2	2,165	5,687
Other	36	56
	2,325	5,838
Plant:		
Completed Plant and Equipment	16,352	14,105
Less — Accumulated Depreciation	3,877	2,442
	12,475	11,663
Advances and Prepayments:		
Federal Agencies	-0-	60
Other	4,452	2,477
	4,452	2,537
Total Assets	$ 248,739	$ 222,154

Liabilities and NRC Equity	*September 30, 1982*	*September 30, 1981*
Liabilities		
Funds held for Others - Notes 1 & 3	$ 14,187	$ 10,613
Accounts Payable and Accrued Expenses:		
Federal Agencies	83,293	64,329
Other	18,040	19,111
Accrued annual leave of NRC Employees	10,055	8,590
Deferred revenue - Note 3	1,365	4,294
Total Liabilities	126,940	106,937
NRC Equity: Balance at October 1	115,217	96,086
Additions:		
Funds Appropriated-Net	465,700	439,901
Non Reimbursable Transfer From Other Gov't Agencies	68	-0-
	580,985	535,987
Deductions:		
Net Cost of Operations	442,617	407,084
Funds returned to U.S. Treasury - Note 2	16,569	13,686
	459,186	420,770
Total NRC Equity	121,799	115,217
Total Liabilities and NRC Equity	$ 248,739	$ 222,154

Note 1. As of September 30, 1982, includes $5,917,138.75 of funds received under cooperative research agreements involving NRC, DOE, Euratom, France, Federal Republic of Germany, Japan, Austria, the Netherlands, Belgium, and the United Kingdom.

Also included is $7,682,148.00 of funds received from deferred revenue billings. These funds will be refunded and/or recorded as earned revenue after the cost of processing the applications has been finalized and accordingly, are not available for NRC use. See Note 3.

Note 2. These funds are not available for NRC use.

Note 3. On March 24, 1978, 10 CFR 1 was revised. Contained therein by category of license are maximum fee amounts to be paid by applicants at the time a facility or material license is issued. Also, after the review of the license application is complete, the expenditures for professional manpower and appropriate support services are to be determined and the resultant fee assessed. In no event will the fee exceed the maximum fee for that license category, which generally has been paid. This could involve the refunding of a significant portion of the initial amount paid. Therefore, the revenue is recorded in a deferred revenue account at the time of billing and is removed from this account and recorded in Funds Held for Others when the bill is paid. The balance in the Deferred Revenue account consists of deferred revenue on billings issued but not collected. See Note 1.

Note 4. Represents current year cost of plant and equipment acquisitions for use at DOE facilities.

FY 1981/1982 Statement of Operations (in thousands)

	Fiscal Year 1982 (October 1, 1981, thru September 30, 1982)	*Fiscal Year 1981 (October 1, 1980, thru September 30, 1981)*
Personnel Compensation	$ 127,157	$ 112,832
Personnel Benefits	11,868	10,352
Program Support	261,556	242,105
Administrative Support	39,538	39,498
Travel of Persons	7,995	6,908
Equipment (Technical) — Note 4	7,428	7,383
Construction — Note 4	-0-	-0-
Taxes and Indemnities	8	16
Refunds to Licensees	1	-0-
Representational Funds	2	2
Reimbursable Work	361	249
Increase in Annual Leave Accrual	1,465	1,263
Depreciation Expense	1,530	952
Equipment Write-offs and Adjustments	63	(357)
Total Cost of Operations	458,972	421,203
Less Revenues:		
Reimbursable Work for Other Federal Agencies	379	240
Fees (deposited in U.S. Treasury as Miscellaneous Receipts - Note 2):		
Material Licenses	2,462	2,075
Facility Licenses	11,819	9,556
Other	1,695	2,248
Total Revenue	16,355	14,119
Net Cost of Operations before prior Year Adjustments	442,617	407,084
Prior Year Adjustment	-0-	-0-
Net Cost of Operations	$ 442,617	$ 407,084

U.S. Government Investment in the Nuclear Regulatory Commission

(From January 19, 1975 through September 30, 1982—in thousands)

Appropriation Expenditures:	
Fiscal Year 1975 (January 19, 1975 through June 30, 1975)	$ 52,792
Fiscal Year 1976 (July 1, 1975 through September 30, 1976)	226,248
Fiscal Year 1977 (October 1, 1976 through September 30, 1977)	230,559
Fiscal Year 1978 (October 1, 1977 through September 30, 1978)	270,877
Fiscal Year 1979 (October 1, 1978 through September 30, 1979)	309,493
Fiscal Year 1980 (October 1, 1979 through September 30, 1980)	377,889
Fiscal Year 1981 (October 1, 1980 through September 30, 1981)	416,867
Fiscal Year 1982 (October 1, 1981 through September 30, 1982)	441,902
Total Appropriation Expenditures	$2,326,627
Unexpended Balance of Appropriated Funds in U.S. Treasury September 30, 1982	215,300
Transfer of Refunds Receivable from Atomic Energy Commission, January 19, 1975	429
Funds Appropriated-Net	$2,542,356
Less:	
Funds returned to U.S. Treasury - Note 2	102,517
Assets and Liabilities transferred from other Federal Agencies without Reimbursement	1,950
Net Cost of Operations from January 19, 1975 through September 30, 1982	2,316,090
Total Deductions	2,420,557
NRC Equity at September 30, 1982 as shown on Balance Sheet	$ 121,799

Appendix 1

NRC Organization

(As of December 31, 1982)

COMMISSIONERS

Nunzio J. Palladino, Chairman
Victor Gilinsky
John F. Ahearne
Thomas M. Roberts
James K. Asselstine

The Commission Staff

General Counsel, Leonard Bickwit, Director
Office of Policy Evaluation, John E. Zerbe, Director
Office of Public Affairs, Joseph J. Fouchard, Director
Office of Congressional Affairs, Carlton C. Kammerer, Director
Office of Inspector and Auditor, James J. Cummings, Director
Secretary of the Commission, Samuel J. Chilk
Office of Investigations, James A. Fitzgerald, Acting Director

Other Offices

Advisory Committee on Reactor Safeguards, Jeremiah J. Ray, Chairman
Atomic Safety & Licensing Board Panel, B. Paul Cotter, Jr., Chairman
Atomic Safety & Licensing Appeal Panel, Alan S. Rosenthal, Chairman

EXECUTIVE DIRECTOR FOR OPERATIONS

Executive Director for Operations, William J. Dircks
Deputy Executive Director for Operations, Jack W. Roe
Deputy Executive Director for Regional Operations and
Generic Requirements, Victor Stello, Jr.
Assistant for Operations, Thomas A. Rehm

Program Offices

Office of Nuclear Reactor Regulation, Harold R. Denton, Director
Office of Nuclear Material Safety and Safeguards, John G. Davis, Director
Office of Nuclear Regulatory Research, Robert B. Minogue, Director
Office of Inspection and Enforcement, Richard C. DeYoung, Director

Staff Offices

Office of Administration, Patricia G. Norry, Director
Executive Legal Director, Guy H. Cunningham
Office of Resource Management/Controller, Learned W. Barry
Office of International Programs, James R. Shea, Director
Office of State Programs, G. Wayne Kerr, Director
Office for Analysis and Evaluation of Operational Data, Carlyle Michelson, Director
Office of Small and Disadvantaged Business Utilization/Civil Rights, William B. Kerr, Director

Regional Offices

Region I Philadelphia, Pa., Ronald C. Haynes, Director
Region II Atlanta, Ga., James P. O'Reilly, Regional Administrator
Region III Chicago, Ill., James G. Keppler, Regional Administrator
Region IV Dallas, Texas, John T. Collins, Regional Administrator
Region V San Francisco, Calif., Robert H. Engelken, Regional Administrator

The NRC is responsible for licensing and regulating nuclear facilities and materials and for conducting research in support of the licensing and regulatory process, as mandated by the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and the Nuclear Nonproliferation Act of 1978; and in accordance with the National Environmental Policy Act of 1969, as amended, and other applicable statutes. These responsibilities include protecting public health and safety, protecting the environment, protecting and safeguarding materials and plants in the interest of national security; and assuring conformity with antitrust laws. Agency functions are performed through: standards-setting and rulemaking; technical reviews and studies; conduct of public hearings; issuance of authorizations, permits and licenses; inspection, investigation and enforcement; evaluation of operating experience, and confirmatory research. The Commission itself is composed of five members, appointed by the President and confirmed by the Senate, one of whom is designated by the President as Chairman. The Chairman is the principal executive officer and the official spokesman of the Commission.

The Executive Director for Operations directs and coordinates the Commission's operational and administrative activities among the program and support staff offices described below, and also coordinates the development of policy options for Commission consideration. The EDO reports directly to the Chairman.

The Office of Nuclear Reactor Regulation licenses nuclear power, test and research reactors under a two-phase process. A construction permit is granted before facility construction can begin and an operating license is issued before fuel can be loaded. NRR reviews license applications to assure that each proposed facility can be built and operated without undue risk to the health and safety of the public and with minimal impact on the environment. NRR monitors operating reactor facilities during their lifetime through decommissioning.

The Office of Nuclear Material Safety and Safeguards. The Office of Nuclear Material Safety and Safeguards is responsible for the licensing and regulation of facilities and materials associated with the processing, transport, and handling of nuclear materials, and the disposal of nuclear waste as well as the regulation of uranium recovery facilities. NMSS reviews and assesses safeguards against potential threats, thefts, and sabotage for licensed facilities, including reactors, working closely with other NRC offices in coordinating safety and safeguards programs and in recommending research, standards and policy options necessary for their successful operation.

The Office of Nuclear Regulatory Research plans and conducts a comprehensive research and standards program that is deemed necessary for the performance of the Commission's licensing and regulatory functions and that is responsive to current and future NRC needs. The program covers areas such as facility operation, engineering technology, accident evaluation, probabilistic risk analysis, and siting, health, and waste management.

The Office of Inspection and Enforcement develops and oversees programs of inspection of nuclear facilities and materials licensees to determine whether facilities are constructed and operations are conducted in compliance with license provisions and Commission regulations; to identify conditions that may adversely affect the protection of nuclear materials and facilities, the environment, or the health and safety of the public; and to provide a basis for recommending issuance or denial of licenses. It develops and oversees a program of investigation of accidents, incidents, and allegations of improper actions that involve nuclear material and facilities; enforces NRC regulations and license provisions; and manages and directs all NRC actions related to emergency preparedness, including evaluation of State and local emergency plans performed by the Federal Emergency Management Agency (FEMA). It performs audits of its programs as carried out by NRC regional offices.

THE COMMISSION STAFF

The Office of Secretary provides secretariat services for the conduct of Commission business and implementation of decisions, including planning meetings and recording deliberations, manages the staff paper system, monitors the status of actions, and maintains the Commission's official records. The office also processes institutional correspondence, controls the service of documents in adjudicatory and public proceedings, supervises the Washington, D.C. Public Document Room, administers the NRC historical program, and provides administrative support for the Commission.

The Office of General Counsel serves the Commission in a variety of legal capacities. The Office assists the Commission in the review of Appeal Board decisions, petitions seeking direct Commission relief, and rulemaking proceedings, and drafts legal documents necessary to carry out the Commission's decisions. The General Counsel provides a legal analysis of proposed legislation affecting the Commission's functions and assists in drafting legislation and preparing testimony. The General Counsel also represents the Commission in court proceedings, frequently in conjunction with the Department of Justice.

The Office of Policy Evaluation plans and manages activities involved in performance of an independent review of positions developed by the NRC staff which require policy determinations by the Commission. The Office also conducts analyses and projects which are either self-generated or requested by the Commission.

The Office of Investigations conducts, supervises and assures quality control of investigations of licensees, applicants, contractors or vendors, including the investigation of all allegations of wrongdoing by other than NRC employees and contractors. Develops policy, procedures and standards for these activites.

The Office of Inspector and Auditor investigates to ascertain the integrity of all NRC operations; investigates allegations of NRC employee misconduct, equal employment and civil rights complaints, and claims for personal prop-

erty loss or damage; conducts the NRC's internal audit activities; and hears individual employee concerns regarding Commission activities under the agency's "Open Door" policy. The office develops policies governing the Commission's financial and management audit program and is the agency contact with the General Accounting Office on this function. Refers criminal matters to the Department of Justice and maintains liaison with law enforcement agencies.

The Office of Public Affairs plans and administers NRC's program to inform the public of Commission policies, programs and activities and keeps NRC management informed of public affairs activities of interest to the Commission. OPA reports directly to the Chairman.

The Office of Congressional Affairs provides advice and assistance to the Commission and senior staff on congressional matters, coordinates NRC's congressional relations activities, and maintains liaison for the Commission with congressional committees and members of Congress. OCA reports directly to the Chairman.

SUPPORT STAFF

The Office of Administration directs the agency's programs for organization and personnel management; security and classification; technical information and document control; facilities and materials license fees; contracting and procurement; rules, proceedings and document services, administration of Freedom of Information Act and Privacy Act requests; management development and training; telecommunications, transportation services, management of space and other administrative housekeeping services.

The Office of Resource Management develops and maintains NRC's financial and manpower management programs, including policies, procedures and standards of accounting, budgeting cost analysis, resource planning and analysis, and automatic data processing systems development and support. Provides management information for other offices and issues special reports for the NRC to Congress, other government agencies and the public. Assists NRC offices in statistical matters and in the budget process, keeping the EDO and Commission informed on programs and issues of significance. Maintains liaison with OMB, the Congress and other government agencies, and the private sector, as appropriate.

The Office of the Executive Legal Director provides legal advice and services to the Executive Director for Operations and staff, including representation in administrative proceedings involving the licensing of nuclear facilities and materials, and the enforcement of license conditions and regulations; counseling with respect to safeguards matters, contracts, security, patents, administation, research, personnel, and the development of regulations to implement applicable Federal statutes.

The Office of International Programs plans and implements programs of international nuclear safety cooperation, creating and maintaining relationships with foreign regulatory agencies and international organizations; coordinates NRC export-import and international safeguards policies; issues export and import licenses; and coordinates responses by NRC to other agencies related to export-import actions and issues.

