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Nuclear Powerplant Licensing: Need for Additional Improvements. EMD-78-29; B-127945. April 27, 1978. 43 pp. + 3 appendices (33 pp.).

Report to the Congress; by Elmer B. Staats, Comptroller General.

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The Nuclear Regulatory Commission (NRC) regulates the construction and operation of commercial nuclear powerplants by establishing minimum construction and operating standards and by conducting reviews to determine if the standards are adequately understood and implemented. The reviews result in two licenses for each plant: one permitting construction and another allowing operation after construction is completed.
Findings/Conclusions: Improvements are needed in management of the licensing process in the following areas: practices involved in imposing new regulatory requirements, evaluation of data to update the regulatory process, and guidance and training of reviewers. Almost 97% of NRC reviewers believed that powerplant designs were either adequate or more conservative than necessary, but a large majority of the reviewers thought that some important safety items were not being reviewed or that time constraints limited efforts. Charges brought by NRC employees that NRC neglects safety issues, restricts staff debate, and takes reprisals against dissenters were reviewed by NRC and the Congress. Most reviewers believe that they can raise dissenting issues without reprisals, but some are not sure of NRC's desire to hear these issues. NRC has taken steps to streamline the licensing process and reduce the time required for licensing and construction. Also, the administration proposed legislation to increase regulatory efficiency, including the use of standardized designs and early approval of sites.
Recommendations: In considering legislative proposals, the Congress should require that: NRC develop a method to update and certify the continued acceptability of proposed powerplant sites; the Advisory Committee on Reactor Safeguards review applications which do not include plant designs approved under a formal NRC standardization program; adequate public hearings be held when decisions are made that relate to the National Environmental Policy Act; and NRC, before transferring the act requirements to States, insure that their environmental programs

are adequate and will not cause undue delay. The Chairman, NRC, should: evaluate the need for additional staff or time in certain review areas; update the licensing process and provide more thorough evaluation of proposed changes in licensing requirements; provide technical reviewers with improved training and guidance; expand the application of procedures for resolving technical disagreements; and improve the structure of the review process. (HTW)

6204

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Nuclear Powerplant Licensing: Need For Additional Improvements

In this report GAO reviews the Nuclear Regulatory Commission's management process for evaluating nuclear powerplant designs and sites and makes recommendations for improvements. The report also discusses the

--Commission staff's perspective on the adequacy of the licensing process,

--Commission staff's ability to raise dissenting technical opinions without experiencing adverse personnel actions, and

--administration's proposed legislation to streamline the licensing process.

EMD-78-29
APRIL 27, 1978

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-127945

To the President of the Senate and the
Speaker of the House of Representatives

This report discusses the Nuclear Regulatory Commission's procedures for evaluating the safety of proposed nuclear power-plant designs and sites.

This review was conducted as a part of our evaluation of the effectiveness of the Commission's regulatory activities as required by the Energy Reorganization Act of 1974 (42 U.S.C. 5876).

We are sending a copy of this report to the Chairman, Nuclear Regulatory Commission.

Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

NUCLEAR POWERPLANT LICENSING: NEED FOR ADDITIONAL IMPROVEMENTS

D I G E S T

The Nuclear Regulatory Commission regulates the construction and operation of commercial nuclear powerplants. It does this by establishing minimum construction and operating standards and by conducting reviews to determine if the standards are adequately understood and implemented.

The Commission reviews result in two licenses for each plant: one permitting construction of the plant and another allowing the plant to operate once construction is completed.

GAO reviewed the Commission's management process for evaluating powerplant designs and sites during licensing reviews. Also, because of congressional interest, GAO expanded the review to include the

--Commission staff's perspective on the adequacy of the licensing process,

--Commission staff's ability to raise dissenting technical opinions without experiencing adverse personnel actions, and

--administration's proposed legislation to streamline the licensing process and make it more efficient.

GAO used a questionnaire to obtain the Commission technical reviewers' perspective on these issues. Responses to questionnaires are discussed throughout the report and a summary of the results is in appendix I.

IMPROVEMENTS NEEDED IN THE COMMISSION'S MANAGEMENT OF THE LICENSING PROCESS

GAO's review identified areas where the Commission could improve the management of the licensing process, either to make it more efficient and predictable or more sensitive to the training needs of the technical staff.

Imposing new regulatory requirements

The Commission establishes numerous regulations to guide the construction and operation of commercial nuclear facilities. However, they are subject to reevaluation and interpretation by individual Commission reviewers. The nuclear industry charges that this practice results in unnecessary and costly design and procedural changes. (See pp. 14 and 15.)

In response, the Commission established a committee to review proposed changes in regulatory requirements in terms of their expected value (benefit) and impact (cost). GAO's review showed, however, that the Commission's value and impact analyses are inadequate and do not include detailed cost estimates. More importantly, GAO found that the Commission imposed many changes on applicants long before the committee reviews took place. (See pp. 14 and 15.)

Updating the regulatory process

The Commission has programs to accumulate powerplant operating data and to track the results of research projects. This, it hopes, will help develop more realistic regulatory requirements. (See pp. 12 and 13.)

But the Commission does not adequately analyze operating experience data or evaluate the data's impact on the licensing process. Also, it only recently began to transmit results of research projects to the licensing staff and to monitor their effect on the licensing process. These procedures, however, do not cover all research projects.

Results of each research project should be summarized, evaluated, and made available for management review. This would help the Commission evaluate its research efforts, allocate future research funds, and insure that the research program supplements the licensing process effectively. (See pp. 13 and 14.)

Guidance and training

Technical reviewers exercise considerable judgment in deciding the scope and depth of their

examination. The appropriateness of reviewers' decisions, therefore, depends on their competence, the amount of guidance they receive, and whether management adequately evaluates their work.

GAO found that the reviewers were experienced and well qualified but that:

--Additional training is needed to keep reviewers' technical skills current, help implement written guidance provided, and help relate each reviewers' efforts to the overall review process. (See pp. 20 and 21.)

--Additional documentation of the work performed for each review is needed to permit a better supervisory analysis, help eliminate duplication between the construction and operating license reviews, and provide a record of the work performed. (See pp. 22 and 23.)

--Reviewers' principal form of written guidance, the Standard Review Plan, needs revision. (See p. 22.)

LICENSING STAFF'S PERSPECTIVE OF THE LICENSING PROCESS

Almost 97 percent of the Commission technical reviewers believed that powerplant designs either were adequate or more conservative than necessary. However, a large majority thought that some important safety items were not being reviewed or that the time constraints limited their review efforts. (See p. 8 for a discussion of some of these items.)

GAO determined that even though the reviewers had concerns about the licensing process, they generally felt that powerplant designs are sufficiently conservative to protect public health and safety. (See pp. 10 and 11.)

COMMISSION STAFF DEBATE AND DISSENT

Over the past 2 years, six Commission employees have publicly charged that the Commission neglects significant safety issues, restricts staff

debate, and takes reprisals against those who question existing policies. These charges have been extensively reviewed by the Commission and the Congress. Through the questionnaire method, GAO tried to determine the extent of staff dissatisfaction and to evaluate new Commission procedures designed to alleviate staff unrest or dissent.

GAO found that most technical reviewers believe they can raise dissenting technical issues without reprisals from Commission management. Newly established procedures for reviewing dissenting staff opinions appear to be effective, although some reviewers are not sure of the Commission's desire to hear these issues. (See pp. 28 to 30.)

ADMINISTRATION PROPOSALS TO INCREASE REGULATORY EFFICIENCY

The Commission has taken some steps to streamline the licensing process, make it more efficient, and reduce the time required to license and construct a nuclear powerplant. These efforts include establishing procedures to approve standardized designs and prospective plant sites before their use.

By using a preapproved design and site, an applicant can begin construction without extensive delays. Additionally, standardized designs can be used more than once without extensive re-review. Preapproved sites and standardized designs provide the key to any significant reduction in the time required to design and construct new powerplants. (See pp. 33 to 35.)

In addition, the administration has sent licensing reform legislation to the Congress that provides for the use of standardized designs and early approval of powerplant sites. Under this legislation, States and utilities could have potential sites approved up to an initial 10 years before being used. A process would also be provided to approve standardized designs so that individual reviews and hearings would not be required each time an application uses that design.

GAO does not expect that the legislation will reduce licensing leadtimes significantly beyond that possible through the Commission's existing administrative procedures. (See pp. 33 to 35.)

The legislation also attempts to reduce redundant Federal and State environmental reviews by allowing States to assume all responsibility for environmental reviews. If States do not exercise this authority, environmental reviews would continue to be performed by the Commission. This would reduce duplicate review efforts but would not necessarily reduce the time it takes to license a nuclear powerplant.

If early site reviews are conducted, it does not matter whether the environmental review is performed by the Commission or the States, since the review will be done years before a utility starts construction work at the site. In cases where early site reviews are not performed, State reviews could become subject to varying degrees of timeliness, efficiency, or environmental and political pressures particularly in those States that have little or no experience in the environmental review process. This could result in even longer times to license powerplants. (See pp. 37 and 38.)

The legislation would also change the timing of public hearings. This change still provides for public participation at critical decision points, but the nature of public participation in environmental hearings would change. The hearings on environmental matters would be changed from adjudicatory to legislative unless there are factual disagreements important to the licensing proceeding. GAO does not think this proposal will result in any substantial savings in licensing leadtimes and does not agree with the administration's attempts to shorten licensing leadtimes by changing the public's input into the hearing process.

For example, this proposed change could reduce the public's rights to subpena and cross-examine witnesses depending on the ability of the Commission to develop and consistently apply criteria for conducting two types of

hearings and for determining when it would be necessary to change from legislative to adjudicatory hearings. (See pp. 38 and 39.)

RECOMMENDATIONS

The administration has been developing new legislative proposals to streamline the licensing process. Most of these proposals, however, have already been administratively implemented by the Commission, but congressional endorsement of the programs could lead to their fuller implementation. In its consideration of such proposals, the Congress should require that:

--The Commission, as part of the early site review proposal, develop a method to update and certify the continued acceptability of the proposed powerplant site.

--The Advisory Committee on Reactor Safeguards review all applications which do not include plant designs approved under a formal Commission standardization program.

--Adequate public hearings be held by the Commission and the States if they make National Environmental Policy Act-related decisions. The public should continue to have access to all pertinent licensing documents and be able to participate in public hearings by subpenaing and cross-examining witnesses.

--The Commission, before transferring National Environmental Policy Act requirements to the States, insure that the States' environmental programs are adequate and will not unduly delay licensing decisions. (See p. 41.)

Additionally, recommendations to the Chairman, Nuclear Regulatory Commission, provide for:

--Evaluating the scope and depth of certain review areas to determine if additional staff or time are required. (See p. 11.)

--Updating the licensing process and providing more thorough and complete evaluation of proposed changes in licensing requirements. (See pp. 17 and 18.)

--Providing technical reviewers with additional training and improved guidance. (See p. 24.)

--Expanding the application of procedures for resolving technical disagreements. (See pp. 31 and 32.)

--Improving the structure of the review process. (See p. 42.)

COMMISSION COMMENTS

The Commission's comments on GAO's recommendations are included in this report as appendix II, and its positions are summarized in each chapter following the applicable recommendations. The Commission generally agreed with GAO's recommendations and has started to take corrective actions where it believes they are applicable. It notes, however, that some corrective actions will be difficult--such as greater use of risk assessment techniques in the licensing process--and will take some time to fully implement.

Contents

ABBREVIATIONS

ACRS	Advisory Committee on Reactor Safeguards
GAO	General Accounting Office
NEPA	National Environmental Policy Act of 1969
NRC	Nuclear Regulatory Commission

CHAPTER 1

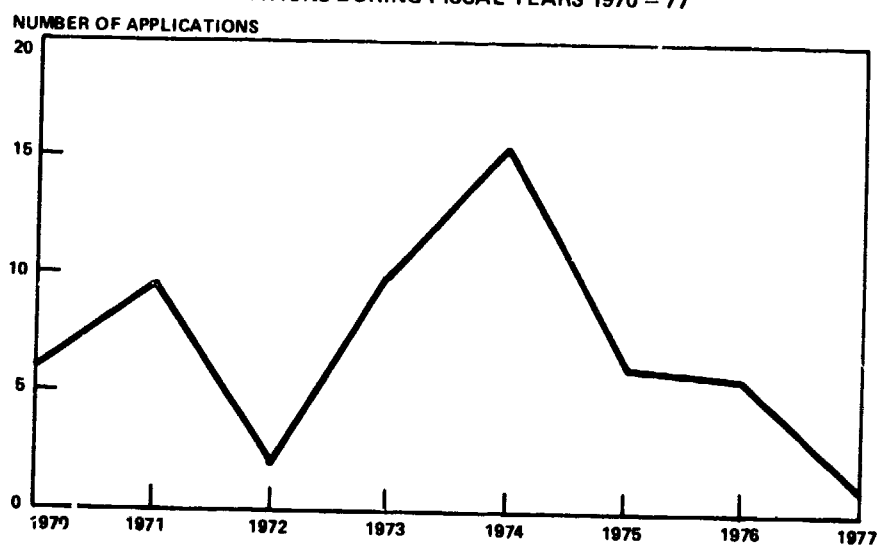
INTRODUCTION--HISTORICAL PERSPECTIVE OF POWERPLANT LICENSING

The Nuclear Regulatory Commission (NRC) regulates the construction and operation of commercial nuclear powerplants. It does this by establishing minimum construction and operating standards and by conducting reviews to determine if the standards are adequately understood and implemented. NRC reviews result in two licenses for each plant: one permitting construction of the plant and another allowing the plant to operate once construction is completed. In addition, NRC continues to monitor the activities of the plant for as long as it operates.

DECREASE IN NUMBER OF POWERPLANT APPLICATIONS

Nuclear powerplants currently provide about 8 percent of the country's total electricity (as high as 42 percent in some sections of the country). As of December 1977, there were 66 commercial powerplants licensed to operate, 77 under construction, and 58 under construction permit review by NRC. However, because of the uncertain climate surrounding nuclear power, licensing of 15 of those units had been suspended, postponed, or canceled, and NRC expects to receive only one or two new construction permit applications in fiscal year 1978. As shown in the following chart, the number of new applications has dropped sharply in recent years.

NUMBER OF NUCLEAR POWERPLANT CONSTRUCTION PERMIT APPLICATIONS DURING FISCAL YEARS 1970 – 77



Whether nuclear powerplant orders will pick up again is uncertain. Such issues as power demand, rising capital costs, long construction time, changing regulatory requirements, availability and cost of fossil fuels, and public acceptance of nuclear power will affect the future growth of the nuclear industry. It could range from an outright moratorium to, some optimists believe, providing up to 45 percent of the Nation's total electrical needs by the year 2000. Some polls indicate that 60 percent of the general public favor building additional nuclear powerplants. Yet, on a given day there may be hundreds of individuals protesting against the construction of a particular nuclear facility.

THE LICENSING PROCESS

The licensing process begins when an applicant applies for a contruction permit to build a powerplant on a selected site. That application presents design criteria and preliminary design information for the proposed plant. It also gives detailed data on the proposed site and describes hypothetical accident situations as well as the safety features that are designed to prevent accidents or mitigate their effects.

NRC conducts a review of this data which includes, but is not limited to, an analysis of the

--site characteristics, including basic geology and seismology information;

--design of structures, components, equipment, and systems;

--reactor design;

--engineered safety features, including an emergency core cooling system;

--instrumentation and control systems;

--radicactive waste management systems; and

--radiation protection systems.

The depth of the analysis in these areas ranges from looking at the applicant's interpretation of appropriate guides, standards, and criteria to a detailed review and verification of selected design features, applicant analyses, supporting calculations, etc. In recent years, NRC has expanded the use of NRC-developed computer codes to

independently test the validity of applicant data, assumptions, and calculations in certain review areas.

After a license to construct the plant has been issued and the plant nears completion, the applicant applies for a license to operate the plant. NRC conducts the same type of review but on design data which is much more complete.

After each review, the published results of NRC's staff analysis and the applicant's design information provide the basis for independent evaluations by the Advisory Committee on Reactor Safeguards (ACRS). This committee was established by law to review and advise NRC concerning license applications for nuclear powerplants and other major nuclear facilities. It is composed of individuals from industry, national laboratories, and universities who have considerable experience in various fields related to safety.

Following the ACRS reviews, public hearings, which are required at the construction permit stage and discretionary at the operating license stage, are conducted by a three-member Atomic Safety and Licensing Board. Licensing board members are chosen from a large panel of lawyers and others having requisite technical expertise. Where scheduling permits, a single hearing may cover both environmental and safety matters; otherwise, separate hearings are held.

While the licensing board makes the initial decisions on whether to issue a license, its determinations are subject to review by an Atomic Safety and Licensing Appeal Board 1/ and can be appealed ultimately to the NRC Commissioners and the Federal courts.

