ELECTRIC POWER RESEARCH INSTITUTE

EPRI

January 16, 1980

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Dr. Roger Mattson
Director, Division of Systems Safety
Office of Nuclear Reactor Regulations

Gentlemen:

Enclosed herewith are our comments on "Draft Action Plans for Implementing Recommendations of the President's Commission and Other Studies of TMI-2 Accident," NUREG-0660, the version of December 10, 1979.

In formulating these comments, we have taken into account the discussions which E. L. Zebroski, R. J. Breen, Milton Levenson, and I had with you in San Francisco on January 7, and those which Mr. Breen, Mr. Levenson, and I had with you on January 10, in Washington, D.C. Those discussions focused on the TMI Action Plan Prerequisites for Resumption of Licensing (letter from Lee V. Gossick to the Commissioners, dated January 5, 1980).

You will note that our comments are divided into two groups: first, general comments; and second, comments on certain specific tasks delineated in NUREG-0660. Our written comments that relate to the Near-Term Operating License requirements are asterisked. These comments have not had the benefit of review by the utility industry, since the time for preparing them has been short. We believe that they would generally agree with our comments.

We appreciate your giving us the opportunity to review NUREG-0660 in its draft stage and hope that our comments will prove helpful. We will be available to discuss further with you any of the comments that we have submitted.

Very truly yours,

Floyd L. Culler
tu

Floyd L. Culler
President

FLC:RJB:vmw

8004180463
41pp. XA

(Approved by Mr. Culler, signed in his absence)

Headquarters: 3412 Hillview Avenue, Post Office Box 10412, Palo Alto, CA 94303 (415) 855-2000
Washington Office: 1800 Massachusetts Avenue, NW, Suite 700, Washington, DC 20036 (202) 872-9222

NSAC Comments on "DRAFT ACTION PLANS FOR IMPLEMENTING RECOMMENDATIONS OF THE PRESIDENT'S COMMISSION AND OTHER STUDIES OF TMI-2 ACCIDENT" NUREG-0660, version of Dec. 10, 1979.

INTRODUCTION

This report contains some comments on many of the individual tasks proposed in the above-referenced NRC report. In general the Nuclear Safety Analysis Center and the EPRI Nuclear Power Division believe that implementation of many of these plans will improve the regulatory system and the safety of nuclear power plants. For most part, however, our comments are confined to those tasks where the Nuclear Safety Analysis Center (NSAC) believes that significant modifications should be made to that task, and that the task would have a relatively direct effect on the technical aspects of nuclear power plant design, construction, operation, or management.

GENERAL COMMENTS

The NRC draft report, NUREG-0660 provides comprehensive, fairly detailed plans for implementing the recommendations of the Kemeny Commission NUREG-0578, NUREG-0585 and others. In some areas, it goes beyond any previous recommendations. NSAC recognizes that the report is still in draft form, and is appreciative of the opportunity to comment on it at this early stage. While we find much that we agree with in the report we believe it will be greatly enhanced if the following general comments are reflected in the final version.

First, the process of responding to the recommendations and studies since TMI-2 would be greatly enhanced if there were a clear statement of a "national nuclear safety policy with which to bind together the narrow and highly technical licensing requirements" (quotation from NUREG-0585, p.1-2), or at least a proposal to lay the groundwork for the development of such a policy. Without such a policy it will be almost impossible to produce a well integrated, prioritized, practical set of plans responsive to the many, highly varied, recommendations which have been made. The final adoption of such a policy is probably an appropriate responsibility for the President or the Congress. But NRC should, NSAC believes, assume a responsibility for developing the basic technical inputs to such a policy, and, in the absence of the assignment of the task to some broader entity, should enunciate the policy around which it intends to integrate both its responses to the recommendations arising from TMI-2 and the rest of its policies, programs and practices.

Second, the plans appear to continue, or even to expand, the policy of regulating by detailed, prescriptive requirements which direct what the licensee is to do, and, often, how he is to do it. The result is to "add to the quilt work of regulatory practice and do little to directly address the nation's heightened concern for the safety of nuclear power plants" (quotation from NUREG-0585, p. 1-2). It is recognized that when a specific problem is perceived by the regulator in a particular plant, it is usually easier to devise a specific remedy for that problem than to devise criteria which, if satisfied, will prevent the recurrence of that or similar problems in both that plant and others. This expedient disregards the facts that conditions may vary from plant to plant, and that a specific remedy for one perceived problem may itself create other problems. Moreover, under a system of detailed, prescriptive regulatory practices licensee management is often denied the opportunity to achieve safety in unique or innovative ways which are more efficient or in other ways better than those set down as industry-wide specific NRC regulatory requirements. This principle applies not only to engineering and technical aspects of safety, but particularly to matters of personnel selection, an area where the NRC plans clearly threaten the right of management even to designate a candidate for licensing as an operator, supervisor, or shift technical advisor.

To the extent possible, we recommend that the licensee requirements growing out of the NRC's planned responses to the various recommendations be stated as criteria (i.e. a quantification of general objectives), rather than prescriptive requirements. The licensee will thus be enabled to achieve the desired result in a way which is safe and practical in his plant, and which will permit him to continue to manage his work force. With the establishment of NSAC and INPO, the opportunity exists for the NRC to work with the utility industry in the development of these criteria.