The Office of State Programs directs programs relating to regulatory relationships with State governments and organizations and interstate bodies, manages the NRC State Agreements program, administers the indemnification program and performs financial qualification reviews of applicants and licensees. The office also verifies that applicants are not in violation of the antitrust laws.

The Office for Analysis and Evaluation of Operational Data provides agency coordination for the collection, storage, and retrieval of operational data associated with licensed activities, analyzes and evaluates such operational experience and feeds back the lessons of that experience to NRC licensing, standards and inspection activities. The office oversees action taken in response to the feedback and assesses the overall effectiveness of the agency-wide operational safety data program, serving as a focal point for interaction with the ACRS and industry groups involved in operational safety data analysis and evaluation.

The Office of Small and Disadvantaged Business Utilization/Civil Rights develops and implements the NRC's program in accordance with the Small Business Act, as amended, insuring that appropriate consideration is given to labor surplus area firms and women-owned businesses. Develops and recommends NRC policy providing for equal employment opportunity and develops, monitors and evaluates the affirmative action program to assure compliance with the policy. Serves as contact with local and national public and private organizations.

OTHER OFFICES

Advisory Committee on Reactor Safeguards. A statutory committee of 15 scientists and engineers advises the Commission on the safety aspects of proposed and existing nuclear facilities and the adequacy of proposed reactor safety standards, and performs such other duties as the Commission may request. The Committee conducts a continuing study of reactor safety research and submits an annual report to the Congress. The Committee also administers the ACRS Fellowship Program.

Atomic Safety and Licensing Board Panel. Three-member licensing boards drawn from the Panel--made up of lawyers and others with expertise in various technical fields--conduct public hearings and make such intermediate or final decisions as the Commission may authorize in proceedings to grant, suspend, revoke or amend NRC licenses.

Atomic Safety and Licensing Appeal Panel. Three-member appeal boards selected from the Panel exercise the authority and perform the review functions which would otherwise be carried out by the Commission in licensing proceedings. ASLB decisions are reviewable by an appeal board, either in response to an appeal or on its own initiative. The appeal board's decision also is subject to review by the Commission on its initiative or in response to a petition for discretionary review.

Appendix 2

NRC Committees and Boards

Advisory Committee on Reactor Safeguards

The Advisory Committee on Reactor Safeguards (ACRS) is a statutory committee established to advise the Commission on the safety aspects of proposed and existing nuclear facilities and the adequacy of proposed reactor safety standards, and to perform such other duties as the Commission may request. The Committee conducts a continuing study of reactor safety research and submits an annual report to Congress. It also administers the ACRS Fellowship Program. As of January 31, 1982, the members were:

DR. PAUL G. SHEWMON, *Chairman*, Professor and Chairman of Metallurgical Engineering Department, Ohio State University, Columbus, Ohio
JEREMIAH J. RAY, *Vice Chairman*, Chief Electrical Engineer, Philadelphia Electric Company, Philadelphia, Pa. (retired)
DR. ROBERT C. AXTMANN, Professor of Chemical Engineering, Princeton University, Princeton, N.J.
MYER BENDER, Director of Engineering Division, Oak Ridge National Laboratory, Oak Ridge, Tenn. (retired)
DR. MAX W. CARBON, Professor and Chairman of Nuclear Engineering Department, University of Wisconsin, Madison, Wis.
JESSE EBERSOLE, Head Nuclear Engineer, Division of Engineering Design, Tennessee Valley Authority, Knoxville, Tenn. (retired)
DR. WILLIAM KERR, Professor of Nuclear Engineering and Director of the Office of Energy Research, University of Michigan, Ann Arbor, Mich.
DR. HAROLD W. LEWIS, Professor of Physics, Department of Physics, University of California, Santa Barbara, Cal.
DR. CARSON MARK, Division Leader, Los Alamos Scientific Laboratory, Los Alamos, N.M. (retired)
DR. DADE W. MOELLER, Chairman, Department of Environmental Health Sciences, School of Public Health, Harvard University, Boston, Mass.
DR. DAVID OKRENT, Professor, School of Engineering and Applied Science, University of California, Los Angeles, Cal.
DR. MILTON S. PLESSET, Professor of Engineering Science — Emeritus, California Institute of Technology, Pasadena, Cal.
DR. FORREST R. REMICK, Assistant Vice President for Research, Pennsylvania State University, University Park, Pa.
DR. CHESTER P. SIESS, Professor Emeritus of Civil Engineering, University of Illinois, Urbana, Ill.
DAVID A. WARD, Research Manager of Nuclear Engineering, E.I. du Pont de Nemours & Company, Savannah River Laboratory, Aiken, S.C.

Atomic Safety and Licensing Board Panel

Panel Members

CHIEF ADMINISTRATIVE JUDGE B. PAUL COTTER, JR., ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
DEPUTY CHIEF ADMINISTRATIVE JUDGE—Executive Robert M. Lazo, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
DEPUTY CHIEF ADMINISTRATIVE JUDGE—Technical, Frederick J. Shon, ASLBP Physicist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE GEORGE C. ANDERSON, Marine Biologist, University of Washington, Seattle, WA
JUDGE CHARLES BECHHOEFER, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE PETER B. BLOCH, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE LAWRENCE BRENNER, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE GLENN O. BRIGHT, ASLBP Engineer, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE A. DIXON CALLIHAN, Retired Physicist, Union Carbide Corporation, Oak Ridge, TN
JUDGE JAMES H. CARPENTER, ASLBP Environmental Scientist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE HUGH K. CLARK, Retired Attorney, E.I. duPont deNemours & Company, Kennedyville, MD
JUDGE RICHARD F. COLE, ASLBP Environmental Scientist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE FREDERICK P. COWAN, Retired Physicist, Brookhaven National Laboratory, Boca Raton, FL
JUDGE VALENTINE B. DEALE, Retired Attorney, Washington, DC
JUDGE DONALD P. DESYLVA, Marine Biologist, University of Miami, Miami, FL
JUDGE MICHAEL A. DUGGAN, Economist, University of Texas, Austin, TX
JUDGE GEORGE A. FERGUSON, Physicist, Howard University, Washington, DC
JUDGE HARRY FOREMAN, Medical Doctor, University of Minnesota, Minneapolis, Minnesota
JUDGE RICHARD F. FOSTER, Environmental Scientist, Sunriver, OR
JUDGE JOHN H. FRYE III, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE JAMES P. GLEASON, Attorney, Silver Spring, MD
JUDGE ANDREW C. GOODHOPE, Retired Administrative Law Judge, Federal Trade Commission, Wheaton, MD

JUDGE HERBERT GROSSMAN, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE CADET H. HAND, JR., Marine Biologist, University of California, Bodega Bay, CA
JUDGE JERRY HARBOUR, ASLBP Environmental Scientist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE DAVID L. HETRICK, Nuclear Engineer, University of Arizona, Tucson, AZ
JUDGE ERNEST E. HILL, Nuclear Engineer, Lawrence Livermore Laboratory, Livermore, CA
JUDGE ROBERT L. HOLTON, Marine Biologist, Oregon State University, Corvallis, OR
JUDGE FRANK F. HOOPER, Marine Biologist, University of Michigan, Ann Arbor, MI
JUDGE HELEN F. HOYT, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE ELIZABETH B. JOHNSON, Nuclear Engineer, Oak Ridge National Laboratory, Oak Ridge, TN
JUDGE WALTER H. JORDAN, Retired Physicist, Oak Ridge Laboratories, Oak Ridge, TN
JUDGE JAMES L. KELLEY, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE JERRY R. KLINE, ASLBP Environmental Scientist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE HERBERT GROSSMAN, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE CADET H. HAND, JR., Marine Biologist, University of California, Bodega Bay, CA
JUDGE JERRY HARBOUR, ASLBP Environmental Scientist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE DAVID L. HETRICK, Nuclear Engineer, University of Arizona, Tucson, AZ
JUDGE ERNEST E. HILL, Nuclear Engineer, Lawrence Livermore Laboratory, Livermore, CA
JUDGE ROBERT L. HOLTON, Marine Biologist, Oregon State University, Corvallis, OR
JUDGE FRANK F. HOOPER, Marine Biologist, University of Michigan, Ann Arbor, MI
JUDGE HELEN F. HOYT, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE ELIZABETH B. JOHNSON, Nuclear Engineer, Oak Ridge National Laboratory, Oak Ridge, TN
JUDGE WALTER H. JORDAN, Retired Physicist, Oak Ridge Laboratories, Oak Ridge, TN
JUDGE JAMES L. KELLEY, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE JERRY R. KLINE, ASLBP Environmental Scientist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE JAMES C. LAMB III, Sanitary Engineer, University of North Carolina, Chapel Hill, NC
JUDGE JAMES A. LAURENSON, ASLBP/Administrative Law Judge, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE GUSTAVE A. LINENBERGER, ASLBP Physicist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE LINDA W. LITTLE, Environmental Biologist, L.W. Little Associates, Raleight, NC
JUDGE M. STANLEY LIVINGSTON, Retired Physicist, AEC National Accelerator Laboratory, Santa Fe, NM
JUDGE EMMETH A. LUEBKE, ASLBP Physicist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE MORTON B. MARGULIES, ASLBP Administrative Law Judge, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE KENNETH A. MCCOLLOM, Electrical Engineer, Oklahoma State University, Stillwater, OK
JUDGE GARY L. MILHOLLIN, Attorney, Catholic University of America, Washington, DC
JUDGE MARSHALL E. MILLER, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE PETER A. MORRIS, ASLBP Physicist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE OSCAR H. PARIS, ASLBP Environmental Sicentist, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE HUGH C. PAXTON, Retired Physicist, Los Alamos Scientific Laboratory, Los Alamos, NM
JUDGE PAUL W. PURDOM, Retired Environmental Engineer, Decatur, GA
JUDGE DAVID R. SCHINK, Oceanographer, Texas A&M University, College Station, TX
JUDGE IVAN W. SMITH, ASLBP Administrative Law Judge, U.S. Nuclear Regulatory Commission, Bethesda, MD
JUDGE MARTIN J. STEINDLER, Chemist, Argonne National Laboratory, Argonne, IL
JUDGE QUENTIN J. STOBER, Biologist, University of Washington, Seattle, WA
JUDGE SEYMOUR WENNER, Retired Administrative Law Judge, Postal Rate Commission, Chevy Chase, MD
JUDGE JOHN F. WOLF, Attorney, Retired Department of Justice, Chevy Chase, MD
JUDGE SHELDON J. WOLFE, ASLBP Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD

Staff:

DANIEL F. BROWN, Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
CHARLES J. FITTI, Executive Secretary, U.S. Nuclear Regulatory Commission, Bethesda, MD
JAMES E. HARD, Technical Advisor for Engineering, U.S. Nuclear Regulatory Commission, Bethesda, MD
CAROLE F. KAGAN, Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
ELVA W. LEINS, Assistant Executive Secretary, U.S. Nuclear Regulatory Commission, Bethesda, MD
DAVID R. LEWIS, Legal Intern, U.S. Nuclear Regulatory Commission, Bethesda, MD
RUTHANNE G. MILLER, Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
LUCINDA E. MINTON, Attorney, U.S. Nuclear Regulatory Commission, Bethesda, MD
MICHAEL A. PARSONT, Technical Advisor for Environmental Matters, U.S. Nuclear Regulatory Commission, Bethesda, MD
DAVID L. PRESTEMON, Legal Counsel to the Panel, U.S. Nuclear Regulatory Commission, Bethesda, MD

Atomic Safety and Licensing Appeal Panel

An Atomic Safety and Licensing Appeal Board, established effective September 18, 1969, was delegated the authority to perform the review function which would otherwise be performed by the Commission in proceedings on applications for licenses or authorizations in which the Commission had a direct financial interest, and in such other licensing proceedings as the Commission might specify.

In view of the increase in the number of proceedings subject to administrative appellate review, the Atomic Safety and Licensing Appeal Panel was established on October 25, 1972, from whose membership three-member appeal boards could be designated for each proceeding in which the Commision had delegated its authority to an appeal board. At the same time, the Commission modified its rules to delegate authority to appeal boards in all proceedings involving the licensing of production and utilization facilities (for example, power reactors).

Pursuant to subsection 201 (g)(1) of the Energy Reorganization Act of 1974, the functions performed by appeal boards were specifically transferred to the Nuclear Regulatory Commission. The Commission appoints members to the Appeal Panel, and the Chairman of the panel (or, in his absence, the Vice Chairman) designates a three-member appeal board for each proceeding. The Commission retains review authority over decisions and actions of appeal boards. The appeal board panel, on January 31, 1982 was composed of the following full-time members and professional staff:

ALAN S. ROSENTHAL, Appeal Panel *Chairman*, U.S. Nuclear Regulatory Commission, Bethesda, Md.
DR. JOHN H. BUCK, Appeal Panel *Vice Chairman*, U.S. Nuclear Regulatory Commission, Bethesda, Md.
JOHN CHO, Counsel, Appeal Panel, U.S. Nuclear Regulatory Commission, Bethesda, Md.
GARY J. EDLES, Appeal Panel Member, U.S. Nuclear Regulatory Commission, Bethesda, Md.
STEPHEN F. EILPERIN, Appeal Panel Member, U.S. Nuclear Reguatory Commission, Bethesda, Md.
ZORI G. FERKIN, Legal Intern, Appeal Panel, U.S. Nuclear Regulatory Commission, Bethesda, Md.
MARK J. GHOURALAL, Legal Intern, Appeal Panel, U.S. Nuclear Regulatory Commission, Bethesda, Md.
LINDA S. GILBERT, Special Counsel, Appeal Panel, U.S. Nuclear Regulatory Commission, Bethesda, Md.
REGINALD L. GOTCHY, Appeal Panel Member, U.S. Nuclear Regulatory Commission, Bethesda, Md.
CHRISTINE N. KOHL, Appeal Panel Member, U.S. Nuclear Regulatory Commission, Bethesda, Md.
THOMAS S. MOORE, Appeal Panel Member, U.S. Nuclear Regulatory Commission, Bethesda, Md.
THOMAS G. SCARBOROUGH, Special Technical Advisor, Appeal Panel, U.S. Nuclear Regulatory Commission, Bethesda, Md.
HOWARD A. WILBER, Technical Advisor, Appeal Panel, U.S. Nuclear Regulatory Commission, Bethesda, Md.