DESIGN STRATEGY

Before granting a license to construct or operate a nuclear facility, NRC must be assured that the licensee has or will take all steps necessary to safeguard public health and safety. NRC issues regulations, standards, guides, criteria, and related documents which describe the conditions that each powerplant must meet. Underlying those regulatory requirements is what NRC describes as a conservative, "defense-in-depth" philosophy. It sets out a strategy which brings three levels of safety to the design of a nuclear powerplant.

1/An independent appeals board comprised of three members who automatically review license application decisions made by the Atomic Safety and Licensing Board. Members are selected from a panel of full-time members appointed by NRC Commissioners.

The first level stresses the prevention of accidents by employing quality standards and engineering practices. This, it is hoped, will lead to a sound design and limit the likelihood of an accident during operation.

The second level of defense is based on the assumption that there will be human errors or equipment failures. As a result, NRC requires that protection systems be designed to insure that the errors or failures are prevented or safely controlled. This includes a requirement that the protection systems--in case they fail to work--be backed up by other safety mechanisms.

A third level of defense assumes that accidents will occur, that some independent safety systems will fail, and that radioactive fission products will be released from the reactor. This forms the basis for requiring plant features and equipment to mitigate the potential consequences of such accidents.

CHANGE IN REVIEW REQUIREMENTS

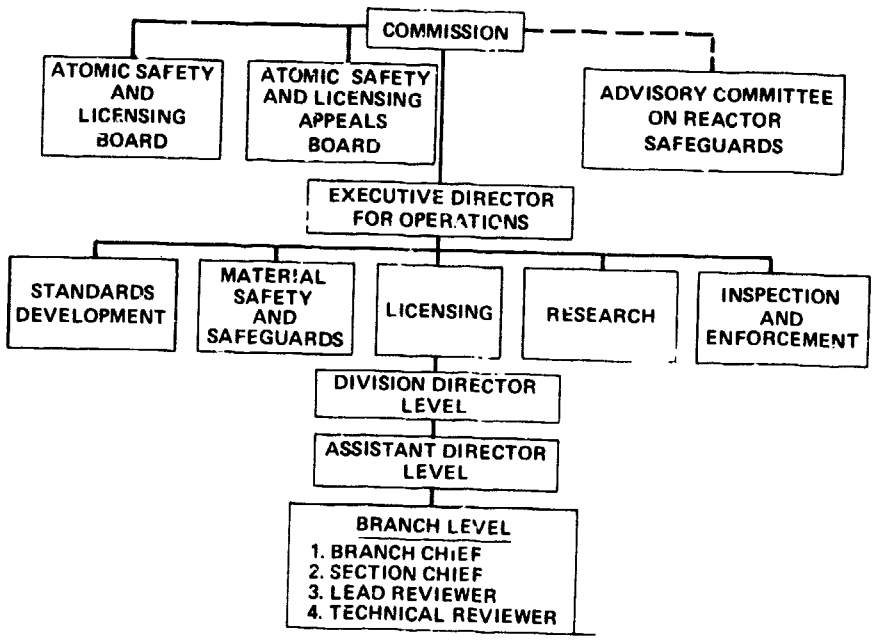
In the earlier days of civilian nuclear power, the NRC staff review was based on less documented design information than is now required of applicants. Many standards of acceptability have been--and continue to be--established from precedents set during individual licensing reviews, from experience gained from operating reactors, and from the information developed in NRC and industry research programs. From 1966 to 1974, the documentation required by NRC to support a construction permit application increased from 3 to almost 18 volumes. One volume normally contains 300 to 400 pages.

NRC, recognizing that its changing requirements have been a problem for the nuclear industry, has taken steps to streamline 1/ the licensing process and insure greater consistency in its data and review requirements. These have included the approval of standard powerplant design features and the adoption of a standard review plan.

1/A GAO report entitled "Reducing Nuclear Powerplant Leadtimes: Many Obstacles Remain" (EMD-77-15, Feb. 25, 1977) discusses the problems involved in reducing the time it takes to license and construct a nuclear powerplant.

SCOPE OF REVIEW

Our review focused on NRC's management processes for evaluating powerplant designs and sites during application reviews. Consequently, we dealt primarily with one of the five major NRC offices--the Office of Nuclear Reactor Regulation, which has the responsibility for reviewing license applications. Following is a simplified organizational chart which identifies the various management and technical review levels within NRC and the licensing group.



During the review, we examined many documents, studies, reports, correspondence, and other records and interviewed present and former regulatory management officials, NRC staff members, representatives of industry and trade associations, and members of public interest groups. We also examined the administration's March 17, 1978, legislative proposal to improve the licensing process. We did not, however, attempt to evaluate either the validity of technical decisions rendered or the review procedures pertaining to environmental or quality assurance aspects of licensing.

A major source of information was a questionnaire sent to 197 technical review personnel in two NRC divisions--the Division of System Safety and the Division of Site Safety and Environmental Analysis. (See app. I.) Completed questionnaires were returned by 169 persons, providing an 86-percent response rate. This questionnaire was designed

to obtain a comprehensive overview of and insight into the licensing of nuclear powerplants from those persons responsible for reviewing actual safety of plant sites and designs.

The following chapters discuss:

--NRC's staff perspective on the adequacy of the review process.

--The methods NRC uses to identify and evaluate changes in the licensing process.

--Certain management steps needed to insure the completeness and efficiency of individual reviews.

--The degree of free and open discussion of technical issues allowed by NRC.

--The administration's legislative proposal to reduce leadtimes and streamline the licensing process.

CHAPTER 2

ADEQUACY OF THE NUCLEAR POWERPLANT REVIEW PROCESS: NRC REVIEW STAFF'S PERSPECTIVE

Because of widespread public concern over the safety of nuclear powerplants and allegations that NRC neglects important safety issues, we asked the staff to express their opinions on the degree to which

--design aspects important to safety are not reviewed,

--time schedules preclude review of design aspects which could have important safety impacts, and

--designs of nuclear powerplants protect the public health and safety.

ARE ALL FACTORS IMPORTANT TO SAFETY ADEQUATELY CONSIDERED?

In the questionnaire we asked reviewers' opinions on the extent to which aspects important to safety are not considered as part of NRC's review. The following table shows that most reviewers believe some issues are not receiving adequate consideration, although only 12 reviewers had major concerns.

Degree to which aspects important to safety are not reviewed	Number of respondents	Percent of respondents
To a very large extent	4	3
To a large extent	8	5
To some extent	29	18
To a minor extent	63	39
Total respondents who believe something is not being reviewed	104	65
Not at all	37	23
No opinion	19	12
Total	160	100

Of the 104 reviewers who believed safety aspects were not being reviewed, 99, or 95 percent, said--in response to another survey question--that the reactor designs they review are adequate or more conservative than necessary. In an attempt to clarify this apparent contradiction, we

contacted 33 of these respondents who had voluntarily identified themselves. Seventeen of them told us that their problem had been resolved or that their concerns were minor and everything important to safety was being reviewed. Eight said that there were procedural problems with the NRC review but nothing important to safety (for example, more use of probability techniques, documentation of review steps, and elimination of duplication in reviews). Four thought that the resolution of outstanding generic safety issues 1/ should be given a higher priority, although they did not think this created an immediate safety concern.

The remaining four stated specific areas which could be reviewed but thought they were of minor safety significance. These include:

--The consequences of ground wave displacement during earthquakes.

--The adequacy of computer systems controlling normal (not accident) plant operating limits. If these systems fail, the plant could conceivably go outside operating limits.

--A determination of whether license applicants follow NRC branch technical positions when evaluating emergency core cooling systems.

--The time it takes the isolation valves to close in the event a turbine missile causes steam releases. (The isolation valves close off and help protect the reactor from accidents in other parts of the plant.)

TIME SCHEDULES AFFECT REVIEWS IN SEVERAL BRANCHES

We also asked the staff whether time schedules have any impact on review efforts. As shown below, 16 persons believed that time schedules limit reviews to the extent that important safety aspects cannot be reviewed.

1/Safety issues which are applicable to more than one powerplant. Examples are the issue of overpressurization of the reactor vessel during startup and shutdown of the system and the issue involving the need for redundant control rods in case the first group fails to work in an emergency situation.

Do time schedules affect your review efforts?	Number of responses	Percent of responses
Negligible impact on the scope and depth of review	55	34
derately limits the scope and depth, without excluding important safety aspects	86	52
Substantially limits the scope and depth to the extent that important safety aspects cannot be reviewed	16	10
Limits my ability to deal with post-construction permit problems, issues, and design changes	7	4
Total	a/164	100

a/Represents 160 respondents. Some selected more than one response.

We were able to contact 7 of the 16 reviewers. They generally believed that time pressures sometimes constrain the depth to which some things can be reviewed, but none believed that important safety issues are eliminated from consideration. For instance, one reviewer complained of interruptions which take him away from his review. Another said that he had 8 to 10 weeks to do a review which included 30 sections in NRC's review criteria. He, therefore, has to use his judgment in deciding which areas are important and should be reviewed. He thought all important areas were reviewed, however.

While 16 of the 160 respondents constitutes a small minority, we noted that 12 of the 16 were from three branches that review reactor and plant systems. This indicates that a particular problem may exist in these branches and that NRC may need to take specific corrective action.

REVIEWERS' PERSPECTIVE ON DESIGN CONSERVATISM INDICATES REVIEW SYSTEM IS ADEQUATE

Our questionnaire also asked reviewers to what degree nuclear powerplant designs protect the public health and safety. Their responses clearly indicate that almost all reviewers believe the designs of nuclear powerplants protect the public health and safety.

Of the five employees who indicated designs were less conservative than necessary, three who identified themselves on the questionnaire believed generic issues deserved more attention and timely resolution. They did not, however, believe that nuclear powerplants pose an undue risk to the public.

Degree of conservatism in your review area (note a)	Number of respondents	Percent of respondents
Significantly more conservative than necessary	17	11
More conservative than necessary	49	30
Appropriately conservative	90	56
Total: Appropriate to significantly more conservative than necessary	156	97
Less conservative than necessary	4	3
Significantly less conservative than necessary	1	1
Total: Less or significantly less conservative than necessary	5	4
No opinion	1	1
Total	162	b/ 100

a/We also asked reviewers about the design conservatism in the total plant and in other review areas. Because reviewers are not familiar with other review areas, we concentrated our analysis on this response. Reviewers' opinions in these other areas are included on page 56.

b/Does not total 100 percent because of rounding.

CONCLUSION

An analysis of our questionnaire results showed a discrepancy between the responses to several questions. A large majority of technical reviewers indicated that some items important to safety were not being reviewed, and some believed that time constraints substantially limited their review efforts. In response to an overall question on

powerplant safety, however, 97 percent of the reviewers indicated that plant designs were either adequate or more conservative than necessary.

In view of this, we contacted all of the reviewers who had a problem and voluntarily identified themselves on the questionnaire. Their verbal comments led us to conclude that while the reviewers have concerns over things not being reviewed either because of the lack of time or some other reason, they generally believed that powerplant designs are sufficiently conservative to protect the public health and safety. We found, however, that most of the problems dealing with time constraints were expressed by reviewers in 3 of the 15 NRC review branches.

RECOMMENDATION TO THE CHAIRMAN, NRC

We recommend that the Chairman, NRC, evaluate the scope and depth of reviews in the plant systems review branches to determine if additional staff or time are required to improve the review process.

NRC COMMENTS

In its February 22, 1978, response to this report (see app. II), NRC stated that the scope and depth of reviews in the plant systems review branches are valid concerns. It elaborated on the increases in workload that have occurred in these branches and explained that priorities have to be set to "assure optimum utilization of available resources on the most important safety review tasks." Also, because its resources are fixed at this time, NRC said that things of lesser importance will have to be delayed until better planning can take place in the budgetary process or unless reprograming of resources in the 1978 and 1979 budgets can be achieved.

CHAPTER 3

PROCEDURES TO IDENTIFY AND EVALUATE CHANGES TO THE LICENSING PROCESS COULD BE IMPROVED

NRC establishes requirements which applicants must meet to receive and maintain a powerplant license. Not all of these requirements are fixed, however. NRC changes some of them on the basis of the results of individual licensing reviews, plant operating experience, or research. While NRC says that these changes are necessary to maintain safety, they often increase construction and operating costs and cause the nuclear industry to be concerned about the stability of the licensing process. We therefore reviewed NRC's process for changing these requirements and found that NRC does not do enough to analyze plant operating experience and research results. Improvements in these areas could help NRC identify needed changes to the licensing process. On the other hand, we found that NRC does not adequately consider the cost impact or benefit of changes it makes to the licensing process. Better cost assessments of proposed changes and increased use of risk assessment techniques could help NRC determine if potential changes to the licensing process are worth (in terms of safety) their expected cost.

NEED FOR A SYSTEMATIC OVERALL ANALYSIS OF OPERATING RESULTS

A large and growing volume of nuclear powerplant operating data exists which is used to identify equipment failure, radiological release, and human error trends. Once trends are identified, actions can be taken to make nuclear powerplants safer or more reliable.

There are currently two major systems which accumulate nuclear powerplant operating data. One--called the Licensee Event Reporting System--is maintained by NRC and includes data on all unscheduled or unanticipated operating events which affect important powerplant systems. The other system --the Nuclear Plant Reliability Data System--is sponsored by the nuclear industry and has a much more extensive data base on engineering, operational, and equipment failure aspects of the plants. It, however, has some deficiencies and is voluntary. According to NRC, only about one-third of all licensees participate in the system.

NRC uses its system to prepare biweekly summaries and several standard reports which are distributed widely within

NRC. We found, however, that no individual or group coordinates the review of these events or considers their general application to the license review process. Instead, NRC assigns project managers and technical specialists to assess the events for their assigned plants or technical area. While many operating trends have been identified by this method, we believe that an overall trend analysis system could help insure that all important trends are identified and that corrective actions are taken.

We also believe that a better trend analysis system could be developed if NRC could improve and use the industry-sponsored system either in conjunction with or as a substitute for its own. NRC recognizes this and is already considering either assuming control of the system or making participation by all licensees mandatory. It expects to complete a study of these options and the actions that must be taken to carry them out in mid-1978. We will continue to monitor NRC actions in this area to determine if it is taking adequate advantage of all powerplant operating experience data available.

NEED FOR ACCOUNTABILITY OF ALL RESEARCH PROJECTS

In setting requirements for nuclear powerplant designs, NRC recognizes that precise engineering data is not always known and deliberately establishes extra safety margins which it believes will insure that the plant is adequately designed and can be safely shut down under all anticipated operating and accident conditions. This conservatism, however, has often been a point of contention by both intervenors and the nuclear industry.

Intervenors or antinuclear groups often charge that extra safety margins in various systems or components do not mean that the plant design as a whole is conservative or safe. The industry, on the other hand, contends that plant designs are too conservative or, at least, are conservative enough.

To help resolve this uncertainty, NRC, through its research program, is trying to define the safety margins in plant designs. 1/ It is not certain, however, whether the research program has effectively supplemented the

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1/Almost 50 percent of the NRC $222 million appropriation in fiscal year 1976 was for the research program.

licensing process. On January 18, 1977, the Office of Management and Budget questioned the effectiveness of the research program and requested that NRC establish formal procedures to prioritize research requirements and insure that research results are used in a timely manner.

In response, NRC has established procedures to (1) insure that research users get a voice in deciding which projects should be undertaken, (2) formally transmit important research results to the user office, and (3) track these results and document their final use in developing regulatory guides, standards, or licensing criteria.

While these new procedures should improve the effectiveness of the research program, we believe they do not go far enough. The new procedures apply only to 88 of the 500 or more research projects (only the more important research projects). While it may not be necessary to formally transmit the results of every research project to the licensing group, we believe that, as a minimum, NRC should summarize and evaluate the results of each project and make them available for management review. This would help NRC management evaluate all research projects, allocate future research funds, and insure that the research program effectively supplements the licensing process.

COST ASSESSMENTS ARE NOT PREPARED FOR MOST NEW REGULATORY GUIDES

NRC's individual technical reviewers can use their discretion in conducting reviews and determining if a utility has met the necessary criteria to receive a license. Consequently, new interpretations or even new requirements may result from the NRC staff review of individual applications. These new interpretations or requirements may become so-called branch technical positions or regulatory guides, which are approved for general applicability to all future applications. NRC, however, does not adequately consider the cost impact of these licensing changes before imposing them on licensees or applicants.

In 1974 NRC established the Regulatory Requirements Review Committee to review and evaluate significant new requirements or interpretations of existing requirements. A major part of the committee's responsibility is to review and consider the impact (including cost) and value (benefit) associated with every proposed change. This is supposed to insure that the expected benefit (in terms of increased safety) of a new requirement justifies its probable cost in time, money, and effort.

We reviewed 37 Power Reactor Regulatory Guides (and revisions) issued between June 1976 and August 1977 which included value/impact statements. We found that only eight included estimates of dollars or time needed to implement the new requirements. The rest said that either (1) the requirements were already being practiced and the costs were not significant or (2) the costs were not known.