Third, NSAC has serious questions about the utility, practicality, or even the safety of the apparently proposed deep involvement of the NRC Operations Center at NRC in minute-by-minute operations at each plant as implied by Task III.A.1. The quantity and type of information to be transmitted to this center suggests that NRC intends to go far beyond requiring reasonable assurance that each plant is in a safe condition; instead the requirement is apparently for intelligence which could be used to detect, from the NRC Operations Center, any violation of the Technical Specifications, and also to direct the operator how to run the plant. Clearly, any such directions, whether intentional or inadvertent, could have the effect of making the operator think that NRC had taken over the responsibility for operating the plant, with the possibility of serious safety and legal problems as a result.

Fourth, assignment of priorities to the various tasks in NUREG-0660 would be highly desirable. All seem to be regarded as equally important. Clearly, the volume of work proposed in NUREG-0660 for the industry is so large that it will severely tax the industry. NRC should take the lead in ranking the tasks, so that the most important ones get first attention. NSAC suggests that a general ranking to be made as follows, the first being most important.

1. Tasks aimed at prevention of accidents.
2. Tasks aimed at mitigating accidents, such as containment, emergency cooling, etc.
3. Tasks aimed at determining the necessity for and type of actions for protection of the population in the event that a radioactive release is considered imminent.
4. Tasks having other primary objectives.

Within each priority group it will be found that there is a range of feasibility and importance so that, for example, some category 1 Tasks may, for good reason, be assigned final priorities lower than some category 2 Tasks, etc.

Fifth, there is imbalance, as represented by extensive overlap among tasks, such that in some cases there are large numbers of tasks aimed at the same general objective in highly redundant fashion, while in other cases, too little effort is proposed.

Redundancy occurs in almost every area for which tasks are proposed--imbalance occurs in some. For example, the plan includes separate requirements for

- o Greatly intensified and broadened operator training.
- o Much increased operator educational requirements.
- o Personal involvement of top utility management in approval of the selection of each individual shift supervisor, and NRC approval of the selection criteria.
- o Detailed NRC approval of operator training curricula and individual operator competence both at the time of the initial licensing of the operator and at intervals during his subsequent employment as a licensed operator.
- o Modification of control rooms for better consistency with the principles of human engineering.
- o Increased numbers of operators in the control room.
- o Presence on each shift of a technical advisor.

- Provision of an administrative aide to each shift supervisor.
- Establishment of an on-site safety engineering group.
- Provision of a "safety panel", displaying the status of the essential safety parameters of the plant to the operator.
- A communications link to off-site experts (reactor vendors).
- A massive data link to NRC headquarters.

All twelve of these requirements have the main objective of preventing the operator's making a significant error in operating the plant, under either normal or abnormal conditions.

On the other hand, as noted above, no resources at all are allocated to the development of a national safety objective. This is an area of too little emphasis.

It is concluded that the plans should be reviewed for unnecessary redundancy and to achieve better balance among objectives.

Sixth, it is NSAC's belief that the licensee costs estimated by NRC are much too low.

Finally, NSAC urges that NRC continue, as in the present case, to solicit industry advice on its program.

The new institutes like INPO and NSAC may make possible the establishment of new patterns of interaction between NRC and the utility industry. We suggest that the NRC consider this possibility.

DETAILED COMMENTS

I.A.1. OPERATOR PERSONNEL AND STAFFING

Increase the capability of the shift crews in the control room to operate the facility in a safe and competent manner by assuring that a proper number of individuals with the proper qualifications and fitness are on shift at all times.

- o Hire 5 shift technical advisors by January 1, 1980, and have them fully trained by January 1, 1981.

* Comment

Despite the doubts expressed in some quarters as to the long run workability of the shift technical advisor concept, it is probably the quickest way of building control room competence to diagnose unusual situations. The concept has the benefit of precedent in various military, industry and government operations; in those operations it has been learned that strong management support is essential to success of the concept. It is assumed that the shift technical advisor would function effectively as part of the on-site safety engineering group called for in Task I.B.3.

- o Relieve shift supervisors of non-safety administrative duties, by providing administrative assistance.

* Comment

A good move so long as shift supervisor retains full authority.

- o Recruit and train additional personnel for shift operations, develop overtime procedures to limit length of time an operator may work without time off and develop procedures to assure that adequate numbers of key individuals are in the control room at all times

* Asterisk designates a task or tasks which are part of NRC's proposed near-term operating license requirements.

* Comment

If the requirement becomes one of having two reactor operators and one senior reactor operator in the control room at all times, it will be necessary to have at least four licensed operators in the plant at all times in order to cover both the control room and the ex-control room duties. Since most plants already have three licensed operators present this would mean adding five reactor operators (one per shift). The particular events of TMI-2 do not appear to justify such an increase. The NRC's justification must therefore be on the basis of generally enhancing resources to deal with unprecedented situations. There is no specific evidence that the increase in safety would be anything but marginal. Certainly this would produce a smaller increase in safety than other NRC recommendations, such as improvement in individual operator capability. This should, therefore, not be a first priority item.

The same conclusion applies to the proposal to limit overtime, in addition to which both this and the proposal to limit movement of individuals in the plant are needlessly prescriptive. The requirement should accommodate more clearly the not unusual situation of having two reactors operated from one control room

I.A.2. TRAINING AND QUALIFICATIONS OFOPERATING PERSONNEL

Increase education, experience, and training requirements for operators, senior operators, supervisors, and other operations personnel, both short-term and long-term. Require that training programs include in-plant emergency drills by shift personnel. Establish accreditation program for training institutions (coordinate with INPO).