PART-TIME MEMBERS:

MICHAEL C. FARRAR, Vice-President, Environmental & Health Programs, American Paper Institute/National Forest Products Association, Washington, D.C.
DR. W. REED JOHNSON, Professor of Nuclear Engineering, University of Virginia, Charlottesville, Va.
DR. LAWRENCE R. QUARLES, Dean Emeritus, School of Engineering and Applied Science, University of Virginia, Charlottesville, Va.

Advisory Committee on Medical Uses of Isotopes

The Advisory Committee on Medical Uses of Isotopes was established in July 1958. The ACMI, composed of qualified physicians and scientists, considers medical questions referred to it by the NRC staff, and renders expert opinion regarding medical uses of radioisotopes. The ACMI also advises the NRC staff, as requested, on matters of policy. Members are employed under yearly personal services contracts. The Deputy Director, Division of Fuel Cycle and Material Safety, serves as Committee Chairman. As of January 31, 1982, the members were:

RICHARD E. CUNNINGHAM, *Chairman*, ACMI, Deputy Director, Division of Fuel Cycle and Material Safety, U.S. Nuclear Regulatory Commission, Silver Spring, Md.
DR. VINCENT P. COLLINS, Medical Director, Houston Institute for Cancer Research, Diagnosis and Treatment, Houston, Tex.
DR. FRANK H. DE LAND, Chief, Nuclear Medicine Department, Veterans' Administration Hospital, Lexington, Ky.
DR. SALLY J. DE NARDO, Director, Nuclear Hematology-Oncology, Department of Nuclear Medicine, University of California-Davis Medical Center, Sacramento, Cal.
DR. JACK K. GOODRICH, Radiology Associates of Erie, Hamot Medical Center, Erie, Pa.
DR. MELVIN L. GRIEM, Professor and Director, Chicago Tumor Institute, University of Chicago, Chicago, Ill.
DR. B. LEONARD HOLMAN, Chief, Clinical Nuclear Medicine, Department of Radiology, Peter Bent Brigham Hospital, Boston, Mass.
DR. EDWARD W. WEBSTER, Director, Department of Radiation Physics, Massachusetts General Hospital, Boston, Mass.
DR. DAVID H. WOODBURY, Director, Nuclear Medicine, Wayne County General Hospital, Eloise, Mich.
DR. JOSEPH B. WORKMAN, Associate Professor of Radiology, Duke University Medical Center, Durham, N.C.

Advisory Panel for the Decontamination of Three Mile Island Unit 2

JOHN E. MINNICH, *Chairman,* Dauphin County Commissioners, Harrisburg, Pa.
THOMAS B. COCHRAN, Senior Staff Scientist, Natural Resources Defense Council, Washington, D.C.
ELIZABETH MARSHALL, Mayor, City of York, York Pa.

ARTHUR E. MORRIS, Mayor, City of Lancaster, Lancaster, Pa.
ROBERT G. REID, Mayor, Borough of Middletown, Pa., Middletown, Pa.
GORDON ROBINSON, Associate Professor, Pennsylvania State Univ., Department of Nuclear Engineering, University Park, Pa.
JOEL ROTH, Chairman, TMI Alert, Harrisburg, Pa.
DEWITT C. SMITH, JR., Director, Commonwealth of Pennsylvania Emergency Management Agency, Harrisburg, Pa.
THOMAS SMITHGALL, Real Estate Broker, Lancaster, Pa.
WILLIAM D. TRAVERS, Technical Assistant/ Nuclear Engineer, TMI Program Office, U.S. Nuclear Regulatory Commission, Washington, D.C.
ANN TRUNK, Middletown, Pa.
HENRY J. WAGNER, JR., Head, Johns Hopkins Univ., Div. of Nuclear Medicine and Radiation Health, Baltimore, Md.
NEIL WALD, Medical Doctor, University of Pittsburgh, Pittsburgh, Pa.

Appendix 3

Local Public Document Rooms

Most documents originated by NRC, or submitted to it for consideration, are placed in the Commission's Public Document Room at 1717 H Street, N.W., Washington, D.C., for public inspection. In addition, documents relating to licensing proceedings or licensed operation of specific facilities are made available in local public document rooms established in the vicinity of each proposed or existing nuclear facility. The locations of these local PDRs and the name of the facility for which documents are retained, are listed below. (NOTE: Updated listings of local PDRs may be obtained by writing to the Local Public Document Room Branch, Division of Rules and Records, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.)

ALABAMA

- Mrs. Maude S. Miller
  Athens Public Library
  South Street
  Athens, Ala. 35611
  Browns Ferry Nuclear Plant

- Ms. Bettye Forbus
  G.S. Houston Memorial Library
  212 W. Burdeshaw Street
  Dothan, Ala. 36303
  Farley Nuclear Plant

- Mrs. Peggy McCutchen
  Scottsboro Public Library
  1002 South Broad Street
  Scottsboro, Ala. 35768
  Bellefonte Nuclear Plant

ARIZONA

- Mrs. Mary Carlson
  Phoenix Public Library
  Science and Industry Section
  12 East McDowell Road
  Phoenix, Ariz. 85004
  Palo Verde Nuclear Plant

ARKANSAS

- Mrs. Mary L. Hudson
  Tomlinson Library
  Arkansas Tech University
  Russellville, Ark. 72801
  Arkansas Nuclear One

CALIFORNIA

- Ms. Dee Sockbeson
  Humboldt County Library
  636 F Street
  Eureka, Calif. 95501
  Humboldt Bay Nuclear Plant

- Mrs. Fontayne Holmes
  West Los Angeles Regional Library
  11360 Santa Monica Boulevard
  Los Angeles, Calif. 90025
  UCLA Research Reactor

- Ms. Ann Douthett
  San Clemente Public Library
  242 Del Mar
  San Clemente, Calif. 92672
  San Onofre Nuclear Plant

- Ms. Sara Thompson
  Stanislaus County Free Library
  1500 I Street
  Modesto, Calif. 95345
  Stanislaus Nuclear Plant

- Ms. Diana Gin
  Business & Municipal Department
  Sacramento Public Library
  828 I Street
  Sacramento, Calif. 95814
  Rancho Seco Nuclear Plant

- Mr. Chi Su Kim
  Gov. Documents and Maps Department
  California Polytechnic State University
  Robert E. Kennedy Library
  San Luis Obispo, Calif. 93407
  Diablo Canyon Nuclear Plant

- Mrs. Betty Zimmerman
  Nuclear Regulatory Commission
  Region V, Office of Public Affairs
  Suite 300
  1450 Maria Lane
  Walnut Creek, Calif. 94596
  GETR Vallecitos

COLORADO

- Ms. Shirley Soenksen
  Greeley Public Library
  City Complex Building
  919 7th Street
  Greeley, Colo. 80631
  Fort St. Vrain Nuclear Plant

CONNECTICUT

- Mrs. Phyllis Nathanson
  Russell Library
  119 Broad Street
  Middletown, Conn. 06457
  Haddam Neck Nuclear Plant

- Ms. Judy Liskou
  Waterford Public Library
  49 Rope Ferry Road
  Waterford, Conn. 06385
  Millstone Nuclear Plant

FLORIDA

- Mrs. B. Bonsall
  Crystal River Public Library
  668 N.W. First Avenue
  Crystal River, Fla. 32629
  Crystal River Nuclear Plant

- Mrs. R. Scott
  Indian River Community College
  Charles S. Miley Learning
  Resources Center
  3209 Virginia Avenue
  Ft. Pierce, Fla. 33450
  St. Lucie Nuclear Plant

- Ms. Renee Pierce
  Miami-Dade Public Library
  Holmstead Branch
  700 North Holmstead Blvd.
  Holmstead, Fla. 33030
  Turkey Point Nuclear Plant
  (Emergency Plan Only)

- Ms. Susan Derrick
  Haydon Burns Library
  122 North Ocean Street
  Jacksonville, Fla. 32204
  Offshore Power Systems

- Miss Esther B. Gonzalez
  Environmental and Urban
  Affairs Library
  Florida International University
  Miami, Fla. 33199
  Turkey Point Nuclear Plant

GEORGIA

- Mrs. Wynell Bush
  Appling County Public Library
  301 City Hall Drive
  Baxley, Ga. 31563
  Hatch Nuclear Plant

- Mrs. Velna R. Glisson
  Burke County Library
  412 Fourth Street
  Waynesboro, Ga. 30830
  Vogtle Nuclear Plant

ILLINOIS

- Mrs. Jeanne L. Hayes
  Byron Public Library
  218 W. Third Streets
  Byron, Ill. 61010
  Byron Nuclear Plant
  (Selected Documents Only)

- Ms. Nancy P. Johnson
  University of Illinois Law Library
  504 East Pennsylvania Avenue
  Champaign, Ill. 61820
  Clinton Nuclear Plant
  (Selected Documents Only)

- Mrs. Betsy Taubert
  Vespasian Warner Public Library
  120 West Johnson Street
  Clinton, Ill. 61727
  Clinton Nuclear Plant

- Ms. Susan Clark
  The Memorial Library Center
  Zion-Benton Public Library District
  2400 Gabriel Avenue
  Zion, Ill. 60099
  Zion Nuclear Plant

- Mr. Earl Shumaker
  Government Publications Department
  Founder's Memorial Library
  Northern Illinois University
  Dekalb, Ill. 60115
  Byron Nuclear Plant
  (Selected Documents Only)

- Ms. Deborah Trotter
  Morris Public Library
  604 Liberty Street
  Morris, Ill. 60451
  Dresden Nuclear Plant

- Ms. Evelyn Moyle
  Jacobs Memorial Library
  Illinois Valley Community College
  Rural Route 1
  Oglesby, Ill. 61348
  LaSalle Nuclear Plant

- Mrs. Marie Hoscheid
  Moline Public Library
  504 17th Street
  Moline, Ill. 61255
  Quad Cities Nuclear Plant

- Mr. Richard Gray
  Rockford Public Library
  215 N. Wyman Street
  Rockford, Ill. 61101
  Byron Nuclear Plant

- Ms. Lucile Sterling
  Savanna Township Public Library
  326 Third Street
  Savanna, Ill. 61074
  Carroll Nuclear Plant

- Mr. Thomas Carter
  Wilmington Public Library
  201 S. Kankakee Street
  Wilmington, Ill. 60481
  Braidwood Nuclear Plant

INDIANA

- Mr. Philip Baugher, Director
  Westchester Public Library
  200 W. Indiana Avenue
  Chestertown, Ind. 46304
  Bailly Nuclear Plant

- Mrs. Charlene Peters
  Madison-Jefferson County
  Public Library
  420 West Main Street
  Madison, Ind. 47250
  Marble Hill Nuclear Plant

IOWA

- Ms. Janice Horak
  Cedar Rapids Public Library
  428 Third Avenue, S.E.
  Cedar Rapids, Ia. 52401
  Duane Arnold Nuclear Plant

KANSAS

- Ms. Sue Hatfield,
  Gov. Doc. Librarian
  Emporia State University
  William Allen White Library
  1200 Commercial Street
  Emporia, Ks. 66801
  Wolf Creek Nuclear Plant

KENTUCKY

- Ms. Beverly Schneider
  Campbell County Public Library
  4th & Monmouth Streets
  Newport, Ky. 41071
  Zimmer Nuclear Plant
  (Selected Documents Only)

- Ms. Kathy Bullard
  Louisville Free Public Library
  4th and York Streets
  Louisville, Ky. 40203
  Marble Hill Nuclear Plant
  (Selected Documents Only)

LOUISIANA

- Mr. Jimmie H. Hoover
  Government Documents Department
  Troy H. Middleton Library
  Louisiana State University
  Baton Rouge, La. 70803
  River Bend Nuclear Plant

- Mr. Ken Owen
  University of New Orleans
  Earl K. Long Library
  Louisiana Collection, Lakefront
  New Orleans, La. 70148
  Waterford Nuclear Plant

MAINE

- Mrs. Barbara Shelton
  Wiscasset Public Library
  High Street
  Wiscasset, Me. 04578
  Maine Yankee Nuclear Plant

MARYLAND

- Ms. Mildred Ward
  Calvert County Library
  Fourth Street
  Prince Frederick, Md. 20678
  Calvert Cliffs Nuclear Plant

MASSACHUSETTS

- Mrs. Margaret Howland
  Library/Learning Resource Center
  Greenfield Community College
  One College Drive
  Greenfield, Mass. 01301
  Yankee Rowe Nuclear Plant

- Ms. Grace Karbott
  Plymouth Public Library
  11 North Street
  Plymouth, Mass. 02360
  Pilgrim Nuclear Plant

MICHIGAN

- Mrs. M. B. Wallick
  Charlevoix Public Library
  107 Clinton Street
  Charlevoix, Mich. 49720
  Big Rock Point

- Mrs. Margean Gladyz
  Reference Department
  Kalamazoo Public Library
  315 South Rose Street
  Kalamazoo, Mich. 49007
  Palisades Nuclear Plant

- Mrs. Averill Packard
  Grace Dow Memorial Library
  1710 West St. Andrews Road
  Midland, Mich. 48640
  Midland Nuclear Plant

- Ms. Janice Murphy
  Ellis Reference & Information Center
  Monroe County Library System
  3700 South Custer Road
  Monroe, Mich. 48161
  Fermi Nuclear Plant

- Ms. Bea Rodgers
  Maude Preston Palenske
  Memorial Library
  500 Market Street
  St. Joseph, Mich. 49085
  D.C. Cook Nuclear Plant

MINNESOTA

- Ms. Betty Stennes
  Environmental Conservation Library
  Minneapolis Public Library
  300 Nicollet Mall
  Minneapolis, Minn. 55401
  Monticello Nuclear Plant
  Prairie Island Nuclear Plant