Industry representatives believe, however, that new NRC requirements or new interpretations almost always signficantly affect costs. They have repeatedly complained that frequent NRC revisions not only increase costs and delay the construction of nuclear powerplants but also create instability in the licensing process.

The problem, we believe, is that by the time the committee reviews the proposed new requirement, the NRC technical reviewers or branches have already made the changes during their individual application reviews--without a need for the committee to formally consider either the benefit or cost impact. This analysis is not required until the NRC staff determines that a new regulatory guide or branch technical position should be proposed to the committee. Committee approval may take up to a couple of years after the requirement is initially established. Meanwhile, the NRC staff implements the new requirement in its licensing reviews.

RISK ASSESSMENT TECHNIQUES COULD PROVIDE A BASIS FOR BETTER VALUE/IMPACT ASSESSMENTS

NRC and its predecessor, the Atomic Energy Commission, sponsored a study to quantify the relative safety of nuclear powerplants, using techniques developed in the U.S. space program. This study analyzed (1) potential accident sequences, (2) likelihood of individual safety systems not functioning properly, and (3) estimates of potential consequences should all systems fail, resulting in a major accident. The study was published in October 1975.

Many groups--such as the American Physical Society, Ford Foundation, and the Union of Concerned Scientists--have questioned some of the assumptions made in the study and whether the study fully assessed all significant safety issues However, there has been a growing recognition among some of these groups and NRC that the study's method of determining probabilities could supplement regulatory decisionmaking. The NRC Commissioners and many NRC management officials agree that the use of probability risk assessment techniques should be expanded. Fifty-six percent of

the technical reviewers responding to our questionnaire concurred.

More specifically, probability risk assessment techniques could be used to

--determine the relative importance of various powerplant safety features so that NRC could better establish review priorities,

--evaluate alternative approaches to resolve outstanding safety issues,

--quantify the value portion of value/impact statements prepared to evaluate new regulations or new interpretations of existing regulations, and

--determine the need to implement new design requirements on operating powerplants.

NRC decisionmaking, at times, has included some risk assessment analyses. Fuller use, however, could help NRC quantify and assign probabilities to decisions now being made on an intuitive and qualitative basis. To use this methodology, however, a well-planned training program for technical reviewers is needed to insure that at least one or two reviewers in each licensing branch are well trained and that the rest have a general knowledge of the techniques.

NRC recognized a need for this training as early as December 1974, but it has not yet adopted a formal training program beyond a short familiarization course which has been attended by only 21 technical reviewers to date. Because of the workload on the reviewers and the emphasis on meeting review schedules, NRC has not set a high priority on this type of training.

CONCLUSIONS

NRC's Division of Operating Reactors is responsible for analyzing a rapidly growing volume of operating experience data and identifying any changes needed in the licensing process. Rather than providing a systematic, coordinated evaluation, however, operating experience data is widely distributed to individuals responsible for specific nuclear powerplants, plant equipment systems, or technical disciplines. This fragmented approach has resulted in some performance trends being identified, but we believe that others could be identified if a concentrated analysis of all the data were performed.

A second, industry-run data base--the Nuclear Plant Reliability Data System--has the potential to substantially improve NRC's trend analysis capabilities and improve the use of operating experience. Use of this system, however, is now limited because the data is both inconsistent and incomplete. NRC is studying the role it should take in this system.

During the past year NRC has taken several steps to tighten controls over the initiation of research projects and use of research results. While these steps appear to improve the research program, they do not document the benefits or lack thereof of most research projects. Without this data, we believe NRC management cannot (1) evaluate all research projects, (2) effectively allocate future research funds, or (3) assure that the research program supplements the licensing process to the maximum extent possible.

NRC established a committee to review all proposed changes to regulatory requirements and insure that their value (in terms of increased safety) outweighed their estimated costs. We found, however, that many new regulatory requirements had already been implemented by the NRC staff in individual case reviews before being evaluated and approved by the committee. This led the committee to conclude, in many cases, that the new requirements were already standard NRC and industry practice and that no significant costs were involved.

Also, new risk assessment techniques have been developed in recent years which could be used by NRC to better evaluate the need for new regulatory requirements. NRC, however, has not considered this a high-priority item and has not provided sufficient training so its staff can use this methodology in a routine manner in the licensing process.

RECOMMENDATIONS TO THE CHAIRMAN, NRC

We recommend that the Chairman, NRC

--analyze the operating data NRC receives in a systematic and coordinated manner,

--establish a management information system to identify and document the degree to which the results of each research project benefit the licensing process,

--assess the value/impact of proposed regulatory requirements during individual licensing reviews before they become standard practice, and

--increase the use of probabilistic risk assessment and insure that technical reviewers receive a general knowledge and that at least one or two reviewers in each licensing review branch are well trained in using risk assessment techniques.

NRC COMMENTS

In response to these recommendations, NRC said:

1. It would defer consideration of the recommendation for a systematic and coordinated analysis of powerplant operating data until we complete another ongoing study that is concentrating on this subject and is scheduled for completion in June 1978. Also, NRC described its efforts to analyze operating data and identify trends which might require corrective action or other licensing reform. It said that these efforts were well coordinated among NRC offices but noted that a more systematic effort is possible with additional manpower.

As noted in the report, we recognize that NRC does much to review powerplant operating data. We emphasize, however, there is no group whose primary job is to review the data and look for trends which might affect safety. This is important, in our view, because the volume of operating data is rapidly increasing due to more powerplants starting to operate and to better reporting procedures in the NRC and industry-sponsored data systems. Thus, it will become even more important that NRC develop a coordinated and systematic data review system in the future.

2. There are various ways for its licensing staff to receive the results of research projects. NRC described the methods used and indicated that they are sufficient to keep the licensing staff informed of research results and insure that the research is meeting licensing needs.

While we agree that these methods help transmit research results to the licensing staff, we point out again that NRC does not document how the results of most research projects are used or provide a summary so that NRC management can evaluate the effectiveness of the overall research program. The recently implemented "Research Results - Transfer and Utilization Information System" (referred to by NRC) serves these purposes but only relates to a small percentage of the total research projects. Without data on all projects, we continue to believe that NRC management cannot evaluate

the effectiveness of the overall research program or allocate research funds to those areas which have the best chance of benefiting the licensing process.

3. It had developed some new guidance on the use and content of value/impact analysis and felt that this completely responds to our recommendation that it assess the value/impact of proposed regulatory requirements during individual licensing reviews before they become standard practice.

We have not had a chance to review these new procedures in detail, but it does appear that NRC has recognized that it has a problem in this area and is attempting to take corrective action. We will continue to monitor NRC's actions to insure that new licensing requirements receive the proper management approval before being applied during individual licensing reviews.

4. It agrees with our recommendation to increase the use of risk assessment methodology in the licensing process. It notes that the use of this methodology for decisionmaking is dependent upon an adequate data base of component and system reliability information and qualified people in applicant organizations as well as in NRC. It is sending some of its people to a concentrated 8-day course to familiarize them with the methodology and is exploring means to develop personnel who are highly trained and skilled in the application of the methodology to the licensing process.

CHAPTER 4

MANAGEMENT STEPS NEEDED TO INSURE COMPLETENESS AND IMPROVE EFFICIENCY OF INDIVIDUAL REVIEWS

Reviewing applications for construction and operation of a nuclear powerplant is a highly complex, technical undertaking. It involves voluminous amounts of information and hundreds of independent judgments and determinations. Therefore, to insure that the reviews are conducted in an informed, consistent, and orderly fashion, NRC should

--hire and maintain, through training, a highly qualified and competent staff;

--provide staff reviewers with adequate supervision and written guidance; and

--establish a review documentation system to spot check the completeness and accuracy of individual reviews and identify procedures to continually improve the efficiency of reviews.

The following sections describe what we found in these areas.

NEED FOR A FORMAL TRAINING PROGRAM

NRC's technical review staff is comprised of highly educated people who have considerable industry and government experience. Sixty-seven percent of the staff members who responded to our questionnaire had at least a master's degree in their technical fields. About 59 percent of the staff had 4 or more years of experience, and 76 percent had over 4 years of related commercial experience before joining the agency.

NRC, though it hires qualified employees, does not have adequate training programs to maintain and update reviewer' technical skills. Moreover, no training program exists on how to conduct a review using NRC written guidance, how to orient new employees, or how to familiarize individual specialists with how their efforts contribute to the overall regulatory program.

Need for training in implementing the Standard Review Plan

Technical reviewers have not received any formal training or guidance on how to use the Standard Review Plan--NRC's

basic document which guides the staff during its review. Eighty-two percent of the reviewers responding to our questionnaire stated that this training is needed, and one-fourth of those believe the need is substantial to critical.

Several NRC management officials concurred and suggested that branchwide discussions on implementing the Standard Review Plan would benefit the technical review staff. One branch chief told us that a session of "taking the Standard Review Plan apart" would help everyone to better understand the important parts of the document. We agree that such discussions along with a more formal training course could help make the plan a more useful document and sharpen judgments made by reviewers.

Need for a program to update technical skills

In any technical area, training programs must be available to keep current the skills and capabilities of the staff. Fifty-two percent of the staff members responding to our questionnaire questioned the adequacy of training provided by NRC to update skills in their area of expertise, and 67 percent believed that a need for this training was moderate to critical. A number of reviewers, particularly in the geology and seismology areas, said that they were not getting an opportunity to stay abreast of new developments and information in their areas of expertise.

Need for orientation to the entire review process

Recently, a consultant hired to survey NRC's organization and management reported that technical reviewers feel isolated and want to know more about how their efforts fit into the overall program of protecting the public health and safety. Similarly, 88 percent of the staff members responding to our questionnaire felt that additional training was needed to provide a broader perspective of overall reactor regulation.

While NRC sends its reviewers to courses on overall reactor safety, the branch chiefs approve reviewers' requests for training. They decide who attends the courses on the basis of their perception of need, relevance, and workload. Consequently, some reviewers have not received instruction in this area.

STANDARD REVIEW PLAN NEEDS IMPROVEMENT AND UPDATING

Written instructions describing how a review should be conducted were not available until NRC implemented the Standard Review Plan in December 1975. This document consists of 17 chapters, 213 specific review areas, and thousands of pages detailing the procedures to be employed during a review. The Standard Review Plan was also intended to improve the quality and uniformity of reviews and to stabilize the licensing process.

While we commend NRC for its efforts in developing and implementing this document, we found that improvements are needed to insure complete, thorough, and consistent reviews. One of the plan's principal authors told us that it was originally intended to serve as a rough guide until two or three revisions were made. No major revisions have yet been made, and a recent NRC consultant's report concluded that a majority of the staff believes that the plan does not provide reviewers with sufficiently clear criteria for safety decisions. About 90 percent of the technical reviewers responding to our questionnaire also indicated that the plan needed to be revised. Further, a June 1977 NRC study stated that the plan's sections varied widely in completeness and specificity and noted that substantial improvements could be made.

On January 31, 1977, NRC established a program to begin identifying and submitting changes to the plan by May 1, 1977. According to NRC officials, this was given a low priority and work on making revisions moved slowly. Consequently, NRC developed and implemented an action plan in October 1977 to update and amend the plan by September 30, 1978.

DOCUMENTATION OF INDIVIDUAL REVIEWS NOT MAINTAINED

Even with the Standard Review Plan, technical reviewers ordinarily exercise considerable judgment in deciding which areas in an application will be examined and the depth each should be reviewed. Therefore, we believe it is important for control purposes that NRC reviewers document the steps taken during a license review. NRC currently documents its reviews in primarily two sources: questions raised by the NRC staff during the application reviews and the Safety Evaluation Reports which summarize the results and conclusions made by the staff during a review. While we found that these sources provided some indication of what was done

during the review, neither sufficiently documents the steps taken by individual reviewers.

Advantages of maintaining documentation of review work

There are several advantages to maintaining a complete system of review documentation. First, it permits supervisors to review and analyze the work of the technical reviewers.

Second, documenting what was examined during the construction permit review could help eliminate duplication during the operating license review. About 60 percent of the staff members responding to our questionnaire indicated that over 40 percent of the operating license review work is the same as that which was done during the construction permit review.

Finally, documentation could preclude duplication of work in other ways. For example, an NRC management official noted instances in which reviewers, half-way through assignments, left the agency, became sick, or otherwise were unable to continue an application review. Other reviewers had to repeat the work because no documentation of what was previously done was available. Further, a branch chief noted that a calculation which he performed was later questioned during the hearings. Because it was performed "on the back of an envelope" and not kept for future reference, the branch chief had to reproduce the work. Clearly, documentation of work performed could reduce these types of problems.

CONCLUSION

Although NRC hires highly educated and experienced persons, we believe NRC's training to maintain staff technical skills could be improved. A training program which both instructs the staff on how to do their jobs and provides opportunities for updating technical skills is necessary. In addition, because reviewers are highly specialized, training which relates review work to the overall regulatory mission of protecting the public health and safety should be available.

NRC established the Standard Review Plan in September 1975, but until October 1977 a low priority resulted in inadequate efforts to update and correct known deficiencies in this written guidance. Without updating the plan, NRC cannot be assured that reviews are conducted in a systematic, consistent, and orderly fashion.

NRC reviewers do not adequately document the steps taken during licensing reviews. We believe such documentation could help supervisors appraise the performance of their staff and serve as a basis for improving the efficiency of the licensing process. Furthermore, documentation could preclude duplication of effort if a reviewer is unable to continue work and someone else has to take over the review.

RECOMMENDATIONS TO THE CHAIRMAN, NRC

We recommend that the Chairman, NRC:

--Identify and meet the training needs of technical reviewers with special emphasis on (1) updating technical skills, (2) providing guidance on implementing the Standard Review Plan, and (3) providing an overall orientation of the licensing process and how each review section relates to an overall program to protect the public health and safety.

--Require technical reviewers to clearly document all conclusions, analyses, and review steps taken during the licensing review.

NRC COMMENTS

NRC generally agreed with our recommendation to provide additional training for its technical reviewers. Specific actions include (1) giving closer attention in the next budget cycle to insure that reviewers are given adequate training to update their technical skills, (2) establishing workshops and other actions to insure that reviewers understand the Standard Review Plan and the requirements for its implementation, and (3) providing broader guidance and training so that technical reviewers understand the relationship of their work to the overall safety review.

NRC did not agree with our recommendation that technical reviewers document all conclusions, analyses, and review steps taken during the licensing review. It noted that (1) such documentation would "produce a mountain of paper for every reactor review," (2) the responsibility for documenting plant safety rests with the applicant, and (3) NRC's conclusions and basis for decisions are consistently documented in the Safety Evaluation Report. 1/

1/NRC's report on the analysis of the data in a powerplant application.

We disagree. Our review of selected Safety Evaluation Reports showed that many conclusions simply reported the applicant's data as a basis for NRC's position. There was no description in these cases of the methods used by the staff to insure that the applicant data were correct.

We believe that in any audit activity (NRC audits applicant data rather than performing 100-percent reviews), it is important that review steps be documented as a recorded basis for the conclusions reached. This is particularly important for NRC because the thoroughness of its review could directly affect the safety of the public. While some increase in paperwork will naturally occur, we think it does not need to be overly burdensome. To the extent that the Standard Review Plan can be revised 1/ to reflect what actually occurs during a licensing review, documentation could be held to a minimum. Conversely, where the Standard Review Plan permits the reviewer discretion in deciding the depth and scope that each safety area will be examined, more documentation would be necessary. These steps, we believe, will help NRC management review the work of subordinates, adjust the review process as necessary to correct deficiencies, and eliminate review duplication that occurs in NRC's two-stage licensing process.

1/NRC is in the process of revising the Standard Review Plan.

CHAPTER 5

DOES NRC ALLOW FREE AND OPEN DISCUSSION OF TECHNICAL ISSUES?

Over the last 2 years, six NRC employees have publicly charged that NRC neglects significant safety issues, restricts staff debate, and takes reprisals against those who question existing policies. Both the technical issues raised as well as the charges of unjustified adverse personnel actions have been extensively reviewed by NRC management, the Commissioners, and the Congress. As a result, we did not attempt to evaluate the merits of individual allegations or actions.

These incidents, however, raise questions about NRC's personnel management and procedures to resolve divergent technical opinions. More specifically, (1) are NRC staff members free to raise, discuss, and resolve technical opinions regarding the design and siting of nuclear powerplants and (2) can employees appeal alleged adverse personnel actions such as involuntary transfers or unfair employee ratings?

PUBLIC DISSENTS RECEIVE CONSIDERABLE SCRUTINY AND REVIEW

Of the six employees who openly disagreed with NRC policies, procedures, or technical judgments, two have resigned, two have been transferred to other NRC offices, and two are still working in the licensing division. Because of the transfers, these staff members have accused NRC of taking reprisals against dissenting employees.