Comment

Although very prescriptive, the requirements implied by this task should substantially improve operator and other employee capability to respond correctly to emergencies. The coordination with INPO is desirable; mutually agreed upon programs and responsibilities will improve reactor operation and safety.

I.A.3. LICENSING AND REQUALIFICATION OF OPERATING PERSONNEL

Increase the requirements for initial issuance of licenses and for license renewals and provide closer NRC monitoring of licensed activities. Audit licensee personnel selection processes. Mandate use of simulators in requalification programs. Require that NRC give requalification (as well as initial qualification) examinations. Permit release of examination scores to licensees. Require reporting of and NRC action on operator errors. Examine applicants for operator and operations supervisor licenses for physical and psychological fitness. Prohibit licensing of persons with histories of drug or alcohol abuse or criminal background. Consider the licensing of managers, engineers, auxiliary operators, maintenance personnel, technicians, and shift technical advisors. Coordinate with INPO.

Comment

The stated scope of this task represents a gross over-reaction to TMI-2 and false implications of widespread incompetence in the manner in which the industry selects, trains, and manages nuclear power plant employees. Some elements of the task do represent desirable safety improvements. In this class are improved technical training of operators and supervisors, stiffer examination standards for them and more extensive use of simul tors in training and examinations. On the other hand, NRC's intrusion into the processes by which candidates are selected and NRC's prescription of the personal involvement of upper management in candidate selection would make NRC the effective employer and manager. There is no indication that such action by NRC is needed or would be effective. Similarily, NRC's consideration of licensing managers, engineers, auxiliary operators, maintenance personnel, and technicians seems to be a gratuitous and too drastic measure when what is needed is probably a spot strengthening of competence, tailored to individual plant conditions, rather than a rigid set of industry rules specifying exactly how the nuclear utilities are to operate.

The proposals regarding psychological fitness examination and history of law violation may pose important legal problems.

We think that this task needs careful re-thinking.

I.A.4. SIMULATOR USE AND DEVELOPMENT

Licensees to correct NRC-identified weaknesses in their simulators, mainly to expand range of off-normal conditions which can be simulated. NRC to undertake research on simulators, up grade simulator standards. NRC to acquire one or more simulators to be located in NRC headquarters area for training NRC staff.

Comment

We agree that simulators are valuable training tools. We also believe that the experience of the military, aircraft industry and space programs should be utilized. We would be pleased to discuss programs that could be supportive in this area. NSAC is concerned that NRC is apparently proposing to simulate more than 70 plants with one or a few simulators and to train their people on them. We suggest that NRC inspectors and emergency action personnel should train on the same simulators as are used for operator training if training of that depth is required. No two plants are truly identical.

I.B.1. MANAGEMENT FOR OPERATIONS

NRC to establish requirements for on-site and off-site support personnel, both management and technical. (Teknekron, Inc. already retained for this work.) Will consider staff competence, staff size, type of staff expertise, pooling of staff resources among utilities, training of managers and technical personnel, control room staffing, quality assurance program and staffing, financial capability, manager and technical personnel requalification, operating procedures, on-site technical support center, on-site operational support center, emergency resources, management consideration of unresolved safety issues. To coordinate with INPO. Will require licensee to restructure organization, add and train staff.

* Comment

These are all valid subjects for consideration, but the implication clearly is that, here again, a detailed, prescriptive set of requirements will result which may usurp the utility management's responsibility. Also, some subjects listed in this task are covered in other tasks as well. Objectives and criteria should be set by NRC, with the understanding that the licensee's action to meet them will be subject to review by the NRC, against those objectives and criteria. INPO will be establishing standards which can be coordinated with NRC objectives in this area.

I.B.2. SYSTEMATIC ASSESSMENT OF LICENSEE SAFETY

An NRC board in each region will evaluate each licensee's performance semi-annually, assessing operating experience, technical and managerial competence, compliance with rules and regulations, and adequacy of licensee programs in safety-related disciplines. The programmatic assessment will be made public.

Comment

Most of the assessments called for involve subjective, not objective, judgements on the part of NRC. Publicizing such judgements, particularly those relating to specific individuals, can only lead to personal disputes in public. Legal complications may well follow for both licensee and NRC personnel. INPO, too, will be making similar assessments regularly. Obviously, coordination is possible.

I.B.3. ON-SITE SAFETY ENGINEERING

Licensee would have to establish an independent, on-site safety review group. Apparently this would be in addition to the already existing Plant Operation Review Committee at each plant. New rule may be promulgated for much more drastic action than is now required when a "total loss of safety function" occurs, such as shut-down until NRC approval to resume operation is received. Requires placing at least two resident NRC inspectors at each site (more if more than two units at site). NRC to expand resident inspector program to include construction phase. NRC to expand inspection program to include direct observation and independent verification of licensee inspections, follow-up on completed maintenance and valve line ups, inspection of terminal boards, etc. NRC possibly also to place resident inspectors at reactor vendors and architect engineers.

* Comment

Addition of independent and dedicated engineering competence to the existing plant-level safety committees would be more desirable than establishing what would be in effect a competing engineering safety committee. The greatly intensified NRC inspection activity proposed is reminiscent of military procurement practices, and could tend to make the licensee strive only to satisfy the local inspector, not to achieve high quality in all respects. The present regulatory program has this tendency in some areas.