MISSOURI

- Mrs. Ladonna Justice
  Daniel Boone Regional Library
  Callaway County Public Library
  709 Market Street
  Fulton, Mo. 65251
  Callaway Nuclear Plant

- Ms. Jerry Ewing
  Olin Library of Washington
  University
  Skinker & Lindell Boulevards
  St. Louis, Mo. 63130
  Callaway Nuclear Plant

MISSISSIPPI

- Mr. William McMullin
  Corinth Public Library
  1023 Fillmore Street
  Corinth, Miss. 38834
  Yellow Creek Nuclear Plant

- Ms. Gayle Keefe
  Hinds Junior College
  McLendon Library
  Main Street
  Raymond, Ms. 39154
  Grand Gulf Nuclear Plant

NEBRASKA

- Mrs. Lucile Lechliter
  Auburn Public Library
  1118 15th Street
  Auburn, Neb. 68305
  Cooper Nuclear Plant

- Mr. Paul Tippery
  W. Dale Clark Library
  215 South 15th Street
  Omaha, Neb. 68102
  Ft. Calhoun Nuclear Plant

NEW HAMPSHIRE

- Ms. Nancy Merrill
  Exeter Public Library
  Front Street
  Exeter, N.H. 03883
  Seabrook Nuclear Plant

NEW JERSEY

- Miss Elizabeth Fogg
  Salem Free Public Library
  112 West Broadway
  Salem, N.J. 08097
  Salem Nuclear Plant
  Hope Creek Nuclear Plant

- Ms. Lois J. Brown
  Ocean County Library
  101 Washington St.
  Toms River, N.J. 08753
  Oyster Creek Nuclear Plant
  Forked River Nuclear Plant

NEW YORK

- Mr. Sol Becker
  Public Health Library
  New York City
  Department of Health
  125 Worth Street
  New York, N.Y. 10013
  Columbia University
  Research Center

- Mr. Peter Allison
  Social Science/Documents Center
  New York University
  Elmer Holmes Bobst Library
  70 Washington Sq. S.
  New York, N.Y. 10012
  Indian Point Nuclear Plant
  (Selected Documents Only)

- Mr. Thomas Larson
  Penfield Library
  State University of NY at Oswego
  Oswego, N.Y. 13126
  Nine Mile Point Nuclear Plant
  FitzPatrick Nuclear Plant

- Ms. Cynthia Dana
  Rochester Public Library
  Business & Social Science Division
  115 South Avenue
  Rochester, N.Y. 14604
  Ginna Nuclear Plant

- Ms. Kathy McGowan
  Shoreham-Wading River Public Library
  Route 25A
  Shoreham, N.Y. 11786
  Shoreham Nuclear Plant

- Mr. Oliver Swift
  White Plains Public Library
  100 Martine Avenue
  White Plains, N.Y. 10601
  Indian Point Nuclear Plant

NORTH CAROLINA

- Miss Ruth Hoyle
  Davie County Public Library
  371 North Main Street
  Mocksville, N.C. 27028
  Perkins Nuclear Plant

- Ms. Linda Hickman
  Olivia Rainey Library
  Wake County Public Library
  104 Fayetteville Street
  Raleigh, N.C. 27601
  Shearon Harris Nuclear Plant

- Southport-Brunswick County Library
  109 West Moore Street
  Southport, N.C. 28461
  Brunswick Nuclear Plant

- Ms. Dawn Hubbs
  Atkins Library
  University of North Carolina at Charlotte
  UNCC Station, N.C. 28223
  McGuire Nuclear Plant

OHIO

- Ms. Vera Ehaus
  Clermont County Public Library
  180 South Third Street
  Batavia, Ohio 45103
  Zimmer Nuclear Plant

- Ms. Shirley Morgan
  Perry Public Library
  3753 Main Street
  Perry, Ohio 44081
  Perry Nuclear Plant

- Mrs. Julia Baldwin, Librarian
  Government Document Collection
  William Carlson Library
  University of Toledo
  2801 West Bancroft Avenue
  Toledo, Ohio 43606
  Davis-Besse Nuclear Plant

OKLAHOMA

- Mr. Craig Buthod
  Tulsa City-County Library
  400 Civic Center
  Tulsa, Okla. 74013
  Black Fox Nuclear Plant

OREGON

- Ms. Sherrie Bittenger
  Arlington City Hall
  Arlington, Ore. 97812
  Pebble Springs Nuclear Plant

- Mr. Jim Takita
  Library Association of Portland
  Social Science & Science Dept.
  801 S.W. 10th Ave.
  Portland, Ore. 97205
  Trojan Nuclear Plant

PENNSYLVANIA

- Mrs. Mary Columbo
  B. F. Jones Memorial Library
  663 Franklin Avenue
  Aliquippa, Pa. 15001
  Beaver Valley Nuclear Plant
  Shippingport Light Water Breeder Reactor

- Mr. Lawrence Peterson
  Government Publications Section
  State Library of Pennsylvania
  Commonwealth and Walnut Street
  Harrisburg, Pa. 17126
  Peach Bottom Nuclear Plant
  Three Mile Island Nuclear Plant
  Fulton Nuclear Plant

- Mr. Phil Hearne
  Dauphin Library System
  101 Walnut Street
  Harrisburg, Pa. 17101
  Three Mile Island Nuclear Plant
  (Transcripts Only)

- Mr. Jacques Peterman
  Free Library of Philadelphia
  Government Publications Dept.
  19th and Vine
  Philadelphia, Pa. 19103
  Three Mile Island Nuclear Plant
  (Transcripts Only)

- Ms. Julia Albright
  Pottstown Public Library
  500 High Street
  Pottstown, Pa. 19464
  Limerick Nuclear Plant

- Ms. Diane Smith
  Pennsylvania State University
  Pattee Library
  Room C207
  University Park, Pa. 16802
  Susquehanna Nuclear Plant &
  Three Mile Island Nuclear Plant
  (Transcripts Only)

- Ms. Elaine Homick
  Reference Department
  Osterhout Free Library
  71 South Franklin Street
  Wilkes-Barre, Pa. 18701
  Susquehanna Nuclear Plant

- Mr. David Vanderstreck
  Pennsylvania State University Library
  York Campus
  1031 Edgecomb Avenue
  York, Pa. 17403
  Three Mile Island Nuclear Plant
  (Transcripts Only)

PUERTO RICO

- Mrs. Rosaio Cabrera
  Public Library, City Hall
  Jose de Diego Avenue
  P.O. Box 1086
  Arecibo, P.R. 00612
  North Coast Nuclear Plant

- Mrs. Amalia Ruiz De Porras
  Etien Totti Public Library
  College of Engineers,
  Architects & Surveyors
  Hato Rey, P.R. 00936
  North Coast Nuclear Plant

SOUTH CAROLINA

- Ms. Ava Black
  Barnwell County Library
  Hagood Avenue
  Barnwell, S.C. 29812
  Barnwell Reprocessing Plant

- Ms. Myra Armistead
  Clemson University
  R. M. Cooper Library
  Clemson, S.C. 29631
  Oconee Nuclear Plant
  (Selected Documents Only)

- Mr. David Eden
  Cherokee County Public Library
  300 East Rutledge Avenue
  Gaffney, S.C. 29340
  Cherokee Nuclear Plant

- Mrs. Allene Reep
  Hartsville Memorial Library
  220 N. Fifth Avenue
  Hartsville, S.C. 29550
  H. B. Robinson Nuclear Plant

- Mrs. Mary Mallaney
  York County Library
  138 E. Black St.
  Rock Hill, S.C. 29730
  Catawba Nuclear Plant

- Ms. Joyce McCall
  Oconee County Library
  501 W. South Broad Street
  Walhalla, S.C. 29691
  Oconee Nuclear Plant

- Ms. Sarah McMaster
  Fairfield County Library
  Garden and Washington Streets
  Winnsboro, S.C. 29180
  Summer Nuclear Plant

- Ms. Mary Toll
  South Carolina State Library
  1500 Senate Street
  Columbia, S.C. 29201
  Catawba Nuclear Plant
  (Selected Documents Only)

TENNESSEE

- Ms. Patricia Maroney
  Chatanooga-Hamilton County
  Library
  1001 Broad Street
  Chattanooga, Tenn. 37402
  Sequoyah Nuclear Plant
  Watts Bar Nuclear Plant

- Ms. June Presley
  Kingsport Public Library
  Broad and New Streets
  Kingsport, Tenn. 37660
  Phipps Bend Nuclear Plant

- Ms. Carol Goris
  Lawson McGhee Public Library
  500 West Church Street
  Knoxville, Tenn. 37902
  Clinch River Breeder Plant

- Mr. John Thweatt
  Tennessee State Library and Archives
  403 Seventh Avenue, North
  Nashville, Tenn. 37219
  Hartsville Nuclear Plant

- Ms. Martha Dockery
  Oak Ridge Public Library
  Civic Center
  Oak Ridge, Tenn. 37830
  Clinch River Breeder Plant

TEXAS

- Mrs. Pamela Morris
  University of Texas at Arlington
  Arlington, Tex. 76019
  Comanche Peak Nuclear Plant
  (Selected Documents Only)

- Ms. Nancy Byrd
  Austin-Travis County Collection
  Austin Public Library
  810 Guadalupe Street
  P.O. Box 2287
  Austin, Tex. 78768
  South Texas Nuclear Plant
  (Selected Documents Only)

- Mrs. Mary Ingram
  Bay City Public Library
  1900 5th Street
  Bay City, Tex. 77414
  South Texas Nuclear Plant

- Mrs. Frieda Whitworth
  Glen Rose-Somervell Public Library
  Barnard & Highway 144
  Glen Rose, Tex. 76043
  Comanche Peak Nuclear Plant

- Mr. Richard Fielder
  Houston Public Library
  500 McKinney
  Houston, Tex. 77002
  Allens Creek Nuclear Plant
  (Selected Documents Only)

- Mrs. Anne Langley
  Newton Public Library
  P.O. Box 657
  Newton, Tex. 77034
  Blue Hills Nuclear Plant

- Mr. John R. Deosdade
  San Antonio Public Library
  Business, Science and Technology
  Department
  203 S. St. Mary Street
  San Antonio, Tex. 78205
  South Texas Nuclear Plant
  (Selected Documents Only)

- Mrs. B. Kroesche
  Virgil & Josephine Gordon
  Memorial Library
  917 N. Circle Drive
  Sealy, Tex. 77474
  Allens Creek Nuclear Plant

VERMONT

- Mr. Jerry Carbone
  Brooks Memorial Library
  224 Main Street
  Brattleboro, Vt. 05301
  Vermont Yankee Nuclear Plant

VIRGINIA

- Mr. Gregory Johnson
  Alderman Library
  Manuscripts Department
  University of Virginia
  Charlottesville, Va. 29901
  North Anna Nuclear Plant

- Ms. Mary Ann Manrique
  Louisa County Courthouse
  P.O. Box 27
  Louisa, Va. 23093
  North Anna Nuclear Plant

- Ms. Sandra Peterson
  Swem Library
  College of William & Mary
  Williamsburg, Va. 23185
  Surry Nuclear Plant

WASHINGTON

- Mrs. Lois McCleary
  W. H. Abel Memorial Library
  125 Main Street South
  Montesano, Wash. 98563
  WPPSS 3 and 5 Nuclear Plants

- Ms. Joan Hamilton
  Richland Public Library
  Swift and Northgate Streets
  Richland, Wash. 99352
  WPPSS 1, 2 and 4 Nuclear Plants
  Skagit Nuclear Plant

WISCONSIN

- Ms. Sue Hagen
  Kewaunee Public Library
  822 Juneau Street
  Kewaunee, Wis. 54216
  Kewaunee Nuclear Plant

- Ms. Dolores Hendersin
  LaCrosse Public Library
  800 Main Street
  LaCrosse, Wis. 54601
  LaCrosse BWR Nuclear Plant

- Mr. Arthur M. Fish
  Document Department, Library
  University of Wisconsin
  Stevens Point
  Stevens Point, Wis. 54481
  Point Beach Nuclear Plant
  (Selected Documents Only)
  Wood Nuclear Plant

- Ms. Gertrude Kaminsky
  Joseph Mann Library
  1616 Sixteenth Street
  Two Rivers, Wis. 54241
  Point Beach Nuclear Plant

Appendix 4

Regulations and Amendments—Fiscal Year 1982

The regulation of the Nuclear Regulatory Commission are contained in Title 10, Chapter 1, of the Code of Federal Regulations. Effective and proposed regulations concerning licensed activities, and certain policy statements relating thereto, which were published in the Federal Register during fiscal year 1981, are described briefly below.

REGULATIONS AND AMENDMENTS PUT INTO EFFECT

Fees for Review of Applications — Part 170

On October 7, 1981, NRC amended its regulations under 10 CFR Part 170, effective November 6, 1981. The interpretative rule, is intended to remove the possibility of misunderstanding the Commission intent to charge fees for review of power reactor license applications and major fuel cycle license applications when review is completed, whether by issuance of a permit, license, or other approval, or by denial or withdrawal of an application, or by any other event that brings active Commission review of the application to an end.

Conduct of Employees; Post Employment Restrictions — Part 0

On October 22, 1981, NRC published an amendment to its regulations on the conduct of employees. The new rule brings NRC the section of 10 CFR Part 0 placing post-employment restrictions on former NRC employees into conformity with the requirements of the Ethics in Government Act of 1978. The amendment, effective immediately, also includes other minor changes.

Protection of Unclassified Safeguards Information — Parts 2, 40, 70, and 73

On October 22, 1981, NRC published an amendment to its regulations and other persons to protect unclassified safeguards information against unauthorized disclosure. Several revisions have been made which are effective immediately and amendments to certain sections are effective January 20, 1982.

Radiation Protection Survey Requirement; Miscellaneous Clarifying Amendments — Part 20

On October 30, 1981, NRC published clarifying amendments to its regulations for radiation protection. The new rule, effective November 30, 1981, makes clear that persons may be cited for violation of NRC rules for failure to perform surveys when indicated or for performing inadequate surveys.