The decisions to transfer the two individuals were approved by the NRC Commissioners. In both cases, NRC said that these actions were not punitive but necessary because debates of technical issues turned into highly personal conflicts which precluded these individuals from effectively working in their branch. According to the former director of the licensing group, the transfers were considered 6 months to a year before the individuals publicly expressed their dissents. 1/

1/Of 12 other professional employees who transferred from the licensing group in 1976, none did so because of pressure from supervisors or management. All of them told us that they were free to raise technical issues while in the licensing group.

Both NRC and the Congress have reviewed the allegations raised. The NRC Commissioners, managers, and staff have spent about 3,750 staff-days evaluating issues and questions raised. The allegations of unfair personnel actions were investigated by NRC's Office of Inspector and Auditor and the technical issues were evaluated by the Advisory Committee on Reactor Safeguards (ACRS). Moreover, both the former Joint Committee on Atomic Energy and the Senate Governmental Affairs Committee held hearings on these allegations in February, March, and December 1976.

Both the NRC staff and ACRS concluded that none of the technical issues raised by dissenting staff members constituted a problem that posed undue risks to public health and safety. The ACRS noted that many of the issues were known and already under review but in some cases believed a higher priority should be given to selected issues.

In response to allegations of unjustified adverse personnel actions, the Office of Inspector and Auditor reported that staff members did not feel reluctant to express technical concerns to supervisors. In a second report the Office of Inspector and Auditor found that personnel management and communication difficulties were a problem in one branch within NRC and that the absence of agencywide rating procedures resulted in supervisors rating subordinates secretly without providing an opportunity to see or discuss the ratings.

Formal procedure for resolving technical issues and standard employee rating system established

Since these allegations were first made, the NRC Commissioners and top level managers have publicly stated that vigorous staff debate and exchanges of different technical views among peers and management are essential. For example, a memorandum to the staff from the Chairman, NRC, stated that it was not only the right but the duty of staff members to advise management of any problem which could adversely affect public health and safety. This should be done, even if peers or supervisors disagree, without fear of recrimination or retribution.

On the basis of this policy, the director of NRC's licensing group issued a letter which established formal channels for appealing technical decisions. Under this procedure, technical appeals are to be brought to successive management levels within the division and office. If satisfaction is not

obtained the staff member can appeal to the Commissioners and the ACRS and finally can place written comments in the Safety Evaluation Report and the public document room. The director's formal commitment to this procedure also included a pledge that no reprisals would be taken against those who pursue their technical concerns.

In response to the finding of a secret personnel rating system, NRC adopted an agencywide employee appraisal system with standardized rating format and a requirement for discussions of ratings with employees.

THE ENVIRONMENT FOR RAISING TECHNICAL ISSUES, PAST AND PRESENT--OUR EVALUATION

Even before the formal procedures for dissenting opinions were initiated, informal mechanisms were available for surfacing the safety concerns of any staff member. The Commissioners and Executive Director for Operations have declared open door policies whereby employees can make an appointment to discuss safety concerns confidentially. The ACRS has encouraged any staff member who believes a serious safety matter is being neglected to anonymously or openly call or write any Committee member.

We believe that the new procedures for handling dissenting staff opinions have improved the environment for raising technical issues. This is based on the following summary of responses received from technical reviewers. It shows that almost 92 percent of the reviewers responding to our questionnaire now believe they are free to raise technical issues.

QUESTION: PRIOR TO (AND SINCE IMPLEMENTATION) OF THE PRESENT POLICY PROVIDING FOR DOCUMENTING UNRESOLVED DISSENTING STAFF OPINIONS IN THE PUBLIC RECORD (AS CITED IN NUCLEAR REACTOR REGULATION OFFICE LETTER NO. 11) HOW FREE WERE (ARE) YOU TO PURSUE DISAGREEMENTS ON TECHNICAL SAFETY ISSUES PAST YOUR SUPERVISORS?

Opinion	Before new procedures		After new procedures	
	Number	Percent	Number	Percent
Very free and encouraged to do so	15	9.5	34	21.7
Free to do so without fear of adverse actions	43	27.2	46	29.3
Free to do so but not certain of management's real desire	64	40.5	64	40.8
Total: Free to raise technical issues	122	77.2	144	91.8
Not very free and discouraged from doing so (note a)	16	10.1	7	4.5
Not free and certain of adverse action (note a)	11	7.0	6	3.8
Total: Not free to raise technical issues	27	17.1	13	8.3
Was not an employee prior to implementation of new procedures	9	5.7	-	0.0
Total	b/158	100.0	157	100.0

a/An analysis of the responses shows that problems were primarily isolated in 3 of the 15 branches we surveyed.

b/Although 169 questionnaire responses were received, not everyone answered these questions.

A substantial number of technical reviewers responding to the questionnaire indicated that they were free to raise technical issues but did not know if management really wanted issues brought up. This was the case before and after issuance of the officewide procedures. The fact that reviewers are really unsure of management's intentions is not unreasonable in light of substantial publicity given to allegations and the transfers of two dissenting staff members. This attitude does, however, point to a need for the Commissioners to periodically reemphasize their free and open debate policy.

Procedures similar to those estabished by the licensing group do not exist in other NRC offices. The other four office directors (inspection and enforcement, research, standards development, and nuclear material safety and safeguards) sent their staffs copies of memorandums from the Commissioners and Executive Director for Operations concerning their respective open door policies. Each of the office directors apprised their staffs that technical issues could be pursued without fear of reprisal. They did not, however, establish a specific procedure to raise technical issues or place unresolved issues into the public record.

Recent experience in raising dissenting technical opinions

The procedures governing resolution of divergent technical opinions in NRC have been at least partially followed by three individuals over the last year. One individual who disagreed with statements made by his branch chief and section leader during an ACRS meeting wrote a letter to his assistant director expressing his opinion. As a result, he was given an opportunity to present his opinion to the ACRS. On two occasions another reviewer formally disagreed with a staff position and presented his opinions to the assistant director, the director, and the ACRS.

In another case, a branch chief disagreed with a proposed NRC position. He presented his arguments to his direct supervisors and the Commissioners. The proposed NRC position was later revised and received the branch chief's concurrence.

In each of these cases persons with dissenting technical opinions were heard by NRC management, the ACRS, or the Commissioners. Their opinions were either incorporated in a revised NRC decision or made public through inclusion of written statements in the public document room or the Safety Evaluation Report.

CONCLUSION

Since it is not uncommon for qualified people to disagree over complex technical issues, continual debate should be expected. Indeed, we believe NRC must encourage debate if it is to effectively fulfill its role of protecting the public health and safety.

Within the past 2 years, however, allegations have cast doubt on the environment for allowing staff members to raise and resolve technical issues as well as certain personnel management practices. In an effort to improve the situation, NRC has

--publicly stated its policy that employees can pursue dissenting technical viewpoints without fear of adverse action or retaliation and

--established an agencywide employee appraisal and rating system.

In addition, the licensing group within NRC has established channels to appeal technical disagreements and place any unresolved issue in the public record. We believe that these actions represent significant improvements in NRC's procedures for handling dissenting staff opinion but think that the formal procedures to resolve technical disagreements should be made NRC-wide.

Also, a large number of technical reviewers feel free to raise technical questions but are unsure of management's desire to hear these issues. This clearly demonstrates a need for NRC to periodically reemphasize its freedom-to-dissent policy.

Management has a responsibility to evaluate each employee's opinion, allow the dissenting employee a reasonable time to prepare and present his case to the next level of appeal, and, most importantly, consider the difference of opinion as healthy and necessary to the review process rather than as an attack on supervisory authority or ability.

RECOMMENDATIONS TO THE CHAIRMAN, NRC

We recommend that the Chairman, NRC:

--Periodically reemphasize NRC's policy of allowing dissent of technical decisions without fear of reprisals.

--Establish NRC-wide procedures to appeal technical decisions and place any unresolved differences in the public record.

NRC COMMENT

NRC agreed with both of these recommendations and noted that the Chairman had testified during the February 6, 1978, budget authorization hearing that procedures were being developed to periodically reemphasize the policy on open dissent and to make it applicable to all offices in NRC.

CHAPTER 6

RECENT LEGISLATIVE PROPOSALS TO REDUCE LEADTIMES AND IMPROVE LICENSING EFFICIENCY

In recent years, the nuclear industry and the general public have been concerned about the efficiency and effectiveness of the nuclear powerplant licensing process. Problems range from the time required to plan, design, and construct a nuclear powerplant to the degree of safety provided in licensing them. In between are concerns about changing regulatory requirements, increasing costs, redundant reviews, and the adequacy of public input into regulatory decision-making.

Various legislative proposals have surfaced in recent years to help resolve some of these concerns. For various reasons, however, these proposals have not been enacted by the Congress. On March 17, 1978, the administration sent new legislation to the Congress to streamline the licensing process and make it more effective. Among other things, this legislation would

--encourage the use of standardized plant designs and provide for early decisions on nuclear powerplant siting acceptability,

--authorize a combined license to construct and operate a nuclear powerplant,

--eliminate mandatory review of each application by the ACRS,

--reduce duplication between Federal and State environmental reviews, and

--modify the timing and scope of the public hearing process to accommodate these revisions.

This chapter analyzes several aspects of the proposed legislation and makes recommendations to improve them.

STANDARDIZATION

In encouraging the use of standardized plant designs, the administration is proposing that NRC establish procedures to approve standardized plant designs through a formal

rulemaking 1/ procedure. This would allow NRC to review and approve a plant design without having received an individual construction permit application. Once approved, utilities could reference this design in other applications and start construction after demonstrating the acceptability of the proposed site. Also, since a public hearing would be mandatory during the rulemaking process, a second hearing would not be required on the NRC-approved design when a utility uses the design in a construction permit application. We have several comments on this proposal.

First, a recent industry survey indicates that only five or six new powerplants will be ordered each year until the 1980s. The extent to which orders will increase beyond that is uncertain. Since there are 15 architectural engineering firms which share in this business, we doubt if any one company would be willing to incur the large cost that would be needed to approve a standardized design in a rulemaking proceeding. One rulemaking hearing to approve criteria for a major safety system resulted in tens of thousands of pages of testimony and exhibits and took more than 100 hearing days to complete. A similar hearing for a total plant design could be many more times as lengthy and cumbersome. In addition, the standardized design would only be effective for 5 years, at which time the architect-engineer would have to apply for an extension of the NRC approval or a new approval. In either case this would require another NRC review.

Second, NRC has been working for several years to implement a standardization concept administratively. The nuclear steam supply system (the reactor portion of the plant) has been more or less standardized for several years, and NRC has already given preliminary approval to certain balance-of-plant designs (essentially all other parts of the plant except the reactor and its related systems). As of yet, however, NRC has not received and approved a construction permit application which references a previously approved total powerplant design.

In addition, NRC has been informed by a number of architect-engineers that--because of antitrust considerations--it may not be possible, under its present standardization program, to use approved final balance-of-plant designs in construction permit applications. They believe that such an approval would require the designation of particular component manufacturers, which would signficantly restrict competition among major suppliers of pumps, valves,

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1/A formal procedure for establishing a standard, guide, or regulation having general applicability.

and other plant components. Consequently, NRC is studying ways to alter its standardization program without restricting competition. While the administration's proposed standardization legislation would add a sense of formality to NRC's administrative programs, standardization is an evolving concept and it is not likely that passage of the legislation will do anything additional to achieve immediate savings in licensing leadtimes. It will be some time before a final powerplant design is approved by NRC, either under its existing standardization procedures or under rulemaking as proposed by the administration. Once an effective standardization program is fully implemented, however, and used in conjunction with a previously approved site as much as 2-1/2 to 4 years could be saved in the time needed to prepare and approve powerplant applications.

Finally, in the past neither applicants nor NRC have been particularly successful in limiting design changes--even in the standardized portions of the plant. Current NRC regulations require that changes to powerplant designs be based on a finding that the design is not in accordance with statutory standards or that they offer substantial additional protection to the public health and safety. NRC, however, has not defined "substantial" or what constitutes the need for substantial additional protection. It is, therefore, not clear to what extent NRC will limit design changes in its standardization program.

EARLY SITE REVIEWS

Under the legislative proposal, States, utilities, and other groups could apply to NRC for a site permit independent of any application to construct a powerplant. Once approved, the permit would remain valid for up to 10 years with options to renew it for additional 10-year periods. While NRC has the general authority to revoke, suspend, or modify a site permit or license if it finds reasons to do so, the legislative proposal is silent on what actions NRC would take to insure the continued acceptability of (1) the site, (2) the need for power, or (3) the need for a nuclear facility. Without a requirement to update this information, the NRC staff would not be required to identify new issues, such as changes in population density or other problems that could affect the acceptability of the site over the 10-year life of the permit. If NRC leaves it to third parties to identify these issues, unnecessary licensing delays could result from contested hearings.

Moreover, NRC has already administratively implemented policies and procedures for early site reviews. However, this procedure is just now beginning to be used, and, as

with standardization, it is yet to have any signficant impact on powerplant leadtimes although it has the potential if effectively used.

ISSUANCE OF A COMBINED LICENSE TO CONSTRUCT AND OPERATE A NUCLEAR POWERPLANT

By law, NRC must review an applicant's preliminary design before issuing a construction permit and review an applicant's final design before issuing an operating license. The legislative proposal would permit another alternative --that is, a combined construction permit and operating license if sufficient information is available to do so. This would require the applicant to submit complete design information for review before the start of construction.

Responses to our questionnaire indicate that under the current two-stage process, 40 percent or more of the operating license review work duplicates work performed during the construction permit review. Moreover, a review of a final design before construction begins would allow NRC to identify any design deficiencies that might not be noted until construction is well underway or completed. For these reasons, we agree that the review process should be flexible enough for NRC to perform either a one-stage or two-stage application review, depending on the availability of information or the degree of standardization.

We believe, however, that there are other alternatives which NRC has not fully evaluated. One would permit some individual branches or technical disciplines--where detailed information is readily available--to perform a one-stage review, while others would follow the traditional two-stage review process. Another alternative would permit utilities to submit the same type of construction permit application as it currently does--with preliminary design information. This information would be updated by the utility and reviewed by NRC during construction, and there would be no need for a separate operating license application or review. Both these alternatives suggest that a license application review could be based on a combination of the one- or two-stage review.

ELIMINATING MANDATORY ACRS REVIEW

The administration's proposal would place the ACRS review for commercial nuclear powerplants--now mandatory for each application--at the discretion of the ACRS or at the request of NRC. This aspect is based on the premise that powerplant designs would become more standardized. Duplicative reviews of a single standardized design would

be eliminated and the ACRS would be able to concentrate on new designs and generic issues.

If NRC preapproves standardized plant designs, we believe it is logical to eliminate the ACRS review each additional time that same design is used.

We believe, however, that this proposal is too broad because it would eliminate the mandatory ACRS review of an application to build a nonstandardized plant; that is, a plant whose design has not been approved by NRC. In our questionnaire, a large majority of the responding technical reviewers believed the ACRS review was of benefit. Several staff members also told us that the ACRS sometimes raised questions not covered in the staff review and that this tended to keep the staff alert and make them do a better job. In addition, we believe that the level of public confidence provided by the independent ACRS evaluation is important to the overall licensing process.

While the administration's proposal would still give the ACRS the option to review any application it chooses, we believe ACRS reviews should be mandatory in the initial approval process for standardized plant designs and for all nonstandardized plants.

COORDINATION OF STATE AND FEDERAL ENVIRONMENTAL REVIEWS

The National Environmental Policy Act of 1969 (NEPA) requires NRC to assess the need for electrical power and evaluate alternative sources of power and environmental impact for each powerplant application. When NEPA was passed, few States had environmental assessment capabilities. Now 27 States make some type of environmental review for powerplant applications. This often duplicates the reviews performed by NRC.

The current administration proposal would allow States with federally approved programs to conduct all or part of the NEPA reviews. NRC would accept the results of these States' reviews. If the States do not exercise this authority, NEPA decisions would continue to be made by NRC.

NRC has already taken steps--including holding joint Federal/State hearings and negotiating cooperative agreements with States--to coordinate Federal and State environmental reviews. While shifting NEPA requirements could encourage States to more closely cooperate with NRC and should lead to less duplication in the licensing process, the legislation will probably not, of itself, signficantly reduce licensing leadtimes.

Under the administration's proposal (and NRC's existing) early site review program, the environmental review would be conducted years before the utility starts construction work at the site. Therefore, it makes little difference who conducts the environmental review since it will no longer have an effect on construction schedules. But if the early site review program is not fully implemented, giving the complete authority for environmental reviews to the States could detract from any overall national goal to streamline the licensing process. In fact, the reviews could become subject to varying degrees of timeliness, efficiency, or environmental and political pressures particularly in those States that have little or no experience in the environmental review process. This could result in even longer times needed to license powerplants.