I.C. OPERATING PROCEDURES

This task is aimed at extensive improvement of operating procedures (particularly for emergencies), plus upgrading licensee radiation protection, radwaste management and chemistry procedures. It calls for licensees to perform extensive analyses, develop new procedures and submit them for NRC review. Also called for is that licensees design and install additional "adequate core cooling" instruments by January 1, 1981. NRC will observe a walk-through for one of the selected new procedures. Event tree sequences will be studied. ACRS will be involved. (The plan for this task occupies 22 pages in the planning document.)

* Comment

This will be an expensive task for the industry, but responds directly to a number of concerns which have been identified industry-wide. However, it is important that the resulting procedures be so written as to instruct the operator to take appropriate actions without necessarily requiring that he first deduce what it is about the system which has gone wrong.

I.D. CONTROL ROOM DESIGN

NRC will develop human engineering guidelines, will review selected plants, will require licensees to provide a "safety monitor console" in each plant, to provide automatic monitoring of operations, test and maintenance activities, to do research on plant status monitoring, on on-line reactor surveillance systems, on improved instrumentation and on disturbance analysis systems. Licensees will also have to commit to meet a control room design standard when such standard is established.

Comment

The "safety monitoring console" is likely to be an effective measure for indicating the safety status of the plant. The other elements of the task need better definition before their value can be assessed.

I.E. ANALYSIS AND DISSEMINATION OF OPERATING EXPERIENCE

Calls for an integrated program which will have at each site the capability to evaluate operating experience of the plant and of plants of similar design. The already planned other activities of the licensees, NSSS vendors, NSAC, INPO, and NRC in this area are included in this task.

* Comment

In general this is a desirable activity, but we question whether a requirement to have evaluation competence at each site should be a universally applied requirement. For a particular utility there may be advantages to centralizing it with other engineering activities at some other location. The NRC should review the basis for the decision.

I.F. QUALITY ASSURANCE

Calls for stronger licensee QA program with more active QA participation in design, construction, installation, testing and operation (as opposed to being exclusively a post-event paperwork organization). Will require QA classification of all plant equipment.

Comment

Effectively performed, licensee QA could eliminate the need (apparent or real) for much of the inspection and testing being done or proposed by NRC.

I.G. TRAINING DURING PRE-OPERATIONAL AND LOW-POWER TESTING

Conduct emergency training during pre-operational and low-power testing.

* Comment

Would appear to be feasible and desirable.

II. SITING AND DESIGN

II.A. SITING

NRC to establish numerical siting criteria.

Comment

No comment at present. Need to know more about the criteria as they develop. Indications from sources other than NUREG-0660 suggest some tendency of NRC to over-react with respect to mandated evacuation radii. We think that a logical and systematic set of criteria can be developed for siting, but it will require re-examination of assumptions as well as procedures.

II.B. CONSIDERATION OF DEGRADED OR MELTED CORES IN SAFETY REVIEW.

NRC to require high point primary system venting, shielding to provide access to vital areas post-accident, modifications to permit post-accident sampling, training for core damage mitigation, conceptual design of filtered vented containment. Also, NRC to perform research on core melt and fission product transport, research on severely damaged fuel and to develop method to predict containment response to hydrogen explosions.

* Comment

In this case, as elsewhere, prescriptive instructions of how to accomplish an objective are used. We suggest again that the general objectives be defined; e.g., primary system venting instead of safe handling of fixed gases, and design of filtered, vented containment instead of safe control of gases and fission products which may escape from the primary system.

Training for core damage limitation might emphasize early accident control and mitigation. Current NSAC defense-in-depth studies will provide additional insights to the types of actions for which training should be given.

The work on molten fuel behavior may be redundant in view of existing or completed programs on both LWRs and LMBRs. This subject requires additional study, and we urge that related specifications for containment be adopted only after further review.

Studies of radiolytic hydrogen formation seem unnecessary in view of existing knowledge. This task appears to call in two different places for much the same work on radiological source terms and fission product release.

II.C.1. SYSTEMS ENGINEERING, RELIABILITY ENGINEERING, AND RISK ASSESSMENT

NRC to carry out "Integrated Reliability Evaluation Program" (IREP). Event tree and probabilistic studies will be done on all plants. Will include single active and passive and multiple active failures, unavailability due to testing and maintenance, certain classes of operator errors, a wide range of transients and LOCA's. Will develop system reliability models.

* Comment

This section needs more definition and development. Neither this subprogram nor II.C.2. nor any other part of the report articulates an overall safety goal. Such a goal should be defined if wide spread use of probabilistic assessments is to be made. If the goal cannot be provided now, significant NRC resources should be devoted to at least the development of basic inputs to the work of defining the goal.

The term "particularly high risk" might be better if quantified.

The establishment of a library of accident sequence and reliability models is good. NRC should interact with industry to insure consistency industry-wide.

The described IREP appears to be a move in the direction of quantifying risk of individual reactor plants. We agree with the desirability of proceeding in this direction. What is not clear at this point is how detailed and how extensive a reliability evaluation program should be before it is a sound basis or reliable contributor to decisions on risk. Experience in the industry strongly supports the notion that developing the fault and event trees for these plants will contribute substantially to the understanding of and insight into the safe operation of those plants. At the same time it must be recognized that many of the inputs to an IREP will be judgemental, and therefore may have significant uncertainties. The possiblity that some relevant inputs may not have been recognized creates additional uncertainties. These uncertainties will be reflected in the results of the IREP, for example in the identification of particular sources of risk. For this reason the results of an IREP must not be accepted uncritically; they must be examined in the light of broad experience. Such examination could lead to the conclusion that the actual risk due to a particular risk contributor is either substantially more or substantially less than inferred from the IREP. Design, operating and regulatory decisions could be affected accordingly.