Use of Administrative Judges in Antitrust Proceedings — Part 2

On November 6, 1981, NRC published amendments, effective immediately, to provide specifically for the appointment of Administrative Law Judges to rule on requests for hearing and/or petitions to intervene. They will also preside in proceedings to consider the anti-trust aspects of construction permit and license applications for nuclear power reactors and other production and utilization facilities.

Removal of Certain Information Collection Requirements for Tritium — Parts 30 and 150

On November 6, 1981, NRC published amendments to its regulations, effective immediately, to remove two requirements for control and accounting procedures for tritium and two requirements for reporting transfers or receipts of tritium.

Issuance of General License — Part 40

On November 10, 1981, NRC published an amendment to its regulations, effective immediately, issuing a general license to authorized uranium mill operators in Agreement States to possess and dispose of mill tailings.

Criteria and Procedures for Determining Eligibility for Access to or Control Over Special Nuclear Material — Part 11

On November 18, 1981, NRC amended its regulations, effective December 18, 1981, making necessary minor revisions and clarifications in previously published requirements for "Criteria and Procedures for Determining Eligibility for Access to or Control Over Special Nuclear Material."

Change of Address for NRC Region V Office — Parts 1 and 20

On November 25, 1981, NRC amended its regulations to inform the public of the new address and telephone number of its Region V office located in Walnut Creek, Calif.

Expediting the NRC Hearing Process — Part 2

On December 1, 1981, the NRC published amendments to its Rules of Practice which facilitate expedited conduct of its adjudicatory proceedings. The changes, effective immediately, permit the presiding officer to require oral answers to motions to compel responses to discovery requests and service of documents by express mail.

Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation; Minor Clarifying and Confirming Amendments — Parts 11, 19, 20, 21, 25, 72, 75, 95, and 170

On December 1, 1981, NRC published minor clarifying amendments to its regulations for Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation and conforming amendments to other parts of the commission's regulations. This rule, effective immediately, is necessary to ensure proper application of the regulations.

Interim Requirements Related to Hydrogen Control — Part 50

On December 2, 1981, NRC amended its regulations to require inerted containment atmosphere, and both hydrogen recombiner capability to reduce the likelihood of venting radioactive gases following an accident and the provision of high point vents in the primary coolant system. The interim requirements are effective January 4, 1982.

Clarification of Exemption for Uranium Shielding in Shipping Containers — Part 40

On December 24, 1981, NRC amended its regulations to clarify the conditions for exemption of uranium used as shielding in shipping containers. This amendment, effective immediately, pertains to the authorization for possession and use of the uranium shielding under an existing NRC exemption from regulatory requirements and has no effect on transportion regulations.

Emergency Planning and Preparedness for Production and Utilization Facilities — Part 50

On December 30, 1981, NRC published amendments to its emergency planning regulations, effective immediately. The change to 10 CFR Part 50, Appendix E delays the date by which prompt public notification systems must be operational around all nuclear power plants. The change to Part 50.54 clarifies the language of the rule to conform with the Commission's intent at the time of promulgation.

Reporting, Recordkeeping, and Application Requirements; Approval — Part 50

On December 30, 1981, NRC amended its regulations on the domestic licensing utilization of production and utilization facilities to indicate Office of Management and Budget approval of the information collection requirements contained in the regulations. The action, effective immediately, is required by the Paperwork Reduction Act of 1980.

Codes and Standards for Nuclear Power Plants; ASME Boiler and Pressure Vessel Code; Incorporation by Reference — Part 50

On December 31, 1981, NRC amended its regulations to incorporate by reference new addenda of the ASME Boiler and Pressure Vessel Code. Adoption of these amendments, effective February 1, 1982, will permit the use of improved methods for construction and inservice inspection of nuclear power plants.

Submittal of Installation Information Pursuant to US/IAEA Safeguards Agreement — Parts 40, 70, and 150

On January 4, 1982, NRC amended its regulations, effective immediately, to relieve applicants for licenses of the requirements to submit installation information in all cases. The amendments will permit the Commission to limit requests for this information to those cases deemed necessary according to US/IAEA Safeguards.

Advance Notification to States of Transportation of Certain Types of Nuclear Waste — Part 71

On January 6, 1982, NRC amended its regulations to implement a federal statute which requires the Commission promulgate regulations providing for timely notification to the governor of any state prior to transport of certain types of nuclear wastes, including spent fuel, to, through, or across the boundary of that state. The amendments are effective July 6, 1982.

Advance Notification to Governors Concerning Shipments or Irradiated Reactor Fuel — Part 73

On January 6, 1982, NRC amended its regulations to implement a federal statute which requires NRC promulgate regulations regarding notification to state governors of the transport of spent fuel through a state. The amendment is effective July 6, 1982.

Licensing Requirements for Pending Construction Permit and Manufacturing License Applications — Parts 2 and 50

On January 15, 1982, NRC amended its power reactor safety regulations, effective February 16, 1982. The rule adds a set of licensing requirements applicable only to construction permit and manufacturing license applications pending at the effective date of this rule.

Amendment to Provide Exception From Procedural Rules for Adjudications Involving Conduct of Military or Foreign Affairs — Part 2

On February 1, 1982, NRC amended its regulations to re-adopt that part of its "Rules and General Applicability," which provides an exception from those rules for adjudications involving the conduct of military or foreign affairs functions. The amendment, effective immediately, explicitly states that the exception may be applied to pending proceedings.

Privacy Act Regulations; Notice of Exemptions; Correction and Clarification — Part 9

On February 2, 1982, NRC amended its regulations under 10 CFR Part 9.95, Specific Exemptions, to identify more properly the pertinent systems of records and to correct the names of two of the 15 Systems of Records which contain exempt records.

Revision of Access Authorization Fees for Nuclear Industry — Part II

On February 4, 1982, NRC amended its regulations, establishing the scheduling of fees charged NRC licensees for

the performance of full field background investigations. The amendment, effective immediately, makes a minor correction in the schedule and increases the fee to cover increased costs to NRC for these services.

Export of Safeguards Samples Pursuant to the US/IAEA Safeguards Agreement — Part 110

On February 16, 1982, NRC amended its regulations to exempt the export of IAEA safeguards samples from the requirements for a license. The amendment, effective immediately, will permit the export of these samples of special nuclear material without an export license by NRC licensees, Agreement State licensees, and the U.S. Department of Energy.

Debt Collection Procedures — Part 15

On February 22, 1982, NRC amended its regulations by adding a new Part establishing procedures that the Commission will follow to collect debts owed to it. The new regulations, effective March 24, 1982, will enable NRC to improve its collection of debts.

Administrative Claims Under Federal Tort Claims Act — Part 14

On March 3, 1982, NRC amended its regulation on administrative claims under the Federal Tort Claims Act, effective immediately. The amendment makes NRC's regulation current and consistent with regulation of the Attorney General, 28 CFR Part 14, changes the office where claims are filed and the NRC officials authorized to act on claims, and provides procedures when NRC employee drivers are sued in State courts.

Requirements for Access to and Protection of National Security Information and Restricted Data; Minor Amendments — Part 25 and 95

On March 4, 1982, NRC amended its regulations to make minor revisions and clarifications in requirements governing access to and control over National Security Information and/or Restricted Data. The amendments are effective April 5, 1982.

Implementation of Commission's Delegation of Authority to Determine Whether There Have Been Significant Changes in Operating License Applicant's Activities or Proposed Activities Since the Construction Permit Antitrust Review — Parts 1 and 2

On March 9, 1982, NRC amended its regulations to incorporate final procedures implementing the Commission's delegation of authority to make the "significant changes" determination to the Director and Nuclear Reactor Regulation or the Director of Nuclear Material Safety and Safeguards. The amendments are effective April 8, 1982.

General Statement of Policy and Procedure for Enforcement Actions — Part 2

On March 9, 1982, NRC amended its regulation by codifying as Appendix C to 10 CFR Part 2 a revised statement of policy involving the public health and safety, the common defense and security, and the environment. The amendment, effective immediately, is intended to provide Commission guidance for enforcement action.

Reporting of Physical Security Events — Part 73

On March 17, 1982, NRC amended its regulations regarding notification requirements for reporting significant physical security events to conform with the proposed requirements for the reporting of significant events contained in 10 CFR 50.72. The amendment, effective April 16, 1982, will require that licensees of nuclear power plants and fuel fabrication facilities, who have access to the system, notify the NRC Operations Center via the Emergency Notification System (ENS), rather than the Regional Office, of a reportable physical security event.

Rule to Require Applicants to Evaluate Differences from the Standard Review Plan — Part 50

On March 18, 1982, NRC amended its regulations, effective May 17, 1982, to improve the efficiency and effectiveness of NRC safety review. The amendment requires future applicants for operating licenses, construction permits, manufacturing licenses, and preliminary or final design approvals for standard plants to identify and evaluate differences from the acceptance criteria of the applicable revision of the Standard Review Plan (SRP) as part of the technical information to be submitted as part of an application.

Statement of Organization and General Information; Delegation of Rulemaking Authority to Executive Director for Operations — Part 1

On March 19, 1982, NRC amended its statement of organization to reflect the action of the Commission delegating additional rulemaking authority to the Executive Director for Operations. This delegation of increased rulemaking authority, effective immediately, is intended to improve the efficiency and effectiveness of NRC's rulemaking process.

Group Licensing for Certain Medical Uses — Part 35

On March 26, 1982, NRC published a final rule, effective immediately, to add a new reagent kittoits list of authorized radioactive drugs and reagent kits. This action is taken by NRC because Food and Drug Administration (FDA) recently approved a "New Drug Application" for the kit which is used to prepare the radiopharmaceutical technetium-99m labeled disofenin.

Needed for Power and Alternative Energy Issues in Operating License Proceedings — Part 51

On March 26, 1982, NRC amended its regulations to provide that, for National Environmental Policy Act (NEPA) purposes, need for power and alternative energy source issues will not be considered in operating license proceedings for nuclear power plants. The purpose of these amendments, effective April 26, 1982, is to avoid unnecessary consideration of issues that are not likely to tile the cost benefit balance.

Elimination of Review of Financial Qualifications of Electric Utilities in Licensing Hearings For Nuclear Power Plants — Parts 2 and 50

On March 31, 1982, NRC amended its regulations to eliminate entirely requirements for financial qualifications review and findings for electric utilities that are applying for construction permits or operating licenses for production or utilization facilities. The new regulations also require power reactor licensees to obtain on-site property damage insurance, or an equivalent amount of protection from the time that the Commission first issues an operating license for the nuclear reactor.

Reporting, Recordkeeping, and Application Requirements — Part 60, 72 and 81

On April 1, 1982, NRC amended its regulations to indicate that Office of Management and Budget clearance is not required for the information collection requirements contained in certain parts. The amendments, effective immediately, affect 10 CFR Parts 60, 72, and 81.

Standards for Protection Against Radiation; Replacement of Provisions of Regulatory Guide 8.15

On April 15, 1982, NRC amended its regulations to place requirements for an acceptable respiratory protection program, currently incorporated by reference in 10 CFR 20.103, directly into 10 CFR 20.103. The amendment is effective immediately.

Physical Security of In Transit Special Nuclear Material of Moderate Strategic Significance — Part 73

On May 4, 1982, NRC amended its physical protection regulation to improve licensee safeguards capabilities for early detection of the possible theft of material while it is in transit. The amendments, effective June 3, 1982, are intended to assure close monitoring of shipments of special nuclear material of moderate strategic significance.

Emergency Planning and Preparedness for Research and Test Reactors: Extension of Submittal Dates — Part 50

On May 6, 1982, NRC amended its regulation under 10 CFR Part 50, to provide sufficient time for affected licensees to prepare upgraded emergency plans. The final rule, effective immediately, increases the thermal power level threshold for the submittal of emergency plans for 500 kilowatts thermal to 2 megawatts thermal, extends the submission date for emergency plans for those facilities having power levels of 2 megawatts and above to four months after the effective date of the rule and requires all research and test reactors below 2 megawatts thermal to submit emergency plans by November 3, 1982.

Regional Licensing Program — Parts 30, 40, and 70

On May 27, 1982, NRC amended its regulations, effective immediately, to provide information concerning domestic licensing of source, byproduct and special nuclear material. The amendment specifies categories of licensing action for which full responsibility has been delegated to Regional Administrators. Its purpose is to inform current or prospective licensees of current NRC practice and organization.

Group Licensing for Certain Medical Uses — Part 35

On June 29, 1982, NRC amended its regulations, effective immediately, to add a new reagent kit, used to prepare the radiopharmaceutical technetium-99m labeled succimer, to its list of authorized radioactive drugs and reagent kits.

Environmental Qualification of Electrical Equipment — Part 50

On June 30, 1982, NRC suspended the June 30, deadline for all operating plants to complete the environmental qualification of safety-related electric equipment, pending publication of final rules to codify the Commission standards.

Emergency Planning and Preparedness — Part 50

On July 13, 1982, NRC amended its regulations, effective immediately, to clarify: (1) that emergency preparedness exercises are part of the preoperational inspection and thus required prior to operation above 5% of rated power, but are not for a Licensing Board, Appeal Board, or Commission licensing decision; and (2) that for issuance of operating licenses authorizing only fuel loading and low power operation, no NRC or Federal Emergency Management Agency review, findings and determinations concerning the state or adequacy of offsite emergency preparedness shall be necessary.

Protection of Employees who Provide Information — Parts 19, 30, 40, 50, 60, 70, 72, 150

On July 14, 1982, the NRC amended its regulations in regard to job protection for employees who provide information to the Commission. These amendments, effective October 12, 1982, emphasize to employers that termination or other acts of job discrimination against employees who engage in activities furthering the purposes of the Atomic Energy Act and the Energy Reorganization Act is prohibited.