Therefore, before transferring NEPA responsibilities to the States, NRC should set minimum standards which the State environmental review programs must meet. These standards should include provisions to insure that the States will not unduly delay licensing decisions.

PUBLIC HEARING OPPORTUNITIES WILL BE REDUCED

Under the current two-stage licensing process, public hearings are mandatory before a construction permit is issued, and they can be held, if requested by an interested party, before an operating license is issued. These hearings are adjudicatory in nature and participants have various rights--including the rights to (1) subpena and cross-examine witnesses and (2) obtain oral or written statements or documents from other parties to the hearing.

The administration's proposal would change the timing of public hearings. They would be held when each prospective site is preapproved or during rulemaking hearings for standardized plant designs. The plant design and site might no longer be considered in a single hearing, but the issues related to each could be considered separately when the site and design are preapproved. This should continue to provide the public with ample opportunity to intervene or question the licensing actions.

The proposal would also modify the type of hearings to be held. While hearings on safety-related aspects of the plant design and site would remain adjudicatory in nature, hearings on environmental matters would be changed to legislative. Only when it is "necessary to resolve particular factual or legal questions which are essential to

the outcome of the proceeding" would adjudicatory type hearings be held for environmental matters.

A Department of Energy official told us that this change was being made because the trend among Federal regulatory agencies was away from adjudicatory type hearings and that most environmental issues could be adequately resolved without the more cumbersome adjudicatory process.

We wish to point out, however, that NRC did not request this change and that the Chairmen of the Atomic Safety and Licensing Board and the Atomic Safety and Licensing Appeal Board believe that most environmental issues for a nuclear powerplant site cannot be resolved through legislative hearings. They told us that the majority of issues contested during an environmental hearing are site specific and factual in nature and, according to the proposed legislation, might still have to be resolved during an adjudicatory hearing. They felt that this hybrid type of hearing could create problems because the individual licensing boards would have to (1) conduct two separate types of hearings and (2) decide when it is necessary to refer an issue to the adjudicatory process. The Chairman of the Appeal Board said that it would be particularly difficult to develop standards so that the licensing boards could consistently apply criteria for referring issues of a factual nature to the adjudicatory hearing process.

We agree that in those cases where issues raised in environmental hearings are contested, this particular change may not shorten licensing leadtimes. In addition, we question the administration's attempts to shorten the environmental hearing process by changing the type of hearings that can be held. For example, if environmental hearings are changed as the administration proposes, intervenors could be restricted in their ability to subpena and cross-examine witnesses and resolve questions to their satisfaction. This would be dependent on the ability of NRC to develop and consistently apply criteria for conducting two types of hearings and for determining when it would be necessary to change from legislative to adjudicatory hearings.

CONCLUSIONS

Many concerns have been raised in recent years about the process for licensing nuclear powerplants including concern over the lengthiness of that process. A number of administrative actions have been taken by NRC designed to improve licensing efficiency and effectiveness and reduce leadtimes. Additionally, various legislative proposals have surfaced in recent years for the same purpose. These

proposals have focused on using standardized plant designs and early siting decisions, two concepts currently being implemented administratively by NRC. Passage of the current proposed legislation citing many of the administrative actions already taken can further increase licensing efficiency, effectiveness, and provide needed flexibliity; however, it is unlikely that the legislation will provide significant additional reductions in licensing and construction leadtimes beyond that possible through the administrative procedures already developed by NRC. Congressional approval, however, could serve as an endorsement of the procedures and encourage their full development.

The proposed legislation would:

--Endorse the use of formal rulemaking proceedings to approve standardized plant designs. These designs could then be used by utilities to construct powerplants without extensive NRC review. While this could help reduce licensing leadtimes, we doubt if any design firm would be willing to incur the cost of getting a complete design approved through a rulemaking proceeding. Also, it is not clear to what extent NRC will limit design changes to standardized portions of the plant. While NRC requires design changes to offer "substantial additional protection" to the public health and safety, the term "substantial" is based on much subjective judgment.

--Allow the issuance of a site permit in separate and early site reviews. We favor this concept but believe that some provision should be developed to insure the continued validity of the site as the permit ages.

--Permit the issuance of a combined construction permit and operating license if sufficient information is available. This would provide flexibility to the licensing process and could help eliminate redundant or unnecessary review. We believe, however, that NRC should evaluate other alternatives using combinations of the one- and two-stage processes.

--Remove the mandatory requirement for ACRS reviews for nuclear powerplants. While this could eliminate unnecessary reviews and allow the ACRS to concentrate on matters of general concern, we believe that mandatory ACRS review should be retained for the initial approval process for standardized plant designs and for nonstandardized powerplant applications.

--Authorize States to perform NEPA reviews, the results of which could be accepted by NRC without duplication. While this should help reduce unnecessary duplication of review, it is doubtful that any significant reduction in licensing times would result. In fact, it could result in increased licensing times unless NRC insures that the State programs are adequate before transferring the responsibility to the States.

--Change the number of opportunities for public hearings on a particular plant while retaining the opportunity for public comment at critical decision points. One proposal would change the type of hearings on environmental matters from adjudicatory to legislative unless there were factual disagreements important to the licensing proceeding. We do not think this proposal will result in any significant savings in licensing leadtimes and do not agree with the administration's attempts to change public input into the hearing process.

RECOMMENDATIONS TO THE CONGRESS

The administration has been developing new legislative proposals to streamline the licensing process. Most of the ways to streamline the process, however, have already been administratively implemented by NRC. In its consideration of such proposals, we recommend that the Congress include a requirement that:

--NRC, as part of the early site review proposal, develop a method to update and certify the continued acceptability of the proposed powerplant site.

--ACRS review all applications which do not include plant designs approved under a formal NRC standardization program.

--Adequate public hearings be held by the States and NRC if they make NEPA-related decisions. The public should continue to have access to all pertinent licensing documents and be able to participate in public hearings by subpenaing and cross-examining witnesses.

--NRC, before transferring NEPA requirements to the States, insure that the States' environmental programs are adequate and will not unduly delay licensing decisions.

RECOMMENDATIONS TO THE CHAIRMAN, NRC

We recommend that the Chairman, NRC:

--Better define what constitutes the need for substantial additional protection and use that in the standardization program to determine the need for new requirements.

--Study ways to eliminate duplication and improve review efficiency. These studies should include, in addition to the overall one-stage licensing proposal, the viability of a single licensing review, where warranted, for individual branches or systems and the updating of a single application as final design information becomes available.

NRC COMMENTS

When NRC commented on our draft report, the report discussed an October 1977 version of the administration proposal to modify the licensing process. Since that time, the administration has finalized its position and submitted specific legislation to the Congress. Therefore, we adjusted our report to reflect changes between the proposed legislation and earlier drafts, but one of NRC's comments relates to a position that is no longer in our report. This is identified below.

In commenting on our recommendations to the Congress, NRC did not take any position. Instead, it pointed out instances where the administration's draft legislation addressed or failed to address our specific concerns. For instance, NRC identifies three specific areas where a January 4, 1978, draft bill addressed our recommendation that NRC insure the continued acceptability of proposed powerplant sites approved under an early site review program.

We are aware of these provisions but believe they do not specifically require NRC to update the site information (if the site is referenced in a construction permit application) and insure it is still acceptable. We believe that this should be an active part of NRC's review of a construction permit application and not the responsibility of intervenors or other third parties. It will not necessarily detract from the advantages of an early site review because new licensing proceedings on the site would not be necessary unless NRC found new and relevant information. It will help insure, however, that site conditions remain acceptable for locating a nuclear powerplant.

NRC also points out that the draft legislation would:

--Permit the ACRS, at its discretion, to review all or selected portions of nuclear powerplant applications not referencing an approved standardized design. We agree with NRC's assessment but believe that the ACRS review is of sufficient value to remain manadatory in these cases.

--Require NRC to approve the environmental review program of a State before permitting it to perform NEPA-related reviews. The legislation, NRC pointed out, also set the requirements for an acceptable State program including provisions for NRC to insure that the States (1) reach coordinated and timely decisions and (2) perform either formal or informal public hearings. NRC notes, however, that there was no requirement for States to hold adjudicatory type hearings and there was some disagreement whether this is necessary. NRC said that this was still under consideration. This situation has now changed. The administration's proposed legislation would change NEPA hearings for both NRC (the States would be required to hold similar hearings) from adjudicatory to legislative, except where adjudicatory hearings are needed to resolve disagreements over facts which are important to the licensing proceeding. We do not believe this proposal will result in any additional savings in licensing lead-times nor do we agree with the administration's attempts to change public participation in the hearing process.

In commenting on our first recommendation to its Chairman, NRC recognized that its standardization program would only be effective if both industry and NRC limited changes to those essential to the continued safety of the plant design. It notes, however, that determining what is essential is as old as the licensing program and cannot be easily determined. It therefore believes that it is unreasonable to expect rapid development of clearcut methods of determining what constitutes significant additional protection, but it does propose to continue its efforts in this area.

Concerning our recommendation that NRC study ways to eliminate review duplication and improve efficiency through variations of the one-stage licensing concept, NRC noted that it had recently completed such an assessment but is proposing to study it further.

APPENDIX I

SUMMARY OF NRC TECHNICAL STAFF RESPONSES TO OUR QUESTIONNAIRE CONCERNING THE LICENSING PROCESS

In our efforts to obtain a comprehensive view of the licensing process, we surveyed the Commission's technical staff responsible for site and design reviews for commercial nuclear powerplants. We did not survey the staff responsible for environmental or quality assurance reviews.

Questionnaires were mailed to 197 persons within NRC's Office of Nuclear Reactor Regulation. These were individuals who work in 15 branches within the Division of Systems Safety and the Division of Site Safety and Environmental Analysis. Responses were received from 169 individuals, which is approximately 86 percent of those receiving a questionnaire.

Six of the 169 questionnaires could not be tabulated because:

--One respondent provided his comments primarily in narrative form rather than checking individual blocks provided.

--Four responses came from persons whose review work fell outside the intended scope of the questionnaire.

--One response was received after our September 30, 1977, cutoff date.

This appendix includes a copy of the questionnaire with a summary of the responses provided for each question. Each question indicates the percentage of persons responding in a particular way. The percentages are adjusted to compensate for the fact that not all respondents answered every question. Also, due to rounding, the percentages shown may not total 100 percent for each question.

APPENDIX I
SUMMARY OF RESPONSES

U.S. GENERAL ACCOUNTING OFFICE
NRC TECHNICAL REVIEW SURVEY

INSTRUCTIONS

This questionnaire is designed for individual technical reviewers and also for supervisors through the Branch Chief level who may not perform individual case reviews but are responsible for those who do. Supervisors who perform no case review work should respond to the questions from the perspective of how they think the questions affect their reviewers or from their own perspective as supervisors as required by individual questions.

Please answer all questions by marking the appropriate boxes; feel free to make additional comments in the spaces provided throughout and at the end of the questionnaire. It has been anticipated that certain questions may not relate to everyone's area of review or that individuals may feel they have no basis to respond. Where such questions have been anticipated, the category "no opinion" is provided as a response alternative.

Throughout this questionnaire, there are numbers printed within parentheses to assist our keypunchers in coding responses for computer analysis. Please disregard these numbers.

Should you have any questions concerning any aspect of this questionnaire, please feel free to contact GAO representatives Louis Lynard, Barry Holman, or Tony Castaldo on 443-2876.

Please complete and return the enclosed questionnaire to GAO within 5 days of receipt.

I. BACKGROUND

NOTE: UNLESS OTHERWISE NOTED THE NUMBERS USED REFLECT THE PERCENTAGE OF RESPONDENTS ANSWERING EACH QUESTION; FRACTIONAL PERCENTAGES ARE ROUNDED UP TO THE NEXT WHOLE NUMBER.

1. What is your current position? (Check one.) (5)

/ 6 / 1. Branch Chief
/ 13 / 2. Section Chief
/ 33 / 3. Lead Reviewer
/ 45 / 4. Reviewer
/ 2 / 5. Other (Please specify)_____

2. In what branch are you currently working? (Check one.) (6-7)

/ 7 / 1. Accident Analysis
/ 6 / 2. Effluent Treatment Systems
/ 6 / 3. Radiological Assessment
/ 8 / 4. Geo-Sciences Branch
/ 7 / 5. Hydrology-Meteorology
/ 8 / 6. Mechanical Engineering
/ 7 / 7. Materials Engineering
/ 6 / 8. Structural Engineering
/ 7 / 9. Reactor Systems
/ 6 / 10. Core Performance
/ 7 / 11. Analysis
/ 8 / 12. Containment Systems
/ 6 / 13. Auxiliary Systems
/ 7 / 14. Instrumentation and Control Systems
/ 5 / 15. Power Systems
/ 0 / 16. Other (Please specify)___

3. What is your educational background in terms of: (1) degrees-held, and (2) major specialty area for each degree? (Check appropriate degrees and list speciality areas for each degree checked.) (8)

	(1) Degrees	(2) Specialty Areas
/ 26 /	1. Bachelors degree	
/ 44 /	2. Masters degree	
/ 21 /	3. Doctorate degree	
/ 2 /	4. Other (Non-degree specialities please specify)	

/ 37 / 4a. Bachelors degree plus other
/ 37 / 4b. Masters degree plus other

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4. Other than academic training, how many years of experience have you had that is related to the work you are now doing. (Check one box for each row that is applicable.)

	1. Less than 1 year	2. 1-3 years	3. 4-5 years	4. Over 5 years	
1. With NRC/AEC	5	35	31	29	(9)
2. Military	25	27	25	23	(10)
3. Industry	5	20	12	64	(11)
4. Academic Instruction	33	31	14	22	(12)
5. Other (Please specify)	12	21	5	63	(13)

5. To what extent have you been involved in (1) performing or (2) supervising the performance of application reviews during the past year? (Check one box for each row.)

	1. To a large extent	2. To some extent	3. To a minor extent	4. Not at all	
1. Performing application reviews	21	18	6	5	(14)
2. Supervising application reviews	26	13	21	40	(15)

II. TRAINING AND ORIENTATION

6. How adequate or inadequate has been training made available to you by NRC (or AEC) regarding (1) new developments in your field of review, (2) how your review area relates to other reviewer's work to provide "defense in depth", or (3) implementing the Standard Review Plan section in your area? (Check one box for each row.)

	1. Very adequate	2. Adequate	3. Borderline	4. Inadequate	5. Very inadequate	6. Not applicable--NO TRAINING GIVEN	
1. Training for new developments in your field of review	9	40	23	9	6	12	(16)
2. Training related to how your review area relates to other reviewer's work to provide "defense in depth"	6	21	21	20	12	21	(17)
3. Training for implementing the Standard Review Plan section in your area	9	41	19	8	10	14	(18)

7. How small or great are the needs for you (your reviewers) to receive additional training in each of the following areas? (Check one box for each row and feel free to make additional comments concerning the need for training.)

	1. No need	2. Small need	3. Moderate need	4. Substantial need	5. Critical need	
1. Updating technical skills	6	28	40	22	6	(19)
2. Implementing SRP sections	18	30	31	19	1	(20)
3. Explaining how each review area relates to overall "defense in depth"	12	18	33	32	6	(21)

COMMENTS: _____

III. GUIDANCE

8. In general, how adequate or inadequate are the scope and depth prescribed by the Standard Review Plan for your area? (Check one box for each row.)

	1. Very adequate	2. Adequate	3. Borderline	4. Inadequate	5. Very inadequate	
1. Scope prescribed	19	63	13	5	2	(22)
2. Depth prescribed	11	52	23	8	7	(23)

9. To what extent do review efforts in your area typically exceed the scope and depth as specified in the Standard Review Plan? (Check one box for each row.)

	1. Not at all	2. To a minor extent	3. To some extent	4. To a large extent	
1. Typically exceed the scope specified	20	35	36	9	(24)
2. Typically exceed the depth specified	10	29	41	14	(25)

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10. To what extent are review efforts in your area typically less than the scope and depth specified in the Standard Review Plan? (Check one box for each row.)

	1. Not at all	2. To a minor extent	3. To some extent	4. To a large extent	
1. Fall short of scope specified	57	33	9	1	(26)
2. Fall short of depth specified	48	39	10	1	(27)

11. If review efforts in your area vary from the scope and depth specified in the Standard Review Plan, to what extent do each of the following factors cause this variance? (Check one box for each row.)

	1. To a very large extent	2. To a major extent	3. To a moderate extent	4. To a minor extent	5. Little, or not at all	6. Not applicable--No variance from SRP	
1. The review of a plant feature already having been made on a generic basis	7	12	26	20	14	21	(29)
2. The similarity of a plant feature to a previous plant reviewed	5	15	23	19	18	20	(29)
3. Inadequacy of the Standard Review Plan in certain areas requiring additional consideration	9	14	22	29	15	11	(30)
4. The Standard Review Plan requiring more review than is needed in certain areas	3	2	16	27	38	15	(31)
5. Outside pressure for additional review	3	6	9	19	49	15	(32)
6. A problem suspected, additional review required	12	14	32	20	16	5	(33)
7. Other (Please specify)_____	27	23	19	12	0	19	(34)

COMMENTS:_____

12. If reviews in your area vary from the Standard Review Plan, how frequently are they (1) documented in writing, and (2) approved in advance by supervisors? (Check one box for each row.)