In developing the IREP methodology we should not ignore the possibility of erroneous operator action during events. It was just such erroneous action which, in the case of TMI-2, led directly to core damage.

While the IREP study may identify problem areas and suggest possible solutions, the actual selection of the methods used to reduce risk is a design function and should not be part of the IREP team charter.

System Interactions is not a subject separate from comprehensive probabilistic analysis. System interactions should be dealt with as potential event sequences. The same type of comment applies to the consideration of seismic effects.

The idea of trading increased demonstrated reliability for meaningless pedigree is good, provided the requirement for the unnecessary pedigree is actually done away with.

The schedule called for in the licensee's mini-IREP program is too short.

II.C.2. RECLASSIFICATION OF NON-CATEGORY I STRUCTURES

Contemplates the possibility of extending a category 1 requirement to all nuclear power plant structures.

Comment

This task appears to be in unnecessary duplication of the existing NRC Seismic Safety Margin Review Program. If IREP is done properly, seismic effects will be factored in.

II.D. REACTOR COOLANT SYSTEM RELIEF AND SAFETY VALVE TESTING

Requires demonstration, by testing, that RCS relief and safety valves, as well as associated piping, are qualified for the full range of accident conditions.

* Comment

One feature of this task is the requirement to provide that the PORV blocking valve will close automatically on low RCS pressure. A manual over-ride must be provided so that the operator can depressurize the plant if necessary; e.g., in the event of steam generator tube rupture. We note that there are still questions to be resolved in this testing program and suggest that detailed requirements beyond Phase I as defined by the industry program submitted in December 1979 be delayed until these are resolved.

II.E.1. AUXILIARY FEEDWATER SYSTEM

Licensees will be required to evaluate, by event tree and fault tree techniques, their auxiliary feed water systems.

* Comment

This task appears to be a small piece of the more comprehensive IREP study called for elsewhere.

II.E.4. CONTAINMENT DESIGN

Requires redundant, dedicated penetrations for external hydrogen recombiners. Requires containment water level instrumentation. Requires licensees to evaluate containment isolation signal system, including high radiation signal. Contemplates gross containment integrity test after each cold shut-down. Requires re-assessment of purging and venting.

* Comment

NSAC generally agrees with the NRC's objectives in this task, but we suggest that specific solutions require study before mandates for their use are incorporated.

II.F. INSTRUMENTS AND CONTROLS

Requires additional containment pressure, containment sump water level, containment hydrogen concentration, and containment radiation intensity instrumentation. Requires primary coolant saturation meter and instrument to measure vessel water level, plus "any additional equipment which could be used to indicate inadequate core cooling".

* Comment

Installation of instruments to measure containment pressure, containment sump water level, containment H_2 concentration, and containment radiation (high range) is desirable, some development and testing may be required to get workable, reliable systems. This appears to be true for the reactor vessel water level instrumentation for example (Item C.2.A), thus making it impossible to meet the NRC-specified schedule for installation. The requirement to install additional equipment to indicate the adequacy of core cooling could mandate core thermocouples in all operating plants. This would require backfitting for some plants a difficult if not impossible task. New requirements detailed in revised Reg. Guide 1.97, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Envisions Conditions During and Following an Accident" (ref. Item B.3.A.) will impose significant changes in plant instrumentation systems and will require study and analyses. The impact or magnitude of these changes will depend on the case-by-case decisions made by the NRC staff on operating plants, as specified by the Regulatory Guide. Major technical problems may be the results of NRC modification of the radiation source term used to qualify post-accident monitoring equipment. There is some indication that source term requirements will be substantially upgraded.

From an overall perspective we suggest that most of these requirements (Instrumentation and Control) have a hierarchy of importance when safety is considered. Some should be subordinated to other safety improvements both in priority and schedule. Those systems which monitor unimportant information should be scheduled after others.

* II.G. ELECTRICAL POWER

Requires improvement of power supplies for pressurizer relief valves, block valves and level indicators.

Comment

As in many other tasks, the NRC-specified schedule is unrealistically short.

II.J.2. CONSTRUCTION INSPECTION PROGRAM

Calls for more direct observation and independent verification by NRC that as-built conditions meet design requirements.

Comment

The proposal that NRC do more hands-on testing requires further study. An alternative would be NRC's contracting with an organization which does this kind of work as a business.

III.A.1. IMPROVE NRC CAPABILITIES TO RESPOND TO EMERGENCIES

Calls for NRC to define its own emergency role more clearly. Calls for NRC capability to access data from operating nuclear plants and to analyze and display the information. Calls for NRC-Operations Center to have capability to make radioactivity dispersion and dose predictions, and to have communications to facilities and off-site authorities in each area. Calls for NRC to conduct drills and exercises. Calls for NRC to be able to issue orders governing plant operations under emergency conditions.

* Comment

The implications and actual requirements of this task cause real concern on our part. We are overwhelmed by the desire or interest of NRC to have the capability to access data from operating nuclear power plants, particularly when coupled with understandings received through other channels regarding the type, extent, and real-time nature of the data to be transmitted to the NRC Operations Center. Our concept of what NRC may be asking for is, so far, a monstrously big task.