Codes and Standards for Nuclear Power Plants — Part 50

On July 14, 1982, the NRC amended its regulations to incorporate by reference the Summer 1981 Addenda of the ASME Boiler and Pressure Vessel Code. These amendments, effective August 13, 1982, will permit the use of improved methods for construction.

Communications Procedures, Clarifying Amendment — Part 50

On July 22, 1982, the NRC amended its regulations to inform applicants and licensees that prior to submitting any communications in microform, they shall obtain specifications and copy requirements from the NRC. These amendments, effective immediately, are issued as the result of a recommendation to clarify the requirements for submission of documents by licensees and to allow and encourage use of microform.

General License for Shipment in Packages Approved for Use by Another Person — Part 71

On August 12, 1982, NRC published an amendment, effective immediately, to its regulations for the transportation of radioactive material. It changed the recordkeeping requirements of the general license authorizing an NRC licensee to use a package that the Commission has previously evaluated and specifically authorized another licensee to use.

Revision and Clarification of Criteria and Procedures for Determining Eligibility for Access to Restricted Data or National Security Information or an Employment Clearance and Confirming Amendments — Parts 10, 11, 25, and 95

On September 2, 1982, NRC published amendments to its regulations to clarify and update the criteria and procedures used for determining the eligibility of an individual to access to Restricted Data or national security information, or an employment clearance. The amendments are effective October 2, 1982.

Institutional Radiation Safety Committee — Part 35

On September 13, 1982, NRC published an amendment to its regulations requiring a Radiation Safety Committee with a simplified membership that will focus on the radiation safety of workers and the general public. The amendment, effective October 12, 1982, replaces the current requirement for a Medical Isotopes Committee.

Commission Review Procedures for Power Reactor Construction Permits and Operating Licenses; Immediate Effectiveness Rule — Part 2

On September 15, 1982, NRC published an amendment to its regulations to clarify the weight of authority to be accorded Commission effectiveness decisions by its Licensing and Appeal Boards conducting subsequent reviews of stay requests or of the merits of applications for construction permits or operating licensees. The amendment is effective immediately.

Minor Clarifying Amendments — Parts 1, 20, 21, and 73

On September 20, 1982, NRC published amendments to its regulations, effective immediately, to inform the public of administrative changes. The amendments codify nomenclature changes required by a reorganization of NRC staff activities; reflect the reassignment of the responsibility for implementing the Paperwork Reduction Act and for preparing the monthly NRC Issuances; publish the new commercial telephone number for the NRC's Region IV Office; and announce that the NRC Region IV Uranium Recovery Field Office, located in Denver, Colorado, is to be operational October 4, 1982.

REVOCATION

Revocation of General License — Part 40

On February 18, 1982, NRC amended its regulations by revoking, effective immediately, the general license issued November 10, 1981, which allowed persons licensed by an Agreement State to process uranium ore, to also possess uranium mill tailings. The revocation is immediately effective.

REGULATIONS AND AMENDMENTS PROPOSED

Procedures Involving the Equal Access to Justice Act: Implementation — Parts 1 and 2

On October 28, 1981, NRC published a notice of proposed rule making to amend its rules of practice. The amendments would add new provisions to 10 CFR Part 2 to implement the recently enacted Equal Access to Justice Act and make minor changes to 10 CFR Part 1.

TMI-Related Requirements for Operating License Applications — Part 50

On November 2, 1981, NRC published a notice of proposed rule making to extend the comment period on a previous proposal to add to its power reactor safety regulations a set of licensing requirements applicable to operating license applications. The notice also states that a similar proposed rule for operating reactors will not be published at this time.

Replacement of Provisions of Regulatory Guide 8.15, Incorporated by Reference In 10 CFR — Part 20.103

On November 9, 1981, NRC published a notice of proposed rule making that would amend its regulations under 10 CFR Part 20, Standards for Protection Against Radiation. The proposal would incorporate the provisions of Regulatory Guide 8.15 into the text of the Commission regulations and make other minor changes to the Standards.

Packaging of Radioactive Material for Transport and Transportion of Radioactive Material Under Certain Conditions — Part 71

On November 13, 1981, NRC published a notice of proposed rule making that would restrict the air transport of plutonium. Plutonium in a medical device for individual human use or in packages for other use in quantities or concentrations small enough to present no significant hazards to the public health and safety would not be affected by these proposed amendments.

Standards for the Reduction of Risk From Anticipated Transients without Scram (ATWS) Events for Light-Water-Cooled Nuclear Power Plants — Part 50

On November 24, 1981, NRC published a notice of proposed rule making that would require improvements in the design and operation of light-water-cooled nuclear power plants. The proposed requirements would reduce the overall risk of nuclear power plant operation.

Emergency Planning and Preparedness for Production and Utilization Facilities — Part 50

On December 15, 1981, NRC published a notice of proposed rule making to provide that no NRC or Federal

Emergency Management Agency review, findings and determinations concerning the state of or adequacy of offsite emergency preparedness would be necessary for issuance of operating licensees authorizing only fuel loading and low power operation (up to 5% of rated power).

Emergency Planning and Preparedness: Exercises — Part 50

On December 15, 1981, NRC published a notice of proposed rule making that would clarify its emergency planning regulations. The proposal makes it clear that full-scale emergency preparedness exercises are part of the operational inspection process and are required prior to operation above 5% of rated power but not for a Licensing Board, Appeal Board or Commission licensing decision.

Immediate Notification Requirement for Operating Nuclear Reactors — Part 50

On December 21, 1981, NRC published a notice of proposed rule making that would require operating nuclear power reactor licensees notify immediately the NRC of any "significant event" as set forth in 10 CFR 50.72. The proposed rule also would clarify this list of reportable significant events.

Administrative Claims Under Federal Tort Claims Act — Part 14

On December 22, 1981, NRC published a notice of proposed rule making to improve its regulations on administration claims under the Federal Tort Claim Act by adding provisions of the governing statute and clarifying certain procedures.

Interim Requirements Related to Hydrogen Control — Part 50

On December 23, 1981, NRC published a notice of proposed rule making that would amend its regulations to improve hydrogen control capability during and following an accident in light-water reactor facilities.

Emergency Planning and Preparedness for Research and Test Reactors: Extension of Submittal Dates — Part 50

On December 31, 1981, NRC published a notice of proposed rule making that would extend the dates by which licensees authorized to possess and/or operate research and test reactor facilities must submit emergency plans in compliance with 10 CFR Part 50 Appendix E.

Environmental Qualification of Electric Equipment for Nuclear Power Plants — Part 50

On January 20, 1982, NRC published a notice of proposed rule making applicable to nuclear power plants to clarify and strengthen the criteria for environmental qualification of electric equipment. The proposed rule would codify specific qualification methods currently contained in national standards, regulatory guides, and certain NRC publications and clarify the Commissions requirements.

Codes and Standards for Nuclear Power Plants — Part 50

On February 3, 1982, NRC published a notice of proposed rule making that would amend its regulations by incorporating by reference new addenda of the ASME Boiler and Pressure Vessel Code. Adoption of these amendments would permit the use of improved methods for construction and inservice inspection of nuclear power plants.

Technical Specifications for Nuclear Power Reactors — Part 50

On March 30, 1982, NRC published a notice of proposed rule making that would reduce the volume of technical specifications for nuclear power reactors that are made of an operating license. The proposed change would improve the safety of nuclear power plants through more efficient use of NRC and license resources.

Physicians Use of Radioactive Drugs — Part 35

On April 13, 1982, NRC published a notice of proposed rule making that would provide an exception from certain regulatory requirements for Tc-99m pentatate sodium used for lung function studies. This amendment would relieve a majority fo NRC's medical licensees from regulatory requirements.

Codes and Standards for Nuclear Power Plants — Part 50

On April 13, 1982, NRC published a notice of proposed rule making that would amend regulations which incorporate by reference national codes and standards for the construction of nuclear power plant components. The amendments would increase references to the ASME Boiler and Pressure Vessel Code to include subsections that provide rules for the construction of certain safety systems and clarify existing regulations by removing obsolete provisions no longer applicable.

Teletherapy Room Radiation Monitors and Inspection and Servicing of Teletherapy Machines — Part 35

On April 28, 1982, NRC published proposed amendments to its regulations applicable to NRC teletherapy licensees. The amendments would ensure prior warning to the operator in the event of a malfunction of a teletherapy source exposure mechanism and adequate inspection and servicing of the teletherapy machine.

Licensee Event Report System — Part 50

On May 6, 1982, NRC published a notice of proposed rulemaking that would codify existing Licensee Event Report (LER) reporting requirements and establish a single set of requirements that would apply to all operating nuclear power plants. The proposed rule would apply only to licensees of commercial nuclear power plants, not to licensees of research reactors, fuel processing facilities, or by-product processing or utilization facilities.

Revision and Clarification of Criteria and Procedures for Determining Eligibility for Access to Restricted Data National Security Information or an Employment Clearance and Conforming Amendments — Parts 10, 11, 25, and 95

On May 7, 1982, NRC published proposed amendments to its regulations that would clarify and update the criteria and procedures used for determining the eligibility of an individual for access to Restricted Data or national security information, or an employment clearance. The proposed rule would also make conforming changes to other parts of the Commission's regulations.

General License For Shipment in Packages Approved for Use by Another Person — Part 71

On May 18, 1982, NRC published a notice of proposed rule making to amend its regulations on the transportation of radioactive material. It proposed to change recordkeeping requirements of the general license authorizing an NRC licensee to use a package that the Commission has previously evaluated and specifically authorized another licensee to use.

Modification of Indemnity Agreements — Part 140

On July 23, 1982, NRC published a notice of proposed rulemaking to amend its regulations to delete the opportunity for public intervention and comment from its procedures of entering into an indemnity agreement with provisions different than those in a standard form or modifying a standard form indemnity agreement. The Commission is proposing the action because the scope of public comment appropriate for this type of action is so restricted that the opportunity for public comment is unnecessary.

Codes and Standards for Nuclear Power Plants — Part 50

On July 29, 1982, NRC published a notice of proposed rulemaking that would amend its regulations by incorporating by reference new addenda of the ASME Boiler and Pressure Vessel Code. Adoption of these amendments would permit the use of improved methods for construction and inservice inspection of nuclear power plants.

Personnel With Unescorted Access to Protected Areas; Fitness for Duty — Part 50

On August 5, 1982, NRC published a notice of proposed rulemaking that would amend its regulations to require commercial and industrial facilities licensed under 10 CFR 50.22 (primarily nuclear power plant licensees) to establish and implement controls designed to assure that personnel with unescorted access to protected areas are not under the influence of drugs or alcohol or otherwise unfit for duty. The result of the proposed rule would be the implementation of fitness for duty programs industry-wide that would be designed to provide greater assurance of safer and more reliable operation of nuclear facilities.

Applicability of License Conditions and Technical Specifications in an Emergency — Part 50

On August 18, 1982, NRC published a notice of proposed rulemaking to clarify regulations in 10 CFR Part 50. The proposed change would provide that a licensee may take reasonable action that departs from a license condition or a technical specification in an emergency when such action is immediately needed to protect the public health and safety.

Licensed Operator Staffing at Nuclear Power Units — Part 50

On August 30, 1982, NRC published a notice of proposed rulemaking to require licensees of nuclear power units to provide a minimum number of licensed personnel on shift at all times and to ensure the presence of a person with a senior operator license at all times in the control room from which a nuclear power unit is operating.

ADVANCED NOTICES OF PROPOSED RULEMAKING

Integrated Operational Experience Reporting System — Part 50

On October 6, 1981, NRC published an advance notice of proposed rulemaking to modify and codify the existing Licensee Event Report (LER) System and assure that those requirements are consistent with Commission regulations covering the immediate reporting of significant events.

Material Control and Accounting Requirements for Facilities Possessing Formula Quantities of SSNM: Extension of Comment Period — Part 70

On November 18, 1981, NRC published a notice extending the comment period to February 9, 1982, on its proposed rulemaking affecting facilities possessing formula quantities of SSNM.

Certification of Industrial Radiographers — Part 34

On May 4, 1982, NRC published an advance notice of proposed rulemaking to present an alternative to the present system of permitting a radiography licensee to train and designate individuals as radiographers. This action is intended to ensure that all radiographers possess adequate training and experience to operate radiographic equipment safely.

Mandatory Property Insurance for Decontamination of Nuclear Reactors — Part 50

On June 24, 1982, NRC published an advance notice of proposed rulemaking to request comments on a report on property insurance prepared by Dr. John D. Long, Professor of Insurance at Indiana University (NUREG-0891). The report followed the interim final rule in the Federal Register (47 FR 13750) requiring utility licensees to purchase on-site property insurance to be used for decontamination expenses arising from an accident.

PROPOSED RULES WITHDRAWN

Establishment of NRC Staff Authority to Call Meetings With Lincesees — Part 19

On November 5, 1981, NRC published a notice withdrawing a proposed rule published March 26, 1980 to amend 10 CFR Part 19, regarding meetings with licensees. An analysis of public comments and review of past inspection and enforcement cases indicate that the amendments are not needed at this time.

EXTENSION OF PUBLIC COMMENT PERIOD

Licensing Requirements for Land Disposal of Radioactive Waste — Parts 2, 19, 20, 21, 30, 40, 51, 61, 70, 73, and 170

On October 22, 1982, NRC published a notice to extend the public comment period on proposed rule making to provide specific requirements for licensing and land disposal of radioactive wastes.

Safeguards Requirements for Nonpower Reactor Facilities Authorized to Possess Formula Quantities of Strategic Special Nuclear Materials — Parts 50, 70, and 73

On December 15, 1981, the NRC extended the public comment period for physical protection regulations for nonpower reactor formulas of strategic special nuclear material. The comment period is being extended in response to public requests.

Emergency Planning and Preparedness; Exercises — Part 50

On January 20, 1982, NRC published a notice of proposed rulemaking concerning clarification of the exercise requirements under the Commission Emergency Planning and Preparedness regulations. The proposal extends the public comment period in response to requests.

Emergency Planning and Preparedness for Production and Utilization Facilities — Part 50

On January 20, 1982, NRC published a notice of proposed rulemaking regarding the degree of emergency preparedness for production and utilization facilities. The proposal extends the comment period in response to requests.