	1. Always or almost always	2. Generally	3. As often as not	4. Sometimes	5. Never or almost never	6. Not applicable (no variances)	
1. Documented in writing	26	28	4	14	18	11	(35)
2. Approved in advance by supervisors	31	23	1	13	22	11	(36)

COMMENTS:_____

13. To what extent, if at all, should the Standard Review Plan be revised to better describe the scope and depth of review? (Check one box for each row.)

	1. Completely	2. To a large extent	3. To a moderate extent	4. To a small extent	5. Not at all	
1. Scope	7	14	28	40	11	(37)
2. Depth	9	21	30	33	6	(38)

COMMENTS:_____

14. How adequate or inadequate is the following written guidance provided by NRC to assure each review is complete, thorough and consistent? (Check one box for each row.)

	1. Very adequate	2. Adequate	3. Borderline	4. Inadequate	5. Very inadequate	6. No opinion	
1. Standard format and content guide	762	19	4	6	3		(39)
2. Standard Review Plan	463	21	4	6	2		(40)
3. Regulations	750	23	9	5	6		(41)
4. Regulation guides	560	31	7	4	3		(42)
5. Branch technical positions	953	15	9	6	8		(43)
6. Other (Internal memos, etc.)	340	20	10	11	16		(44)
7. Composite impact of all guidance	361	23	7	2	2		(45)

COMMENTS:_____

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IV. REVIEW PROCESS

15. For those sections of (1) construction permit and (2) operating license applications pertaining to your area of review, what percentage of the data submitted by applicants could be classified as follows? (Please fill in as many blanks for each column as needed.)

	Percentage (1) Construction Permit		Percentage (2) Operating License	
1. Conceptual design	12	(5-7)	3	(26-28)
2. Preliminary design	24	(8-10)	6	(29-31)
3. Final design	13	(11-13)	42	(32-34)
4. Test data	7	(14-16)	10	(35-37)
5. Analyses in support of application	24	(17-19)	27	(38-40)
6. Design criteria without further details of how it will be met	17	(20-22)	9	(41-43)
7. Other (Please specify) _____	3	(23-25)	3	(44-46)
TOTAL	100%		100%	

16. How adequate (1) at the construction permit review phase and (2) at the operating license review phase is the information required by the Standard Format and Content guide for evaluating the safe design and siting of nuclear power plant applications? (Check one for each row.)

	1. Very adequate	2. Adequate	3. Borderline	4. Inadequate	5. No opinion	
1. Construction permit review phase	15	59	13	7	6	(47)
2. Operating license review phase	8	58	18	10	6	(48)

COMMENTS: _____

17. To what extent do you think there are aspects relating to the safe design and siting of nuclear power plants which are not now reviewed but should be because of a potential significant impact on safety? (Check one and if applicable describe specific aspects needing review and how it should be accomplished.)

- [3] 1. To a very large extent
- [5] 2. To a large extent
- [18] 3. To some extent
- [39] 4. To a minor extent
- [23] 5. Not at all
- [12] 6. No opinion

COMMENTS: _____

18. Generally, how similar or dissimilar are: (1) the reviews made from one construction permit review to the next, and (2) from one operating license review to the next? (Check one box for each row and feel free to comment on reasons for any dissimilarities.)

	1. Identical	2. Very similar	3. Similar	4. Dissimilar	5. Very dissimilar	6. No opinion	
1. From one construction permit review to the next	3	36	42	11	4	5	(50)
2. From one operating license review to the next	3	31	43	13	5	6	(51)

COMMENTS: _____

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19. To what extent do the following factors cause design changes to be made at the operating license phase? (Check one box for each row.)

	1. Not at all	2. To a small extent	3. To a moderate extent	4. To a large extent	5. Completely	No opinion	
1. Changes in review requirements	6	45	24	18	1	7	(52)
2. Changes in criteria intrepretation	10	50	20	14	0	1	(53)
3. Detailed implementation of design criteria varied from that approved at the construction permit phase	7	38	23	17	1	14	(54)
4. Design changes made by applicants since construction permit approved but not previously reviewed by NRC	3	32	34	16	2	13	(55)
5. Review of more detailed data at the operating license phase identified unanticipated problems	4	26	44	17	2	6	(56)
6. Inadequate review at the construction permit phase	15	55	1-	7	0	10	(57)

COMMENTS:

20. To what extent have your review procedures been affected by the results of research conducted either by: (1) NRC, or (2) others? (Check one box for each row and provide examples and explanation as needed.)

	1. Completely	2. To a large extent	3. To a moderate extent	4. To a small extent	5. Not at all	No opinion	
1. Impact of NRC research	1	12	27	35	17	7	(58)
2. Impact of research by others	1	22	33	28	9	7	(59)

COMMENTS:

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21. To what extent do the following statements apply to the work generally performed in your review area during a construction permit review? (Check one box for each row.)

	1. Completely or almost completely	2. To a major extent	3. To a moderate extent	4. To a minor extent	5. Little or not at all	6. Not part of the application or review in my area	
1. A detailed review is conducted for all segments of the application pertaining to my branch's review area	35	36	17	8	5		(60)
2. A detailed, in depth, review is made of selected design features, analyses, supporting calculations, etc., to test the accuracy and completeness of applicant data	17	23	25	17	17	3	(61)
3. NRC analysis is performed independently of data and analysis provided by applicants	11	16	18	25	26	4	(62)
4. A review is made of applicant's interpretations of guides and standards as a basis for design, construction and operation	22	29	19	17	12	1	(63)
5. Applicants are questioned how they intend to implement certain aspects of the criteria to which they have committed themselves	18	30	31	15	5	1	(64)
6. The accuracy of any computer codes used by the applicant is checked	6	13	16	18	21	27	(65)
7. Computer codes developed by or for NRC are used for making independent calculations	21	10	9	12	21	28	(66)
8. Application segments are reviewed to determine whether the applicant has stated that its design has or will be implemented in accordance with NRC criteria	33	33	20	10	3	1	(67)
9. The reasonableness and adequacy of methodologies used or proposed for use by applicants is reviewed	28	40	19	8	4	1	(68)
10. Specific application segments are eliminated from detailed review which, in description, are similar to those approved on other applications	32	30	26	8	3		(69)
11. Certain portions of the application are eliminated from review based on the individual reviewer's judgment	1	9	20	24	46	1	(70)
12. Other (Please specify)_____ (involves only 1 response)	0	0	0	0	0		(71)

APPENDIX I

22. To what extent do the following statements apply to the work generally performed in your review area during an operating license review? (Check one box for each row.)

	1. Completely or almost completely	2. To a major extent	3. To a moderate extent	4. To a minor extent	5. Little or not at all	6. Not part of the application or review in my area	7. No opinion	
1. A detailed review is conducted for all segments of the application pertaining to my branch's review area	41	31	16	5	2		3	(5)
2. A detailed, in depth, review is made of selected design features, analyses, supporting calculations, etc. to test the accuracy and completeness of applicant data	24	29	20	18	6	1	3	(6)
3. NRC analysis is performed independently of data and analysis provided by applicants	15	14	20	25	19	3	5	(7)
4. A review is made of applicant's interpretations of guides and standards as a basis for design, construction and operation	24	30	22	10	9	2	3	(8)
5. Applicants are questioned how they intend to implement certain aspects of the criteria to which they have committed themselves	25	28	22	11	9	1	4	(9)
6. The accuracy of any computer codes used by the applicant is checked	8	13	12	12	24	24	7	(10)
7. Computer codes developed by or for NRC are used for making independent calculations	25	6	10	9	18	23	8	(11)
8. Application segments are reviewed to determine whether the applicant has stated that its design has been implemented in accordance with NRC criteria	34	33	16	9	3	1	5	(12)
9. The reasonableness and adequacy of methodologies used or proposed for use by applicants is reviewed	32	37	15	8	4	1	3	(13)
10. Specific application segments are eliminated from detailed review which, in description, are similar to those approved on other applications	3	17	28	22	24	1	3	(14)
11. Certain portions of the application are eliminated from review based on the individual reviewer's judgment	2	8	15	19	53		3	(15)
12. Other (Please specify)_____ (involves only 1 response)	0	0	0	0	0		100	(16)

APPENDIX I

23. To what extent do you (your reviewer's) need input from other branches concerning Standard Review Plan sections for which your branch has primary review responsibility? (Check one.)

/ 8 / 1. To a very large extent (17)

/15 / 2. To a large extent

/41 / 3. To some extent

/25 / 4. To a minor extent

/11 / 5. Little or not at all

24. To what extent is such input from other branches requested and received concerning Standard Review Plan Sections for which your branch has primary review responsibility? (Check one.)

/ 8 / 1. To a very large extent (18)

/13 / 2. To a large extent

/43 / 3. To some extent

/22 / 4. To a minor extent

/15 / 5. Little or not at all

25. Approximately what percent of the operating license review work is the same as that which was done during the construction permit review? (Check one and feel free to comment on any differences between the two reviews in terms of type, scope, depth and degree of independent verification.)

(19)

/ 1 / 1. 0% (Zero)

/ 8 / 2. 1 - 20%

/21 / 3. 21 - 40%

/17 / 4. 41 - 60%

/19 / 5. 61 - 80%

/ 6 / 6. More than 80%

/ 11 / 7. No opinion

COMMENTS: _____

_____

_____

_____

_____

26. How familiar are your supervisors (you, if a supervisor) with the review work performed so that they (you, if a supervisor) can ensure a complete, consistent, and accurate review was made? (Check one.)

(20)

/ 39 / 1. Very familiar

/ 42 / 2. Familiar

/ 14 / 3. Borderline

/ 3 / 4. Unfamiliar

/ 2 / 5. Very unfamiliar

/ 1 / 6. Don't know

27. To what extent do each of the following items document what and how specific aspects of reviews in your area are performed so that someone else could later determine those things that were or were not assessed in each review. (Check one box in each row.)

	1. To a very large extent	2. To a large extent	3. To some extent	4. To a minor extent	5. Very little	6. Not at all	
1. "Round" Questions	39	36	18	3	3	1	(21)
2. Safety Evaluation Reports	27	39	25	4	3	3	(22)
3. Logs or record books	4	11	24	14	25	23	(23)
4. Meeting summaries and trip reports	4	20	38	21	16	6	(24)
5. Progress Reports	1	7	17	12	25	40	(25)
6. Other (Please specify)_____	50	18	18	0	5	9	(26)

28. To what extent would it be feasible to combine the two present licensing phases into a single review for: (1) a custom plant, and (2) a standardized plant? (Check one box for each row and feel free to comment concerning advantages or disadvantages of a single review.)

	1. To a very major extent	2. To a major extent	3. To a moderate extent	4. To a minor extent	5. Little or not at all	6. No opinion	
1. Custom Plant	13	21	24	13	24	5	(27)
2. Standardized Plant	25	31	17	9	11	5	(28)

COMMENTS: _____

_____

_____

APPENDIX I

29. In general, approximately how many staff days are (would be) required for you (your reviewers) to review the following types of applications? (Please fill in the blanks and enter a question mark (?) for areas where you have no basis to judge.)

	Reviewer Staff Days *	
1. Construction permit	45	(29-31)
2. Preliminary design approval	39	(32-34)
3. Operating license	54	(35-37)
4. Final design approval	58	(38-40)
5. Combined construction/ permit operating license	67	(41-43)
6. Combined preliminary and final design approval for a standardized plant	68	(44-46)

V. ACCURACY AND COMPLETENESS OF APPLICANTS DATA

30. Overall, how would you rate the: (1) accuracy and, (2) completeness of the data applicants submit during the review process? (Check one box for each row.)

	1. Very Good	2. Good	3. Fair (O.K.)	4. Poor	5. Very Poor	
1. Accuracy	6	56	30	6	2	(47)
2. Completeness	4	26	47	17	6	(48)

31. How frequently have you experienced serious problems with the: (1) accuracy and, (2) completeness of applicant data, either late in the review process or after completion of the safety evaluation report? (Check one box for each row and, if applicable, briefly describe (using examples) how data difficulties were identified.)

	1. Never or almost never	2. Rarely	3. Sometimes	4. Frequently	5. Always or almost always	
1. Accuracy	6	33	48	11	3	(49)
2. Completeness	6	18	46	31	5	(50)

COMMENTS: _____

32. For cases you (your reviewers) have reviewed, to what extent were each of the following factors present? (Check one box for each row.)

	1. To a very large extent	2. To a large extent	3. To some extent	4. Very little	5. Not at all	
1. Applicants anticipating probable review questions and providing information to cover them	4	27	41	25	3	(51)
2. Applicants being unaware, at the time they submit their application, of the type of questions NRC reviewers might ask	4	14	48	31	4	(52)
3. Applicants receiving insufficient guidance concerning NRC review requirements	1	8	36	47	9	(53)
4. Applicants only providing that data which is absolutely necessary and which is the most favorable to their application. (Please provide examples below of instances where this last factor materially affected the review, findings and design requirements.)	16	26	33	21	5	(54)

EXAMPLES: _____

VI. TIME TO CONDUCT CURRENT REVIEWS

33. How adequate or inadequate is the time scheduled for reviewing licensing applications? (Check one.) (55)

- /10/ 1. Very adequate
- /43/ 2. Adequate
- /26/ 3. Borderline
- /15/ 4. Inadequate
- /7/ 5. Very inadequate

* Summary responses to this question are expressed by average number of days; not as a percentage.

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34. How much pressure do you (your reviewers) generally experience in attempting to complete your (their) reviews within the established time schedule? (Check one.) (56)

/ 5 / 1. Little or no pressure

/ 11 / 2. Minor pressure

/ 31 / 3. Moderate pressure

/ 28 / 4. Major pressure

/ 3 / 5. Extreme pressure

35. Generally, to complete your review work on time, how much average weekly overtime is required? (Check one.) (57)

/ 19 / 1. None

/ 51 / 2. 1 - 5 hours

/ 25 / 3. 6 - 10 hours

/ 4 / 4. 11 - 20 hours

/ 1 / 5. More than 20 hours

36. What generally is the impact of time schedules on your review efforts? (Check one or more and provide additional comments below as needed.) (58)

/ 34 / 1. Negligible impact on the scope and depth of review

/ 52 / 2. Moderately limits the scope and depth, without excluding important safety aspects

/ 10 / 3. Substantially limits the scope and depth to the extent that important safety aspects cannot be reviewed

/ 4 / 4. Limits my ability to deal with post construction permit problems, issues and design changes

COMMENTS: _____

_____

_____

_____

_____

_____

VII. FREEDOM TO DISSENT FROM NRC TECHNICAL DECISIONS

37. Prior to the present policy providing for documenting unresolved dissenting staff opinions in the public record (as cited in NRC Office letter No. 11), how free were you to pursue disagreements on technical safety issues past your supervisor(s)? (Check one.) (59)

/ 10 / 1. Very free and encouraged to do so

/ 27 / 2. Free to do so without fear of adverse actions

/ 41 / 3. Free to do so but not certain of management's real desire

/ 10 / 4. Not very free and discouraged from doing so

/ 7 / 5. Not free and certain of adverse actions

/ 6 / 6. Not applicable; I wasn't with NAC then

38. Under the new procedures governing dissenting opinions, how free are you to pursue disagreements on technical safety issues past your supervisor(s)? (Check one.) (60)

/ 22 / 1. Very free and encouraged to do so

/ 29 / 2. Free to do so without fear of adverse actions

/ 41 / 3. Free to do so but not certain of management's real desire

/ 5 / 4. Not very free and discouraged from doing so

/ 4 / 5. Not free and certain of adverse actions

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VIII. FACTORS AFFECTING RESULTS OF STAFF REVIEWS

39. How frequently are design changes made against your best technical judgment because of pressures from each of the following sources? (Check one box for each row.)

	1. Never or almost never	2. Sometimes	3. As often as not	4. Generally	5. Always or almost always	
1. Intervener pressure for more conservatism	66	28	2	3	1	(61)
2. Intervener pressure for less conservatism	97	3		1	0	(62)
3. Industry pressure for more conservatism	92	7	1	1	0	(63)
4. Industry pressure for less conservatism	43	41	7	7	3	(64)
5. Management pressure for more conservatism	53	37	5	3	1	(65)
6. Management pressure for less conservatism	54	35	5	4	1	(66)
7. ACRS pressure for more conservatism	44	36	11	9	0	(67)
8. ACRS pressure for less conservatism	75	18	5	1	0	(68)

COMMENTS: _____

40. How frequently are changes made to your "round" questions and safety evaluation report drafts by: (1) your supervisor(s), and (2) project management officials? (Check one box for each row.)