We recall that the Kemeny Commission Recommendations p. 63 Section 5, state that "Responsibility and accountability for safe power plant operation, including the management of a plant during an accident should be placed on the licensee in all circumstances. It is therefore necessary to assure that licensees are competent to discharge this responsibility." But we note, in the December 10, 1979 draft of NUREG-0660, the objectives of Task III.A.1. are "to enable the NRC, in the event of a nuclear accident at a licensed reactor facility, (1) to monitor...(2) to advise...and in an extreme case (3) to be able to issue orders governing such operations."

It appears that the NRC may not intend to follow the very important recommendation of the Kemeny Commission to leave responsibility with the licensee during an accident. We suggest that the NRC may not recognize that if it (even in an extreme case) issues orders governing operations during an accident that it may be assuming full responsibility for plant operation, and the consequences thereof.

NSAC has serious questions about the utility, practicality and especially the safety of the possible deep involvement of the NRC Operations Center at NRC headquarters in minute-by-minute operations at each plant as implied by Task III.A.1. We understand that NRC may be considering the real-time transmission of dozens of plant parameters to NRC headquarters, as well as the after-the-fact ability to transmit several hundred other plant parameters. While the stated intention to keep NRC informed is of course legitimate there is a real question of deciding on a prudent balance. There is the chance that an NRC question or comment might be construed as a regulatory instruction, with resulting confusion as to whether the plant owner is still responsible for its safe operation. If the NRC indirectly influences the operation of a reactor has it taken over that responsibility in not only a technical but also a legal sense? Two-way communication between NRC headquarters and each control room already exists. On-site technical advisors are or will soon be a reality. On-site safety engineering groups are called for by another section of the plans (Task I.B.1.). There is a real risk that the operator will receive conflicting advice from these various groups, as well as a flood of requests for information, at a time when he, not NRC or his other "advisors", should be controlling the situation. We suggest that this whole area needs more and better integrated thought and industry consultation than it appears to have received.

III.A.2. IMPROVE LICENSEE FACILITIES FOR RESPONDING TO EMERGENCIES

Calls for on-site technical support center, on-site operational support center, near-site emergency operations center, health physics center, data link to NRC's emergency operations center and evidence of ample technical; and management support (including arrangements with reactor suppliers and A/E firms) for emergencies.

* Comment

These plans need coordination with those of the AIF subcommittee on emergency preparedness. See comments above with respect to the nuclear data link.

III.A.3. UPGRADE EMERGENCY PLANNING AND PREPAREDNESS

Requires off-site support center for key federal, state, and local personnel with assured communications to the plant and off-site support personnel, plus adjacent facilities for news media. Also requires improved off-site radiological monitoring capability.

* Comment

This task would create additional "centers", adding to the complex of emergency centers and facilities. Critical examination of the nature and need for these separate centers is needed. Again, coordination is required. The functions at INPO and the thinking of several industry committees are being focused in this area.

III.B.1. TRAINING OF STATE AND LOCAL GOVERNMENT PERSONNEL

Will require licensee to become heavily involved in such training.

Comment

The estimate that the licensee resources required will be one person may be too low.

III.C. PUBLIC INFORMATION

Calls for a "National Nuclear Safety Information Week" and various other informational activities.

Comment

Is "National Nuclear Safety Information Week" a good idea? It is not similar to "Fire Prevention Week" in that individual citizens cannot contribute to nuclear safety unless they are technically qualified and engaged in a nuclear activity. "National Nuclear Safety Week" could easily be turned into another vehicle for anti-nuclear propaganda and in all probability would degrade rather than enhance overall reactor safety.

The presidential news release of December 7, 1979 directs the new Radiation Policy Council (not NRC) to work with media representatives on a program for improving media coverage of radiological emergencies. It also directs FEMA to develop procedures for dissemination of information during an emergency.

III.D.1. HEALTH PHYSICS PROGRAM IMPROVEMENTS

Calls for intensified health physics activities, in-depth reviews, new standards on radiation measurement and monitoring data collection.

Comment

It is proposed in this task that the licensees expand their collection of worker radiation exposure data to cover medical radiation exposure, health data and exposure to non-radioactive carcinogens (such as those found in tobacco smoke). No mention is made of what agency will analyze and interpret these data.

While the collection of these diverse data from diverse sources might have its potentially beneficial aspects, this task appears to have been expanded substantially beyond the proper scope of the NRC. Additionally, "non-radioactive carcinogens" are so wide-spread, according to current government releases, that the collection of personal data on exposure to them would be a hopelessly complex and massive task, even if were appropriate for the NRC. We suggest that such data on carcinogens would be impossible to analyze, even if they existed.

III.D.2. POST ACCIDENT RADIATION EXPOSURE

Would require extensive review of all plant areas of potential post-accident radiation exposure, and modifications to provide coolant and containment atmosphere sampling ability post-accident, and access to vital areas post-accident.

Comment

This is an extraordinarily complex task with major uncertainties in such fundamental areas as radioactive source terms, types of core damage to be considered, types and numbers of post-accident equipment failures to be considered, and length of time post-accident after which it may be assumed that human intervention and improvisation can be assumed to become effective. In consequence, it is unlikely that the NRC schedule for licensees to accomplish plant modifications is at all realistic. This task requires careful thought and more definition.