Interim Requirements Related to Hydrogen Control; Extension of Comment Period and Editorial Corrections — Part 50

On February 25, 1982, NRC published a notice extending the public comment period on its proposed rule that would amend 10 CFR Part 50 to improve hydrogen control capability during and following an accident in light-water reactor facilities.

Appendix 5

Regulatory Guides — Fiscal Year 1982

NRC regulatory guides describe methods for implementing specific parts of the Commission's regulations and, in some cases, describe techniques used by the staff in evaluating specific problems or postulated accidents. Guides also may advise applicants regarding information the NRC staff needs in reviewing applications for permits and licenses.

Comments on the guides are encouraged, and the guides are revised whenever appropriate, to reflect new information or experience. NRC issues the guides for public comment in draft form before they have received complete staff review and an official staff position has been established.

Once issued, regulatory guides may be withdrawn when superseded by Commission regulations, when equivalent recommendations have been incorporated in applicable approved codes and standards, or when changes make them obsolete.

When guides are issued, revised, or withdrawn, notices are placed in the *Federal Register.*

To reduce the burden on the taxpayer, the NRC has made arrangements with the U.S. Government Printing Office to become a consigned sales agent for certain NRC publications including regulatory guides, except for draft guides issued for public comment which receive free distribution. Active guides are sold on a subscription or individual copy basis. NRC licensees receive, at no cost, pertinent draft and active regulatory guides as they are issued.

The following guides were issued or revised (or withdrawn as noted) during the period October 1, 1981, to September 30, 1982:

Division 1 — Power Reactor Guides

1.68.3 Preoperational Testing of Instrument and Control Air Systems

1.10 WITHDRAWN. Preoperational Testing of Instrument Air Systems

1.84 Design and Fabrication Code Case Acceptability — ASME Section III Division 1 (Revision 19)

1.85 Materials Code Case Acceptability — ASME Section III Division 1 (Revision 19)

1.101 Emergency Planning and Preparedness for Nuclear Power Reactors (Revision 2)

1.142 Safety-Related Concrete Structures for Nuclear Power Plants (Other Than Reactor Vessels and Containments) (Revision 1)

1.147 Inservice Inspection Code Case Acceptability — ASME Section XI Division 1 (Revision 1)

Division 2 — Research and Test Reactor Guides

None

Division 3 — Fuels and Materials Facilities Guides

3.1 Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material (Revision 1)

3.46 Standard Format and Content of License Applications, Including Environmental Reports, for In Situ Uranium Solution Mining

3.48 Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation (Dry Storage)

3.49 Design of an Independent Spent Fuel Storage Installation (Water-Basin Type)

3.50 Guidance on Preparing a License Application To Store Spent Fuel in an Independent Spent Fuel Storage Installation

3.51 Calculational Models for Estimating Radiation Doses to Man from Airborne Radioactive Materials Resulting from Uranium Milling Operations

3.52 Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Fuel Fabrication Plants

3.53 Applicability of Existing Regulatory Guides to the Design and Operation of an Independent Spent Fuel Storage Installation

Division 4 — Environmental and Siting Guides

4.17 Standard Format and Content of Site Characterization Reports for High-Level-Waste Geologic Repositories

Division 5 — Materials and Plant Protection Guides

5.63 Physical Protection for Transient Shipments

Division 6 — Product Guides

None

Division 7 — Transportation Guides

None

Division 8 — Occupational Health Guides

None

Division 9 — Antitrust and Financial Review Guides

None

Division 10 — General Guides

10.1	Compilation of Reporting Requirements for Persons Subject to NRC Regulations (Revision 4)
10.6	Guide for the Preparation of Applications for Use of Sealed Sources and Devices for Performing Industrial Radiography (Revision 1)

DRAFT GUIDES

Division 1

CE 913-5	Proposed Revision 2 to Guide 1.13, Spent Fuel Storage Facility Design Basis
EE 042-2	Proposed Revision 1 to Guide 1.89, Environmental Qualification of Electric Equipment for Nuclear Power Plants
IC 010-5	Proposed Revision 2 to Guide 1.105, Instrument Setpoints
IC 121-5	Response-Time Testing of Protection System Instrument Channels
IC 126-5	Instrument Sensing Lines
IC 131-5	Installation of Transducers
MS 901-4	Identification of Valves for Inclusion in Inservice Testing Programs

Division 2

HF 201-4	Proposed Revision 1 to Guide 2.6, Emergency Planning for Research and Test Reactors

Division 3

CE 037-4	Applicability of Existing Regulatory Guides to the Design and Operation of an Independent Spent Fuel Storage Installation
CE 219-4	Proposed Revision 1 to Guide 3.15, Standard Format and Content of License Applications for Storage Only of Unirradiated Reactor Fuel and Associated Radioactive Material
HF 608-4	Training and Certification of Independent Spent Fuel Storage Installation Operators

Division 4

WM 013-4	Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste

Division 5

SG 042-2	Proposed Revision 2 to Guide 5.9, Guidelines for Germanium Spectroscopy Systems for Measurement of Special Nuclear Material
SG 044-4	Proposed Revision 1 to Guide 5.21, Nondestructive Uranium-235 Enrichment Assay by Gamma Ray Spectrometry
SG 046-4	Proposed Revision 1 to Guide 5.34, Nondestructive Assay for Plutonium in Scrap Material by Spontaneous Fission Detection
SG 047-4	Proposed Revision 1 to Guide 5.37, In Situ Assay of Enriched Uranium Residual Holdup
SG 048-4	Proposed Revision 1 to Guide 5.38, Nondestructive Assay of High-Enrichment Uranium Fuel Plates by Gamma Ray Spectrometry
SG 049-4	Proposed Revision 1 to Guide 5.53, Qualification, Calibration, and Error Estimation Methods for Nondestructive Assay
SG 126-4	Physical Protection for Transient Shipments
SG 229-4	Proposed Revision 1 to Guide 5.59, Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance

Division 8

OP 618-4	Second Proposed Revision 4 to Guide 8.8, Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable (ALARA)
OP 722-4	Qualifications for the Radiation Safety Officer in a Large-Scale Non-Fuel-Cycle Radionuclide Program

Division 10

OP 706-4	Proposed Revision 1 to Guide 10.9, Guide for the Preparation of Applications for Licenses for the Use of Gamma Irradiators
TM 608-4	Guide for the Preparation of Applications for Licenses in Medical Teletherapy Programs

Appendix 6

Nuclear Electric Generating Units In Operation Or Under Construction

(As of December 31, 1982)

The following listing includes nuclear power reactor electrical generating units which were in operation, under construction, or under NRC review for construction permits in the United States as of December 31, 1982, representing a total capacity of approximately 149,000 MWe. TYPE is indicated by: BWR — boiling water reactor, PWR — pressurized water reactor, HTGR — high temperature gas-cooled reactor, and LMFBR — liquid metal cooled fast breeder reactor. STATUS is indicated by: OL — has operating license, CP — has construction permit, UR — under review for construction permit. The dates for operation are either actual or those scheduled by the utilities as of December 31, 1982.

This listing includes 15 fewer units than a year ago, reflecting cancellations of plans for future facilities.

Site	Plant	Capacity (Net MWe)	Type	Status	Utility	Commercial Operation
ALABAMA						
Decatur	Browns Ferry Nuclear Power Plant Unit 1	1,065	BWR	OL 1973	Tennessee Valley Authority	1974
Decatur	Browns Ferry Nuclear Power Plant Unit 2	1,065	BWR	OL 1974	Tennessee Valley Authority	1975
Decatur	Browns Ferry Nuclear Power Plant Unit 3	1,065	BWR	OL 1976	Tennessee Valley Authority	1977
Dothan	Joseph M. Farley Nuclear Plant Unit 1	804	BWR	OL 1977	Alabama Power Co.	1977
Dothan	Joseph M. Farley Nuclear Plant Unit 2	814	PWR	OL 1981	Alabama Power Co.	1981
Scottsboro	Bellefonte Nuclear Plant Unit 1	1,235	PWR	CP 1974	Tennessee Valley Authority	1985
Scottsboro	Bellefonte Nuclear Plant Unit 2	1,235	PWR	CP 1974	Tennessee Valley Authority	1986
ARIZONA						
Winterburg	Palo Verde Nuclear Generating Station Unit 1	1,304	PWR	CP 1976	Arizona Public Service Co.	1983
Winterburg	Palo Verde Nuclear Generating Station Unit 2	1,304	PWR	CP 1976	Arizona Public Service Co.	1984
Winterburg	Palo Verde Nuclear Generating Station Unit 3	1,304	PWR	CP 1976	Arizona Public Service Co.	1986

Site	Plant	Capacity (Net MWe)	Type	Status	Utility	Commercial Operation
ARKANSAS						
Russelville	Arkansas Nuclear One Unit 1	836	PWR	OL 1974	Arkansas Power & Light Co.	1974
Russelville	Arkansas Nuclear One Unit 2	858	PWR	OL 1978	Arkansas Power & Light Co.	1980
CALIFORNIA						
Eureka	Humboldt Bay Power Plant Unit 3[1]	65	BWR	OL 1962	Pacific Gas & Electirc Co.	1963
San Clemente	San Onofre Nuclear Generating Station Unit 1	436	PWR	OL 1967	So. Calif. Ed. & San Diego Gas & Electric Co.	1968
San Clemente	San Onofre Nuclear Generating Station Unit 2	1,100	PWR	CP 1982	So. Calif. Ed. & San Diego Gas & Electric Co.	1983
San Clemente	San Onofre Nuclear Generating Station, Unit 3	1,100	PWR	CP 1973	So. Calif. Ed. & San Diego Gas & Electric Co.	1983
Diablo Canyon	Diablo Canyon Nuclear Power Plant Unit 1[2]	1,084	PWR	CP 1968	Pacific Gas & Electric Co.	1984
Diablo Canyon	Diablo Canyon Nuclear Power Plan Unit 2	1,106	PWR	CP 1970	Pacific Gas & Electric Co.	1984
Clay Station	Rancho Seco Nuclear Generating Station Unit 1	873	PWR	OL 1974	Sacramento Municipal Utility District	1975
COLORADO						
Platteville	Fort St. Vrain Nuclear Generating Station	330	HTGR	OL 1973	Public Service Co. of Colorado	1979
CONNECTICUT						
Haddam Neck	Haddam Neck Generating Station	555	PWR	OL 1967	Conn. Yankee Atomic Power Co.	1968
Waterford	Millstone Nuclear Power Station Unit 1	654	BWR	OL 1970	Northeast Nuclear Energy Co.	1971
Waterford	Millstone Nuclear Power Station Unit 2	864	PWR	OL 1975	Northeast Nuclear Energy Co.	1975
Waterford	Millstone Nuclear Power Station Unit 3	1,156	PWR	CP 1974	Northeast Nuclear Energy Co.	1986
FLORIDA						
Florida City	Turkey Point Station Unit 3	646	PWR	OL 1972	Florida Power & Light Co.	1972
Florida City	Turkey Point Station Unit 4	646	PWR	OL 1973	Florida Power & Light Co.	1973
Red Level	Crystal River Plant Unit 3	806	PWR	OL 1977	Florida Power Corp.	1977

[1]Shut down indefinitely (not included in summary)
[2]Low power license issued 9/81 and revoked 11/81.

Site	Plant	Capacity (Net MWe)	Type	Status	Utility	Commercial Operation
FLORIDA — (continued)						
Ft. Pierce	St. Lucie Plant Unit 1	817	PWR	OL 1976	Florida Power & Light Co.	1976
Ft. Pierce	St. Lucie Plant Unit 2	842	PWR	CP 1977	Florida Power & Light Co.	1983
GEORGIA						
Baxley	Edwin I. Hatch Plant Unit 1	757	BWR	OL 1974	Georgia Power Co.	1975
Baxley	Edwin I. Hatch Plant Unit 2	771	BWR	OL 1978	Georgia Power Co.	1979
Waynesboro	Alvin W. Vogtle, Jr. Plant Unit 1	1,100	PWR	CP 1974	Georgia Power Co.	1987
Waynesboro	Alvin W. Vogtle, Jr. Plant Unit 2	1,100	PWR	CP 1974	Georgia Power Co.	1988
ILLINOIS						
Morris	Dresden Nuclear Power Station Unit 1[2]	200	BWR	OL 1959	Commonwealth Edison Co.	1960
Morris	Dresden Nuclear Power Station Unit 2	772	BWR	OL 1969	Commonwealth Edison Co.	1970
Morris	Dresden Nuclear Power Station Unit 3	773	BWR	OL 1971	Commonwealth Edison Co.	1971
Zion	Zion Nuclear Plant Unit 1	1,040	PWR	OL 1973	Commonwealth Edison Co.	1973
Zion	Zion Nuclear Plant Unit 2	1,040	PWR	OL 1973	Commonwealth Edison Co.	1974
Cordova	Quad-Cities Station Unit 1	769	BWR	OL 1972	Comm. Ed. Co.-Iowa-Ill Gas & Elec. Co.	1973
Cordova	Quad-Cities Station Unit 2	769	BWR	OL 1972	Comm. Ed. Co.-Iowa-Ill Gas & Elec. Co.	1973
Seneca	LaSalle County Nuclear Station Unit 1	1,078	BWR	OL 1982	Commonwealth Edison Co.	1983
Seneca	LaSalle County Nuclear Station Unit 2	1,078	BWR	CP 1973	Commonwealth Edison Co.	1983
Byron	Byron Station Unit 1	1,120	PWR	CP 1975	Commonwealth Edison Co.	1984
Byron	Byron Station Unit 2	1,120	PWR	CP 1975	Commonwealth Edison Co.	1985
Braidwood	Braidwood Unit 1	1,120	PWR	CP 1975	Commonwealth Edison Co.	1985
Braidwood	Braidwood Unit 2	1,120	PWR	CP 1975	Commonwealth Edison Co.	1986
Clinton	Clinton Nuclear Power Plant Unit 1	950	BWR	CP 1976	Illinois Power Co.	1984
Clinton	Clinton Nuclear Power Plant Unit 2	950	BWR	CP 1976	Illinois Power Co.	Indef.