	1. Never or almost never	2. Sometimes	3. As often as not	4. Generally	5. Always or almost always	
1. Your supervisor(s)	18	53	9	11	9	(69)
2. Project Management officials	40	42	9	6	3	(70)

41. When changes have been made, if ever, how do they affect your findings? (Check one and feel free to provide examples.)

(71)

/ 0 / 1. Significantly increases the importance of safety issues

/ 15 / 2. Increases the importance of safety issues

/ 63 / 3. No impact

/ 14 / 4. Decreases the importance of safety issues

/ 2 / 5. Significantly decreases the importance of safety issues

/ 7 / 6. No changes made

EXAMPLES: _____

42. Overall, how satisfied or dissatisfied are you with the opportunities presented to defend your position concerning changes by supervisors or project management? (Check one and feel free to explain.)

(72)

/ 19 / 1. Not applicable--changes, if any, were not disagreed with

/ 26 / 2. Very satisfied

/ 35 / 3. Satisfied

/ 11 / 4. Borderline

/ 8 / 5. Dissatisfied

/ 2 / 6. Very dissatisfied

COMMENTS: _____

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43. How would you rate the design conservatism of U.S. nuclear powerplants for protecting public health and safety? (Check one for each row.)

	1. Significantly more conservative than necessary	2. More conservative than necessary	3. Appropriately conservative	4. Less conservative than necessary	5. Significantly less conservative than necessary	6. No opinion	
1. Overall plan design	12	24	52	1	1	11	(73)
2. Design related to your review area	11	30	56	3	1	1	(74)
3. Design related to other review areas	7	22	37	4	0	30	(75)

(Please feel free to comment below on any specific components, systems, etc., which you belive are either less or more conservative than necessary.)

COMMENTS: _____

IX. STANDARDIZATION

44. To what extent does standardization contribute to: (1) a more complete design when NRC approves the beginning of construction, and (2) less need for design changes? (Check one box for each row.)

	1. Not at all	2. To a small extent	3. To a moderate extent	4. To a large extent	5. Completely	6. No opinion	
1. A more complete design when beginning of construction is approved	10	18	27	21	3	21	(76)
2. Less need for design changes	11	16	23	25	3	22	(77)

45. To what extent does standardization reduce the need for reviewing subsequent applications containing previously approved standardized systems? (Check one.) (78)

- /8/ 1. Not at all
- /16/ 2. To a small extent
- /23/ 3. To a moderate extent
- /36/ 4. To a large extent
- /4/ 5. Completely
- /12/ 6. No opinion

46. To what extent does the need to review "interfaces" impact the concept of standardization? (Check one and feel free to add additional comments describing how.) (79)

- /2/ 1. Not at all
- /17/ 2. To a small extent
- /22/ 3. To a moderate extent
- /34/ 4. To a large extent
- /8/ 5. Completely
- /17/ 6. No opinion

COMMENTS: _____

APPENDIX I

47. To what extent do you think: (1) standardization is being encouraged and, (2) standardization should be encouraged by NRC? (Check one for each row and please feel free to explain your opinions on standardization as needed.)

	1. Not at all	2. To a small extent	3. To a moderate extent	4. To a large extent	5. Completely	6. No opinion	
1. Standardization is being encouraged	2	7	38	36	6	10	(5)
2. Standardization should be encouraged	6	4	24	40	16	9	(6)

COMMENTS: _____

X. PROBABILISTIC METHODOLOGY

48. How familiar are you with the use of probability techniques for risk assessment? (Check one.) (7)

/ 3 / 1. Total familiarity

/ 20 / 2. Major familiarity

/ 42 / 3. Moderate familiarity

/ 24 / 4. Minor familiarity

/ 12 / 5. Little or no familiarity

49. To what extent: (1) have you used probability techniques in your review work, and (2) do you believe such techniques should be used? (Check one box for each row and feel free to provide any additional comments.)

	1. Not at all	2. To a small extent	3. To a moderate extent	4. To a large extent	5. Completely	
1. Current use	28	45	18	9	0	(8)
2. Should be used	10	24	35	30	1	(9)

COMMENTS: _____

XI. ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

50. How would you rate the benefits or disbenefits derived from ACRS reviews of individual applications? (Check one box for each row.)

	1. Significant benefit	2. Some benefit	3. No impact	4. Some disbenefit	5. Significant disbenefit	
1. Review of known safety issue areas	20	49	23	8	1	(10)
2. Identification of new safety issue areas	23	53	19	3	1	(11)
3. The value of a second judgment	30	53	14	2	1	(12)
4. Any additional time added to the review process	3	19	28	38	12	(13)
5. Any additional complexity added to the review process	3	23	26	40	8	(14)

COMMENTS: _____

XII. ATOMIC SAFETY LICENSING BOARD

51. To what extent are the following factors indicative of the hearing process? (Check one box for each row and feel free to provide any additional comments.)

	1. Not at all	2. To a small extent	3. To a moderate extent	4. To a large extent	5. Completely	6. No opinion	
1. Significant safety issues are raised that were not previously reviewed.	32	40	4	1	1	22	(15)
2. Issues raised are those which have already been considered by the NRR staff.	1	10	6	52	13	18	(16)
3. Issues raised at individual hearings are those which could be better considered on a generic basis.	1	12	29	29	6	23	(17)
4. Intervenor concerns seem to focus on public anxieties and perceptions of nuclear power plant safety in general.	2	6	9	47	15	21	(18)
5. Intervention rules and procedures limit discussion of significant issues that may develop as the hearing progresses.	19	18	11	7	3	42	(19)

COMMENTS: _____

XIII. ADDITIONAL COMMENTS

52. If you have any additional comments regarding this questionnaire or the licensing process, please feel free to use the space on this page. Attach additional sheet(s) if necessary.

APPENDIX II

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 21 1978

Mr. Monte E. Canfield, Jr.
Director
Energy and Materials Division
United States General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Canfield:

We have received and reviewed a draft of the GAO report entitled "Nuclear Powerplant Licensing: Need for Additional Improvements." Members of the NRC staff met with representatives of GAO on February 21, 1978 to provide detailed comments on the draft report and I understand these comments are to be considered by GAO in the preparation of the final report.

Taking into account these detailed comments, I believe the final GAO report, and the source data it contains, can be quite useful. I should like, in this letter, to provide our staff response to the several specific recommendations of the report. As you will see, we agree with many of the recommendations, and are and have been in the process of implementing them. Even so, the report does serve to highlight some of the implementation problems we have encountered, and is therefore helpful to us in our continuing efforts to improve the licensing process within the bounds of our statuatory authority and resources that are currently available to us.

Our comments on the specific recommendations in the individual chapters of the draft report follow.

CHAPTER 2 -- ADEQUACY OF THE NUCLEAR POWERPLANT REVIEW PROCESS: NRC REVIEW STAFF'S PERSPECTIVE

Recommendation

That the Chairman, NRC: evaluate the scope and depth of reviews in the plant systems review branches to determine if additional staff or time are required to insure reviews are adequate.

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Comment

NRR management appreciates the concerns which underlie this recommendation. There are considerable demands now being placed on the resources of the five plant and reactor systems branches of the Division of Systems Safety (DSS). Routine indicators, such as formal schedule slippages in licensing reviews, standards reviews, and generic technical activities, show an increasing problem in these branches, particularly over the past six months, as the demands have increased and the resources remained constant. This mismatch in resources and demands correlates with the indications from the GAO survey; i.e., a higher percentage of reviewers in the five systems branches expressed concern over insufficient time to review potentially significant safety issues than did the reviewers in the other five DSS branches.

The reasons for the high demand on the systems branches are known. One cause is the fact that there are some 20 nuclear power plants now undergoing operating license review. None of these plants were reviewed according to the Standard Review Plan at their construction permit stage. Bringing these plant designs and the licensing documentation into conformance with the SRP at the OL stage requires considerable staff effort, particularly in the systems branches.

Another cause of the high demand on systems-related staff expertise is the initiation of the Systematic Evaluation Program for operating nuclear power plants which requires about 10 man-years per year of DSS effort for re-review of the eleven oldest operating reactors. In addition, there are more than 30 ongoing CP applications and standard plant designs currently under review by DSS personnel. Superimposed on this routine case review workload is the Commission's program to resolve generic technical issues in reactor safety.

The three most highly impacted systems branches have undertaken week-by-week scheduling of all of their technical reviewers to assure optimum utilization of available resources on the most important safety review tasks. Generally this effort shows that we can continue to provide a quality product on our OL and SEP work in these branches for the remainder of FY78. However, the CP and standard plant reviews in these branches will probably slip considerably. Generic technical activities, the review of DOE's preliminary designs for advanced reactor concepts, and the second plan of our work to update the SRP may have to be severely curtailed in several of the systems branches for the remainder of FY78 assuming resources in these branches remain constant.

Schedule slips are the only available course of action since reprogramming of resources internal to DSS cannot solve this problem.

Sufficient expertise in the technical disciplines of interest do not exist in the other branches, and the resources of the other branches are already finely tuned to the safety issues and licensing cases scheduled for their attention.

The GAO recommendation implies that the scope and depth of the reviews in the systems disciplines may be in need of adjustment. There is other evidence that this is a valid concern. However, the evidence suggests expansion, not contraction, of both the scope and the depth of systems-oriented reviews which will exacerbate the resource/schedule problems described above. For example, our recent evaluation of the Union of Concerned Scientists petition for emergency action suggests that the electrical systems review should be expanded in scope to include electrical connections and increased in-depth review of specific environmental qualification test conditions. Similar indicators are being obtained from DSS audits of as-built safety systems for plants under OL review. This tendency to expand the systems branches' reviews is responsive to the staff's concerns which underlie this GAO recommendation, but the resource problem is heightened as the expansion continues. In addition, the other GAO recommendations on SRP revisions, increased training, and more thorough documentation of the safety review all act to accentuate the resource limitations which are the root cause of our problems in this area.

The solution to the problems in the systems branches is better planning in the budget process and reprogramming as possible in FY78 and FY79. Efforts in these regards are a normal NRR management function and are underway.

CHAPTER 3 -- PROCEDURES TO IDENTIFY AND EVALUATE CHANGES TO THE LICENSING PROCESS COULD BE IMPROVED

Recommendation

That the Chairman, NRC: analyze the operating data NRC receives in a systematic and coordinated manner.

Comment

The substance of this recommendation is part of another, ongoing GAO study. The objectives of this detailed study, as we understand them are to ascertain:

(1) if the current NRC reporting requirements and review programs are adequate with respect to identifying significant safety issues,

(2) if the NRC has taken appropriate corrective actions when a significant safety issue has been identified, and

APPENDIX II

(3) if the NRC has a program for systematically analyzing operating experience and whether the NRC program is adequate with respect to identifying generic trends.

Presently, the review and analysis of operating data is undertaken by the Division of Operating Reactors in NRR, as well as by the Office of Inspection and Enforcement and the Office of Management and Program Analysis within the areas of their responsibilities.

The Office of Inspection and Enforcement performs an initial evaluation of licensee reported matters to determine if prompt NRC response is required or if generic problems are identified. Depending upon the significance of the reported matter, an on-site inspection is conducted to determine or confirm the facts associated with the reported matter. The results of these inspections are documented in the I&E Inspection Reports.

DOR reviews all Licensee Event Reports, both from the standpoint of significance to the individual facilities involved, and separately for generic importance. The latter review includes consideration of safety trends in accumulated operating experience that should be applied to decisions made in ongoing reviews as well as to other operating reactors.

In addition to the DOR review effort, the Office of Inspection and Enforcement and the Office of Management and Program Analysis perform a variety of functions directed towards summarizing and analyzing specific operating experience events and towards analyzing trends in operating experience. These efforts are summarized in the following publications:

Nuclear Power Plant Operating Experience (Annually)
Current Events - Power Reactors (Every Two Months)
Occupational Radiation Exposure Reports (Annually)
Abnormal Occurrence Reports (Quarterly to Congress)
Quarterly LER Review (Quarterly)
LER Data Abstracts (Bi-weekly; Monthly; Quarterly)
Radioactive Materials Released from NPPS (Annually)
I&E Bulletins (As Situation Dictates)
I&E Circulars (As Situation Dictates)

The Office of Inspection and Enforcement also evaluates and analyzes all events that occur at specific plants to determine trends at various plants, and each IE Region Office and Headquarters evaluate the data from many plants to evaluate trends.

The review of operating data is well coordinated among the appropriate NRC offices. Obviously, it is possible to develop a more systematic

method of handling this important activity. However, depending on the extent to which such improvement is thought to be required, substantial additional manpower resources will be necessary. We believe it would be appropriate to defer further consideration of this recommendation until the ongoing GAO study is completed, and detailed recommendations regarding this matter are available for consideration.

Recommendation

That the Chairman, NRC: establish a management information system to identify and document the degree to which the results of each research project benefit the licensing process.

Comment

The results of significant completed research are formally transmitted to the user offices through Research Information Letters (RIL). The implementation of these reasearch results is monitored by the NRC program offices and the results are documented by the Office of Management and Program Analysis. A management information system titled "Research Results-Transfer and Utilization Information System" has been initiated and is well along in its development. It is expected to be completely operational within the next several months.

Although this formalized procedure transmits carefully screened, important results to the user office, it is not the only method by which the results of research projects are transferred. Staff members from the user offices not only attend contractor program reviews conducted by the Office of Research, but serve as members of Research Review Groups (RRG). The purpose of the RRG's is to review ongoing and proposed research projects and to provide recommendations as to the technical merit and direction of the projects. In addition, user office staff members participate in the annual Water Reactor Safety Information Meeting. Further, the user offices are on the distribution for topical, final, and periodic reports. Through this participation, user office staff members are cognizant of the formulation and conduction of research projects that do not result in a RIL being issued.

In addition, the Office of Nuclear Reactor Regulation (NRR) reviews the products of the NRR Technical Assistance programs to assure that the results of these programs are providing the needed licensing input.

Recommendation

That the Chairman, NRC: assess the value/impact of proposed regulatory requirements before they become practice.

Comment

Present Commission policy requires formal value/impact consideration of all significant changes in regulatory requirements. Accordingly, the Regulatory Requirements Review Committee has, for several years now, required consideration of value/impact analyses by the Regulatory Requirements Review Committee in its role of advising the NRR Office Director on the approval of significant changes in regulatory requirements for nuclear power plants. Formal agency-wide guidance on the use and content of value/impact analyses was approved by the Commission on January 20, 1978. The Office of Nuclear Reactor Regulation issued complementary guidance for use with its licensing

activities in the form of Office Letter #16 on January 13, 1978. These guidance documents were issued in the course of or following the work by GAO staff in preparing this report. We believe that the present implementation of the guidance contained in the reports is completely responsive to this recommendation.

Recommendation

That the Chairman, NRC: increase the use of probabilistic risk assessment and insure that technical reviewers receive a general knowledge, and that at least one or two reviewers in each licensing review branch are well trained in using risk assessment techniques.

Comment

We agree with this recommendation and are taking the necessary steps toward achieving the objective of increased implementation of risk assessment methodology in the licensing process. An internal NRR procedure has been established for developing increased uses of these techniques, and specific implementation plans are being developed.

Successful application of this methodology for decision-making is dependent upon an adequate data base of component and system reliability information and qualified practitioners of the methodology in the applicant organizations, as well as the NRC staff. The speed with which increased use of risk assessment methodology can be introduced into the licensing process is dependent upon the speed with which the NRC and applicants' staffs can be trained and

the ability to reprogram appropriate NRR staff into such a training program from the current review process.

Two very specific goals have been established for obtaining the necessary training of the NRR staff. First, and easiest, is the goal of increasing the number of staff members that have some familiarity with the methodology. This goal is being achieved by enrolling selected NRR staff members in the concentrated "System Reliability and Safety Analysis Course" offered by the Office of Nuclear Reactor Research. This is an intensive eight day course that can be expected to familiarize a person, who has some knowledge of probabilistic and statistical methods, with the risk assessment methodology. At the present time, 21 people from NRR have attended this PAB familiarization course, and another 15 are scheduled to attend the course near the end of this month. Further, an additional course dealing with reliability techniques will start for approximately one dozen NRC staff members this month.

The second and much more difficult goal is to develop personnel who are highly trained and skilled in the application of the methodology to the licensing process. It may require up to a year for this necessary training. In concert with the Office of Research, the Office of Nuclear Reactor Regulation is exploring means to achieve this objective in a manner that will not overly burden the Research-Probabilistic Analysis Branch in its day-to-day functions, and cause the least impact on the day-to-day operations of NRR.

CHAPTER 4 -- MANAGEMENT STEPS NEEDED TO INSURE COMPLETENESS AND IMPROVE EFFICIENCY OF INDIVIDUAL REVIEWS

Recommendation

That the Chairman, NRC: identify and meet the training needs of technical reviewers with special emphasis on (1) updating technical skills, (2) providing guidance on implementing the Standard Review Plan, and (3) providing an overall orientation of the licensing process and how each review section relates to an overall program to protect the public health and safety.