III.E.1. CONTROLLING RADIOACTIVE MATERIAL DISCHARGES

Proposes upgrading iodine absorbers and tightening vent gas and leak detection systems requirements. Calls for new research on iodine species behavior in the food chain, as well as work on tritium and C^{14}. Calls for review of all sites in regard to liquid pathway interdiction requirements.

Comment

We suggest that there may be adequate information on the behavior of I, H^3 and C^{14} in the food chain, and that only limited research is required.

III.E.2. OFF-SITE DOSE ESTIMATES

Calls for upgrading radiological environmental monitoring, establishment of 50 TLD's around each site. The primary resources will be supplied by the licensee.

Comment

This task, while providing the means of getting desirable information is not important to either preventing or limiting the effect of a nuclear accident. This task hence should take lower priority than tasks for either of those objectives.

IV. NRC ORGANIZATION, MANAGEMENT, PRACTICES, AND PROCEDURES

We have no comments on the individual items in this section of the NRC plans. NSAC has already commented on The Kemeny Commission's review of the NRC, in the letter dated November 8, 1979 from Floyd L. Culler, Jr. to Dr. Frank Press. A copy of this letter is appended to this report. Additionally, we note examples of the following tendencies on the part of NRC in NUREG-0660:

- o There is little indication of an intention to consult the utility industry for suggestions particularly in such areas as human factors, ways of increasing inspection effectiveness, advisory committees, achieving timely and effective safety assessments intervenor funding, or safety policy.

- o Enforcement plans tend to be punitive rather than constructively corrective in some areas.

We suggest that these tendencies might be counter-productive with respect to safety, since they emphasize only the legal relationship between the NRC and its licensees. Regulatory rules and practices in whose development the licensees have participated may be better, and are likely to be better understood and more willingly accepted than those developed without significant licensee participation. Moreover, participation by the licensee often results in ways of achieving whatever level of safety is desired which are superior from the point of view of achieving that objective.

Imposing penalties may be effective in achieving rigorous observance of the letter of regulations, but many indirectly interfere with safe operation of the plant. The licensee must presume the regulations to be correct and of adequate scope. He will be disinclined to question them since any change might add another avenue by which penalties could be assessed.

NUCLEAR
SAFETY
ANALYSIS
CENTER

operated for
the electric
utility industry
by the
Electric Power
Research
Institute

November 8, 1979

Dr. Frank Press, Director
Office of Science and Technology Policy
Old Executive Office Building, Room 360
Washington, D.C. 20500

Dear Dr. Press:

This is in response to your request for the Nuclear Safety Analysis Center (NSAC) to provide a response to the recommendations of the Kemeny Commission on nuclear safety, and to comment on the advisability of a moratorium or other delay in the licensing of nuclear power reactors at the construction permit stage or at the operating stage. You asked, for our opinion about possible shutdowns for major reviews of individual reactors for which there are either "short-term--lessons learned" or generic safety issues to be resolved.

In the three days available, NSAC staff and senior EPRI staff members have prepared these comments. Since there has been no opportunity to secure broad industry reactions to our commentary, the comments do not represent a formal industry position. The governing board of NSAC has had no opportunity to consider them.

We do have information and opinions of the study groups from within the electric utility industry over the last seven and one-half months, as evidenced by the establishment of the Nuclear Safety Analysis Center (NSAC), the organization of the Institute for Nuclear Power Operations (INPO), the preparation of the "Nuclear Power Plant Emergency Response Plan," and the progress toward establishing an insurance pool. An emergency public information procedure for nuclear plants has been prepared in the interest of improving public information and safety. It is clear from these activities that the industry is responding to lessons derived from the Three Mile Island accident. Its response has been immediate and substantial.

The NSAC conclusions from analysis of TMI-2 agree substantially with those of the Kemeny Commission on the causes and the detailed sequence of events in the accident. The nuclear utility industry and NSAC concur with most of the recommendations of the Commission, and already have underway through INPO and NSAC implementation of many of the major suggestions for training, quality surveillance, response capability for emergencies, and continuing technical analysis to improve the overall safety of the nuclear reactors and their operations.

3412 Hillview Avenue
Post Office Box 10412
Palo Alto CA 94303
(415) 855-2000

The most important policy questions debated within the Kemeny Commission were those of whether currently operating reactors should be shut down while the recommended improvements are made, and whether there should be a licensing moratorium or extended delays equivalent to a moratorium.

In answer to the question of whether operating reactors should be shut down while improvements suggested in the Kemeny Report are implemented, we think that the probability of an accident which will create a significant risk to human health, is very low. The risk is not great enough to justify the social and economic costs of prolonged shutdowns. The effects of such curtailment would be extremely serious in many regions of the country where nuclear provides more than 20% of the electricity. We believe that operating reactors should incorporate at a steady pace those improvements in equipment, operating procedures and training which will demonstrably increase the safety of the system.

Should there be a moratorium on licensing at the operating license stage? Seven reactors are now awaiting operating permits. We think that licensing at the operating permit stage should proceed as schedules are determined for safety related improvements. We suggest that a group of NRC reviews and technical staff be assigned to follow these plants through the licensing stage and for the first year of operation. This will assure that there is no gap between review-approvals and compliance-inspection. During the next year or so, with increased management and attention to safety issues adequate safety for the period of initial operations can be assured.