[2]Low power license issued 9/81 and revoked 11/18.

Site	Plant	Capacity (Net MWe)	Type	Status	Utility	Commercial Operation
INDIANA						
Madison	Marble Hill Unit 1	1,130	PWR	CP 1978	Public Service of Indiana	1986
Madison	Marble Hill Unit 2	1,130	PWR	CP 1978	Public Service of Indiana	1988
IOWA						
Pala	Duane Arnold Energy Center Unit 1	515	BWR	OL 1974	Iowa Elec. Light & Power Co.	1975
KANSAS						
Burlington	Wolf Creek	1,150	PWR	CP 1977	Kansas Gas & Elec. Co.	1985
LOUISIANA						
Taft	Waterford Steam Electric Station	1,151	PWR	CP 1974	Louisiana Power & Light Co.	1984
St. Francisville	River Bend Station Unit 1	934	BWR	CP 1977	Gulf States Utilities Co.	1985
St. Francisville	River Bend Station Unit 2	934	BWR	CP 1977	Gulf States Utilities Co.	Indef.
MAINE						
Wiscasset	Maine Yankee Atomic Power	810	PWR	OL 1972	Maine Yankee Atomic Power Co.	1972
MARYLAND						
Lusby	Calvert Cliffs Nuclear Power Plant Unit 1	825	PWR	OL 1974	Baltimore Gas & Elec. Co.	1975
Lusby	Calvert Cliffs Nuclear Power Plant Unit 2	825	PWR	OL 1976	Baltimore Gas & Elec. Co.	1977
MASSACHUSETTS						
Rowe	Yankee Nuclear Power Station	175	PWR	OL 1960	Yankee Atomic Elec. Co.	1961
Plymouth	Pilgrim Station Unit 1	670	BWR	OL 1972	Boston Edison Co.	1972
MICHIGAN						
Big Rock Point	Big Rock Point Nuclear Plant	64	BWR	OL 1962	Consumers Power Co.	1963
South Haven	Palisades Nuclear Power Station	635	PWR	OL 1971	Consumers Power Co.	1971
Lagoona Beach	Enrico Fermi Atomic Power Plant Unit 2	1,093	BWR	CP 1972	Detroit Power Co.	1984
Bridgman	Donald C. Cook Plant Unit 1	1,044	PWR	OL 1974	Indiana & Michigan Elec. Co.	1975
Bridgman	Donald C. Cook Plant Unit 2	1,082	PWR	OL 1977	Indiana & Michigan Elec. Co.	1978
Midland	Midland Nuclear Power Plant Unit 1	492	PWR	CP 1972	Consumers Power Co.	1984
Midland	Midland Nuclear Power Plant Unit 2	818	PWR	CP 1972	Consumers Power Co.	1984

Site	Plant	Capacity (Net MWe)	Type	Status	Utility	Commercial Operation
MINNESOTA						
Monticello	Monticello Nuclear Generating Plant	525	BWR	OL 1970	Northern States Power Co.	1971
Red Wing	Prairie Island Nuclear Generating Plan Unit 1	503	PWR	OL 1973	Northern States Power Co.	1973
Red Wing	Prairie Island Nuclear Generating Plant Unit 2	500	PWR	OL 1974	Northern States Power Co.	1974
MISSISSIPPI						
Port Gibson	Grand Gulf Nuclear Station Unit 1	1,250	BWR	OL 1982	Mississippi Power & Light Co.	1983
Port Gibson	Grand Gulf Nuclear Station Unit 2	1,250	BWR	CP 1974	Mississippi Power & Light Co.	Indef.
Yellow Creek	Yellow Creek Unit 1	1,285	PWR	CP 1978	Tennessee Valley Authority	Indef.
Yellow Creek	Yellow Creek Unit 2	1,285	PWR	CP 1978	Tennessee Valley Authority	Indef.
MISSOURI						
Fulton	Callaway Plant Unit 1	1,188	PWR	CP 1976	Union Electric Co.	1984
NEBRASKA						
Fort Calhoun	Fort Calhoun Station Unit 1	478	PWR	OL 1973	Omaha Public Power District	1973
Brownville	Cooper Nuclear Station	764	BWR	OL 1974	Nebraska Public Power District	1974
NEW HAMPSHIRE						
Seabrook	Seabrook Nuclear Station Unit 1	1,198	PWR	CP 1976	Public Service of N.H.	1985
Seabrook	Seabrook Nuclear Station Unit 2	1,198	PWR	CP 1976	Public Service of N.H.	1987
NEW JERSEY						
Toms River	Oyster Creek Nuclear Power Plant Unit 1	620	BWR	OL 1969	GPU Nuclear Corp.	1969
Salem	Salem Nuclear Generating Station Unit 1	1,079	PWR	OL 1976	Public Service Elec. & Gas Co.	1977
Salem	Salem Nuclear Generating Station Unit 2	1,106	PWR	OL 1980	Public Service Elec. & Gas Co.	1981
Salem	Hope Creek Generating Station Unit 1	1,067	BWR	CP 1974	Public Service Elec. & Gas Co.	1986

Site	Plant	Capacity (Net MWe)	Type	Status	Utility	Commercial Operation
NEW YORK						
Indian Point	Indian Point Station Unit 2	864	PWR	OL 1973	Consolidated Edison Co.	1974
Indian Point	Indian Point Station Unit 3	891	PWR	OL 1975	Power Authority of the State of New York	1976
Scriba	Nine Mile Point Nuclear Unit 1	610	BWR	OL 1969	Niagara Mohawk Power Co.	1969
Scriba	Nine Mile Point Nuclear Unit 2	1,080	BWR	OL 1974	Niagara Mohawk Power Co.	1986
Ontario	R. E. Ginna Nuclear Power Plant Unit 1	470	PWR	OL 1969	Rochester Gas & Elec. Co.	1970
Brookhaven	Shoreham Nuclear Power Station	820	BWR	CP 1973	Long Island Lighting Co.	1983
Scriba	James A. FitzPatrick Nuclear Power Plant	810	BWR	OL 1974	Power Authority of the State of New York	1975
NORTH CAROLINA						
Southport	Brunswick Steam Electric Plant Unit 2	790	BWR	OL 1974	Carolina Power & Light Co.	1975
Southport	Brunswick Steam Electric Plant Unit 1	790	BWR	OL 1976	Carolina Power & Light Co.	1977
Cowans Ford Dam	Wm. B. McGuire Nuclear Station Unit 1	1,180	PWR	OL 1981	Duke Power Co.	1981
Cowans Ford Dam	Wm. B. McGuire Nuclear Station Unit 2	1,180	PWR	CP 1973	Duke Power Co.	1984
Bonsal	Shearon Harris Plant Unit 1	915	PWR	CP 1978	Carolina Power & Light Co.	1986
Bonsal	Shearon Harris Plant Unit 2	915	PWR	CP 1978	Carolina Power & Light Co.	1990
OHIO						
Oak Harbor	Davis-Besse Nuclear Power Station Unit 1	874	PWR	OL 1977	Toledo Edison-Cleveland Electric Illum. Co.	1977
Perry	Perry Nuclear Power Plant Unit 1	1,205	BWR	CP 1977	Toledo Edison-Cleveland Elec. Illum. Co.	1984
Perry	Perry Nuclear Power Plant Unit 2	1,205	BWR	CP 1977	Toledo Edison-Cleveland Elec. Illum. Co.	1988
Moscow	Wm. H. Zimmer Nuclear Power Station Unit 1	810	BWR	CP 1972	Cincinnati Gas & Elec. Co.	1983
OREGON						
Prescott	Trojan Nuclear Plant Unit 1	1,080	PWR	OL 1975	Portland General Elec. Co.	1976

Site	Plant	Capacity (Net MWe)	Type	Status	Utility	Commercial Operation
PENNSYLVANIA						
Peach Bottom	Peach Bottom Atomic Power Station Unit 2	1,051	BWR	OL 1973	Philadelphia Elec. Co.	1974
Peach Bottom	Peach Bottom Atomic Power Station Unit 3	1,035	BWR	OL 1974	Philadephia Elec. Co.	1974
Pottstown	Limerick Generating Station Unit 1	1,065	BWR	CP 1974	Philadephia Elec. Co.	1985
Pottstown	Limerick Generating Station Unit 2	1,065	BWR	CP 1974	Philadephia Elec. Co.	1987
Shippingport	Beaver Valley Power Station Unit 1	810	PWR	OL 1976	Duquesne Light Co. Ohio Edison Co.	1976
Shippingport	Beaver Valley Power Station Unit 2	852	PWR	CP 1974	Duquesne Light Co. Ohio Edison Co.	1986
Goldsboro	Three Mile Island Nuclear Station, Unit 1	776	PWR	OL 1974	GPU Nuclear Corp.	1974
Goldsboro	Three Mile Island Nuclear[2] Station, Unit 2	906	PWR	OL 1978	GPU Nuclear Corp.	1978
Berwick	Susquehanna Steam Electric Station Unit 1	1,052	BWR	OL 1982	Pennsylvania Power & Light Co.	1982
Berwick	Susquehanna Steam Electric Station Unit 2	1,052	BWR	CP 1973	Pennsylvania Power & Light Co.	1984
SOUTH CAROLINA						
Hartsville	H. B. Robinson S.E. Plant Unit 2	665	PWR	OL 1970	Carolina Power & Light Co.	1971
Seneca	Oconee Nuclear Station Unit 1	860	PWR	OL 1973	Duke Power Co.	1973
Seneca	Oconee Nuclear Station Unit 2	860	PWR	OL 1973	Duke Power Co.	1974
Seneca	Oconee Nuclear Station Unit 3	860	PWR	OL 1974	Duke Power Co.	1974
Broad River	Virgil C. Summer Nuclear Station Unit 1	900	PWR	OL 1982	So. Carolina Elec. & Gas Co.	1983
Lake Wylie	Catawba Nuclear Station Unit 1	1,145	PWR	CP 1975	Duke Power Co.	1985
Lake Wylie	Catawba Nuclear Station Unit 2	1,145	PWR	CP 1975	Duke Power Co.	1987
Cherokee County	Cherokee Nuclear Station Unit 1	1,280	PWR	CP 1977	Duke Power Co.	Indef.
TENNESSEE						
Daisy	Sequoyah Nuclear Power Plant Unit 1	1,128	PWR	OL 1980	Tennessee Valley Authority	1981

[2]Low power license issued 9/81 and revoked 11/18.

Site	Plant	Capacity (Net MWe)	Type	Status	Utility	Commercial Operation
TENNESSEE — (Continued)						
Daisy	Sequoyah Nuclear Power Plant Unit 2	1,148	PWR	OL 1981	Tennessee Valley Authority	1982
Spring City	Watts Bar Nuclear Plant Unit 1	1,165	PWR	CP 1973	Tennessee Valley Authority	1984
Spring City	Watts Bar Nuclear Plant Unit 2	1,165	PWR	CP 1973	Tennessee Valley Authority	1985
Oak Ridge	Clinch River Breeder Reactor Plant[3]	350	LMFBR	UR	U.S. Government	1990
Hartsville	TVA Plant A Unit 1	1,205	BWR	CP 1977	Tennessee Valley Authority	Indef.
Hartsville	TVA Plant A Unit 2	1,205	BWR	CP 1977	Tennessee Valley Authority	Indef.
TEXAS						
Glen Rose	Comanche Peak Steam Electric Station Unit 1	1,150	PWR	CP 1974	Texas Utilites	1984
Glen Rose	Comanche Peak Steam Electric Station Unit 2	1,150	PWR	CP 1974	Texas Utilities	1985
Bay City	South Texas Nuclear Project Unit 1	1,250	PWR	CP 1975	Houston Lighting & Power Co.	1987
Bay City	South Texas Nuclear Project Unit 2	1,250	PWR	CP 1975	Houston Lighting & Power Co.	1989
VERMONT						
Vernon	Vermont Yankee Generating Station	504	BWR	OL 1972	Vermont Yankee Nuclear Power Corp.	1972
VIRGINIA						
Gravel Neck	Surry Power Station Unit 1	775	PWR	OL 1972	Va. Electric & Power Co.	1972
Gravel Neck	Surry Power Station Unit 2	775	PWR	OL 1973	Va. Electric & Power Co.	1973
Mineral	North Anna Power Station Unit 1	865	PWR	OL 1976	Va. Electric & Power Co.	1978
Mineral	North Anna Power Station Unit 2	890	PWR	OL 1980	Va. Electric & Power Co.	1980
WASHINGTON						
Richland	WPPSS No. 1 (Hanford)	1,266	PWR	CP 1975	Wash. Public Power Supply System	Indef.
Richland	WPPSS No. 2 (Handford)	1,103	BWR	CP 1973	Wash. Public Power Supply System	1984
Satsop	WPPSS No. 3	1,242	PWR	CP 1978	Wash. Public Power Supply System	1986

[3]Indefinitely postponed.

Site	Plant	Capacity (Net MWe)	Type	Status	Utility	Commercial Operation
WASHINGTON — (Continued)						
Skagit/Hanford	Skagit/Hanford Unit 1	1,277	BWR	UR	Puget Sound Power & Light Co.	1991
Skagit/Hanford	Skagit/Hanford Unit 2	1,277	BWR	UR	Puget Sound Power & Light Co.	1993
WISCONSIN						
LaCrosse	LaCrosse (Genoa) Nuclear Generating Station	48	BWR	OL 1967	Dairyland Power Coop.	1969
Two Creeks	Point Beach Nuclear Plant Unit 1	495	PWR	OL 1970	Wisconsin Michigan Power Co.	1970
Two Creeks	Point Beach Nuclear Plant Unit 2	495	PWR	OL 1971	Wisconsin Michigan Power Co.	1972
Kewanee	Kewanee Nuclear Power Plant	515	PWR	OL 1973	Wisconsin Public Svc. Corp.	1974

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