Comment (1)

We agree that this objective of training is important. In FY77, NRR spent $102,000 on technical training for its employees. (The agency manpower reporting systems indicates that NRR employees spent a total 23.8 manyears in training in FY 77.) This $102,000 was spent for technical courses at such institutions as MIT, Georgia Tech and Northwestern University; $18,000 was spent on technical courses at MIT, alone. Additionally, in FY77, NRR sent 99 employees

to the technical systems courses offered by the Office of Inspection and Enforcement. These courses are specifically designed for NRR employees.

To identify the training requirements of NRR employees, an individual Training Plan is developed each year for each employee. These plans, developed jointly by the first-line supervisor and the employee, are approved by the Division Directors and are used to assess the overall training requirements needed to fulfill NRR's programmatic responsibilities for the coming year and to assist in budget preparation.

Special attention is given to providing necessary training for updating technical skills. However, in light of the results of the GAO survey, even closer attention will be given in the next budget cycle to assure that these needs can be met.

Comment (2)

This recommendation reflects the present staff training plans of NRR management as they relate to the Standard Review Plan. The NRR staff is now about halfway through a major, one-year, two step process of updating the Standard Review Plan. This exercise, which is being accomplished by branch personnel, offers a present opportunity to again think through the plan. When the revised plan is available in the fall of 1978, workshop-type meetings of the technical reviewers will be held to assure that all have an opportunity to discuss and understand the changes that have been made and the requirements for their implementation. Senior reviewers and supervisors will lead the meetings. In addition, NRR management is now providing supplementary guidance on a case-by-case basis concerning the documentation of deviations relative to the SRP as specified in Office Letter #10 and its supplements.

We believe the foregoing is an adequate implementation of this GAO recommendation.

Comment(3)

The recommendation to broaden guidance to reviewers so that specialists in one review area understand the context of their work in the overall safety review is a valuable one. Several branches now provide some in-house training directed towards reviewers gaining a broader perspective of the overall safety program. On specific cases, Project Managers meet with all reviewers to provide such insight for the particular cases under review. In addition, reviewers gain experience in this area by attendance at generic technical staff meetings, ACRS meetings, public hearings, and visits to nuclear facilities. To

further expand this effort, the matter of orientation vis-a-vis the overall safety program will be factored into the SRP workshop in the fall of 1978.

The relationship between the overall defense-indepth safety philosophy of nuclear reactor regulation and supplements to this philosophy being provided by contemporary risk assessment methods has been the subject of heightened discussion within the staff in past months. This recommendation suggests that NRR management may need to more formally structure these discussions, perhaps by some sort of formal seminar series for the staff using senior reviewers and supervisors as leaders. Consideration of this sort of training is now underway.

Recommendation

That the Chairman, NRC: require technical reviewers to clearly document all conclusions, analyses, and review steps taken during the licensing review.

Comment

We cannot agree with the absolute nature of this recommendation. Documentation of "all" steps and judgments would literally produce a mountain of paper for every reactor review. Tests of safety significance and need for followup in inspection or operation must be reasonably applied in the course of licensing review in deciding which information should be documented. Generally, the staff places such documentation burdens upon the license applicants, since they have primary responsibility for safety of the reactors and since the Safety Analysis Reports (not the staff Safety Evaluation Reports) are the primary documentary basis for the safety of a plant. The NRR staff management will review the degree to which staff reviewers uniformly document their conclusions and bases for decisions in the SERs. Our judgment at this time is that there is no great inconsistency among the review branches and that current documentation is already quite substantial; in fact, it may be approaching the point of being burdensome beyond benefit. The SRP implementation since its issuance in 1975 has done much to standardize and formalize the basis for staff review and conclusions.

Notwithstanding the above, the staff is continually in the process of improving the SERs. As specific needs to improve the discussions in the SERs are identified, such improvements will be made.

CHAPTER 5 -- DOES NRC ALLOW FREE AND OPEN DISCUSSION OF TECHNICAL ISSUES?

Recommendation

That the Chairman, NRC: periodically reemphasize their policy of allowing dissent of technical decisions without fear of reprisals.

Comment

We concur with the GAO recommendation. A comprehensive NRC policy regarding the handling of differing professional opinions and the encouragement of NRC employees to make known their differing professional views currently is under development. Part of this policy will address the means for periodically re-emphasizing the policy to NRC employees. The most recent expression of Commission interest in this matter was made during the testimony of the Chairman before the Committee on Interior and Insular Affairs at the February 6, 1978 Budget Authorization Hearing. An extract of that testimony follows:

"While many steps have been taken to improve the free flow of communications within the NRC, I am still not satisfied with progress as a whole and I don't want to leave the impression that everyone is entirely happy. I would like to have more time to visit with staff, to guage their feelings and morale and to hear their concerns directly and personally. If, as I suspect, staff morale is low in spots, then we will have to move faster in improving communications between all levels--to make the open door policy more a reality.

"It has been my observation that the various memos, policy statements, and letters establishing the open door policy on employee communications and related matters, as well as my own informal statements on the subject, are less than a satisfactory and complete definition of the sort of agency policy that there should be on this subject. With that in mind, we are moving to prepare a more comprehensive agency policy and agency-wide procedures which will be incorporated as a chapter of our NRC Manual. I intend to provide ample opportunity for outside input and public comment, as well as employee recommendations, on the draft chapter. Of course, we must bear in mind that this is an extremely difficult policy area to cover in a single written statement -- even a manual chapter -- and expect it to be applicable to all possible circumstances which may arise. But in moving ahead and establishing a general statement of policy, we are attempting to set

up a system for handling major professional, personal, and other kinds of differences.

"In short, Mr. Chairman, I hope we are moving into a posture such that the NRC will be in the vanguard of those agencies which are truly open, both externally and internally."

Recommendation

That the Chairman, NRC: establish NRC-wide procedures to appeal technical decisions and place any unresolved differences in the public record.

Comment

We concur with this recommendation. NRR Office Letter #11 established such a procedure which has proved to be effective for NRR. As the Chairman stated in his testimony before the House Committee on Interior and Insular Affairs at the February 6, 1978 Budget Authorization hearing, preparation of NRC procedures is currently underway.

CHAPTER 6 -- RECENT LEGISLATIVE PROPOSALS TO REDUCE LEADTIMES AND IMPROVE LICENSING EFFICIENCY

The Administration is in the process of considering new legislative proposals to streamline the nuclear power plant licensing process. In this connection, the initial four recommendations in this chapter, directed to the Congress, have all been addressed in the proposed legislation. The legislation does include specific provisions regarding treatment of new information following issuance of site permits. The bill also contains provisions regarding relaxation of mandatory ACRS reviews and NRC review of State environmental programs prior to transferring NEPA requirements to the States. The matter of insuring that States will not unduly delay licensing decisions is addressed in a section of the bill dealing with coordination of all Federal and State reviews. At the present time, there is some disagreement as to whether the States should hold formal hearings in exercising their delegated NEPA responsibilities. This last issue is still under consideration.

As a way of comment, the following compares the appropriate provisions of the January 4, 1978 draft of the proposed legislation with each of the four recommendations.

Recommendation

--NRC, as part of the early site review proposal, develop a method to update and certify the continued acceptability of the proposed powerplant site.

Comment

The Administration bill includes several provisions relating to the continued acceptability of an approved site. Section 193.d(2) (page 27) provides for the renewal of site permits for subsequent ten-year periods unless the Commission finds that significant new information relevant to the site has become available and that as a result thereof it is likely that the site will not comply with the Atomic Energy Act or the Commission's regulations. Sections 18 and 19 of the bill (pages 55-56) provide for the revocation and modification, respectively, of site permits on the same basis as for other NRC permits and licenses. Finally, section 189.a(2) in the bill (page 18) includes a general provision for reopening issues in a subsequent licensing hearing which could have been raised in a prior proceeding. Under this provision, any issue which could have been raised in an earlier proceeding, such as a site permit proceeding, could be raised in a subsequent proceeding, such as a construction permit proceeding referencing an approved site, upon a prima facie showing that significant new information relevant to the issue has been discovered since the prior proceeding and that as a result thereof it is likely that the site or facility design will not comply with the Atomic Energy Act or the Commission's regulations. Issues which could not have been raised in the prior proceeding may be raised in the subsequent proceeding without a prima facie showing.

Recommendation

--ACRS review all applications which do not include plant designs approved under a formal NRC standardization program.

Comment

This recommendation differs from the comparable provision in the Administration draft bill. Section 10 of the Administration bill (pages 34-35) includes a requirement for mandatory ACRS reviews for applications for standardized design approvals and construction permits and operating licenses for facilities other than thermal neutron power generation facilities. For all other applications, ACRS review would be discretionary unless a review of all or part of the application is requested by the Commission. In cases where a review is neither required nor specifically requested by the Commission, the ACRS, in its discretion, may review all or selected portions of the application.

Recommendation

--adequate public hearings are held by the States and the Department of Energy if they make NEPA related decisions.

Comment

Section 195 in the Administration draft bill (page 35) would permit a State with an NRC-approved program to assume part or all of NRC's NEPA responsibilities. Section 195.d sets forth the requirements for an approved program including the requirement (page 43) for provisions to assure open and early public participation, including provisions for formal or informal hearings, under such procedures as the State may deem appropriate. As drafted, this provision would not require that the States hold formal adjudicatory hearings on the environmental suitability and need for the plant determinations which would be accepted by NRC.

Recommendation

--NRC, before transferring NEPA requirements to the States, insure that the States' environmental programs are adequate and will not unduly delay licensing decisions.

Comment

As indicated under item 3 above, the Administration draft bill (section 195.d, page 41) includes a number of requirements which must be met by the State in order to obtain NRC approval of its program for making NEPA determinations. These include the requirement (page 43) for provisions to assure that coordinated and timely decisions are reached. In addition, section 196 in the bill (page 48) gives the Commission a statuatory role in coordinating and scheduling related State reviews.

The final two recommendations, directed to the NRC, along with our comments, are the following:

Recommendation

That the Chairman, NRC: better define what constitutes the need for substantial, additional protection and use that in the standardization program to determine the need for new requirements.

Comment

It has always been clear to the Commission that a standardization program would be effective only to the extent that disciplined management within both industry and the staff steadfastly adhered to the basic principle of its standardization program; that is, that changes should be limited to those essential to the continued acceptabililty of the design from a safety standpoint. The Commission's last general statement of policy on standardization issued on June 29, 1977 stated that:

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> "We firmly believe that standardization of the design of nuclear power plants continues to be in the interest of public health and safety, and of effective and efficient regulation, and we reaffirm our strong support for its continued and expanded use within the Commission's regulatory activities. However, the full benefits of standardization will only be realized if both government and industry management are firm in their commitment to limit changes to an approved standard design to those clearly needed for public health and safety reasons."

From public comments received in response to the Commission's statement of June 29, 1977, it is apparent that the importance of firmness in the management of the standardization program is widely understood.

The need for disciplined management, in our view, relates not only to supervisory levels but also, and perhaps more importantly, to individual designers within industry and to individual design reviewers within the staff. While the professional stature, career growth, and self satisfaction of an individual designer are generally enhanced by the use of accumulated knowledge and experience, and of ingenuity, to develop design modifications to significantly improve the performance of the product, the situation for a standardized product is altered. There the timing for implementation of such changes is vital. The thought processes of the designer, and of the designer's supervisors, must be biased in favor of delaying changes to the design unless the continued acceptability of the design, without the change, is in serious question. This is true for changes to improve safety as well as for changes to improve performance. Thus, it is equally applicable to the individual staff reviewer and the reviewer's supervisors as it is to their industry counterparts. Each individual involved in developing or reviewing a standard design must manage his or her thought prosesses with a disciplined constancy of purpose not to alter the design for improvements in performance or safety until the appropriate time specified for up-dating the entire design, or unless those alterations are essential to the public health and safety or to the viability of the design in the marketplace.

The staff has demonstrated its capability to implement the standardization program at the construction permit stage of review with an effective degree of disciplined management. Clear evidence of this is provided in our records of the reduced number of questions we asked for plants that referenced approved standard designs. These records provide strong supporting evidence that the staff has exhibited the requisite disciplined management needed to implement a standardization program at the construciton permit phase

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of the licensing process. It also provides some, but far from conclusive evidence that the staff will be able to perform in a like manner at the operating license phase of the process. Only

experience will provide conclusive evidence in this respect, and this experience will only begin to be obtained in late 1978 and thereafter.

While industry has been equally successful at the construction permit phase of the process, there is little documented evidence available to the staff that can be used to assess industry's success in achieving disciplined management of its standard designs during the development of final designs. However, one

reactor manufacturer has stated that no major changes have been made to its standard design for the purpose of improving plant performance capability, and that only a few significant design changes have come about during the conversion of the approved preliminary design into the final design. Hopefully, this is illustrative of industry performance. Actual experience at the operating license stage of review will provide clear evidence of industry's performance in this respect.

The need to limit changes to standard designs to those that provide either significant additional protection to public health and safety or significant improvement in plant performance is clear. What is not clear are the measures to be used to determine significance to safety or performance for individual changes and for an accumulated number of changes. In some instances a clear measure is available. As an example, the staff performed an assessment of major fires in a nuclear plant after the occurrence of a major fire in a unit of the Browns Ferry facility, and estimated that fires could contribute about one-fifth of the overall probability for core melt from all accidents. Clearly this was significant and accordingly steps were taken immediately to make changes to all plants and designs to improve the fire protection features. Unfortunately not all assessments are readily made nor do they provide results that are a definitive. It is conceivable that a probability measure can be established for assessing the significance of many safety changes and of many combinations of safety changes. If existing data permit acceptable and reliable probability assessments to be made, comparison with the selected probability measure can be used for determining safety significance. Where the data do not permit this then other methods must be used.

The question of what is significant, and what is not, is as old as the licensing program. It is unreasonable to expect rapid

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development of clearcut methods of determining sigfnificance for the standardization program. The difficulty of the tasks is apparent. However, we do propose to continue our efforts to

develop such methods, assigning as high a priority to the task as is commensurate with its importance relative to other responsibilities.

Recommendation

That the Chairman, NRC: study ways to eliminate duplication and improve review efficiency. These studies should include, in addition to the overall one-stage licensing proposal, the viability of a single licensing review where warranted for individual branches or systems and the updating of a single application as final design information becomes available.

Comment

The staff recently completed an assessment of the Commission's standardization program and recommended specific changes to enhance its utility and effectiveness. These changes are expected to promote the use of final designs for nuclear steam supply systems in combined applications for construction permit and final design approvals. This in effect will provide for the one-stage licensing review for the portion of the plant covered by the final design approval.

Unfortunately, it appears that, because of antitrust concerns and the inherent restraints of established business practices, architect-engineers will not be able to apply for approvals of final designs for the balance of plant that can be referenced in combined applications for construction permits and final design approvals. As a consequence, an alternative concept would need to be developed to enable the goal of one-stage licensing review to be achieved for the complete nuclear plant.

The staff now believes that a Standard Design Approval in lieu of a combined Preliminary Design Approval and a Final Design Approval, is a potential alternative procedure. The concept involves the submittal of information that is significantly more developed than that now provided for a preliminary design but somewhat less that that for a final design. It would of necessity be limited in many areas to complete functional specifications rather than to actual design drawings and specifications. It would also require a supplementary staff audit function during plant construction to verify that the actual components or features installed or constructed, adequately meet the approved functional specifications. The staff believes it can develop acceptable procedures

to permit implementation of the concept; however, it will require a significant amount of time to do so. The staff proposes to study the concept further and to define the new procedure and practices that would need to be developed.

I believe our comments have covered all the recommendations in the GAO report. I wish to express our appreciation for the opportunity to review this document and to submit the foregoing comments.

Sincerely,

for Lee V. Gossick
Executive Director for Operations

APPENDIX III

PRINCIPAL NRC OFFICIALS RESPONSIBLE FOR ADMINISTERING ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
CHAIRMAN:		
Joseph M. Hendrie	Aug. 1977	Present
Marcus A. Rowden	Apr. 1976	June 1977
William A. Anders	Jan. 1975	Apr. 1976
EXECUTIVE DIRECTOR FOR OPERATIONS:		
Lee V. Gossick	Jan. 1975	Present
DIRECTOR OF NUCLEAR REACTOR REGULATION:		
Edson G. Case (acting)	June 1977	Present
Ben C. Rusche	Apr. 1975	June 1977
Edson G. Case (acting)	Jan. 1975	Apr. 1975
DIRECTOR OF NUCLEAR REGULATORY RESEARCH:		
Saul Levine	Jan. 1977	Present
Saul Levine (acting)	June 1976	Jan. 1977
Herbert Kouts	Jan. 1975	June 1976

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