Should there be delays or a moratorium in construction permits for reactors now scheduled? This is a more difficult question, because there appears to be time to incorporate improved approaches in operations to assure reactor safety. We do not think that a moratorium on construction permits is required or desirable to achieve this goal. The utilities and their suppliers can accelerate actions on revised equipment and procedures, to reach increased levels of safety with the cooperation of the licensing body. This increased attention to changes, now already occurring, should significantly improve the safety qualifications of the plant. By the time permits are granted, the program of INPO will be effective in improving operating safety.

We believe there are basically sound technical reasons for our recommendation to proceed with licensing.

1. The reactor containment system did indeed function, along with the safety auxiliary systems, to protect the public. "... we conclude that in spite of serious damage to the plant most of the radiation was contained, and the actual release will have a negligible effect on the physical health of individuals." (Kemeny Commission Report) The primary objective of nuclear safety, protection of the public, was achieved. We suggest that reactors which are now under licensing review are safer because major improvements in equipment, training and general awareness have already been made.

2. The defense-in-depth or multiple barrier approach worked; in spite of operator mistakes, the equipment worked better, on the whole, than studies had predicted for an accident which involved a severely damaged core and a

degraded cooling system. The likelihood of another such accident--still not damaging to the public--has already been reduced by the actions already taken. Additional reductions in the probability of serious accidents will continue to be made as new lessons from TMI are implemented.

3. Our "What If" study concluded that there was little probability that this accident could have proceeded in such a way as to release significantly more radioactive materials, enough to become a real risk to human health. The possibility of a meltthrough, in our opinion, was small.

4. Nothing in our analysis of the TMI accident would indicate that the basic estimates of risk to human health due to major reactor accidents should be raised. On the other hand, some hazards to the public of a moratorium may be significant:

   (1) Still greater dependence on imported oil (nuclear capacity operating and under construction is worth about 3 million barrels of oil per day).

   (2) Greater degree of vulnerability of the economy to sudden interruptions in energy supply with resulting dislocations.

5. The accident has developed the awareness of the nuclear utilities to the full measure of their public responsibility for the safety of reactors under their operation. Their potential financial liability from loss of power and recovery costs resulting from an accident is a powerful practical motivation for improving the quality of nuclear operations. This, coupled with their responsibility for public safety, will continue to reduce the chance of another large accident.

As our studies continue and as we have opportunity to review the Staff Topical Reports, we will develop additional views which will, of course, be available to you at your request.

We now turn to specific comments on the Commission's recommendations.

COMMENTS ON COMMISSION RECOMMENDATIONS

A. The Nuclear Regulatory Commission

Recommendation A.1: The NRC should be restructured as a new independent agency in the Executive Branch.

Comment: The nuclear utility industry recognizes that the licensing and regulatory structure as it presently exists, is not optimum. Therefore, most agree that changes are desirable. What is required is an organization with clear lines of responsibility and authority leading to a responsible decision maker.

In NSAC, we have no technical basis for preferring an agency in the administrative branch with a single administrator over a reconstituted commission. Pragmatically,-the single administrator agency concentrates decision power in one man, but does focus accountability and responsibility for weighing all issues. Commission accountability is generally diffuse and diminishes personal accountability.

Regardless of the basic organizational structure, it is very desirable to establish a strong technical administrative authority within the regulatory body. It should be noted that what is in question is the structure and management of NRC, not the technical competence of the staff.

We recommend that general criteria be set up to guide the realigning of functions and possible restructuring. These criteria should include the following:

(1) The sole purpose of the regulatory body should be to achieve, maintain, and improve nuclear safety. The following functions are important:

   (a) Policy formulation leading to standards, criteria, and codes;

   (b) Licensing--including systems evaluation;

   (c) Inspection and enforcement;

   (d) Evaluation of risk--preferably by probabilistic risk techniques as developed for WASH-1400;

   (e) Research in broad areas.

(2) National policy formulation should be reserved for the Congress and the President. The regulatory agency should not have the power to decide whether nuclear energy is to be used in the United States. In our opinion it should not be vested with authority to decide export policy for nuclear plants and material.

(3) Nuclear safety should, insofar as possible, be removed from politics; so, too, should the regulatory agency.

(4) The responsible executives in the regulatory body should have demonstrated high scientific and/or engineering management qualifications. Basic safety judgments, particularly in crisis, are best made by people who understand the technology and science.

(5) The organization should support the research necessary to clarify technical issues in nuclear power facilities and, along with other agencies, to expand the basic safety research.

(6) The regulatory program for training, testing, operational and equipment reviews, and emergency response systems should take into account the work of the utility industry's Institute for Nuclear Power Operations and the technical and analysis potential of the Nuclear Safety Analysis Center.

(7) Nuclear safety regulations should continue to evolve as experience accumulates. The regulatory function must constantly evaluate experience cooperatively with the private sector.

The Kemeny Report carries an indictment of the whole NRC structure and the regulatory processes. We believe this may be a disservice to many competent NRC people. Clearly, there are deficiencies in some aspects of the Commission's managerial structure and relationships. There are overlapping and often duplicative or conflicting procedures and requirements.

The areas of deficiency are serious in terms of delays, cancellations, duplicative reviews of many issues, and increased costs. While these deficiencies may justify a call for changes, they do not necessarily support the implied conclusion of the Kemeny Report that the regulatory process has been ineffective in protecting public health and safety.

At present, a de facto moratorium exists in licensing. This itself will lead to further major changes, and will cause further confusion and delays. These will surely extend this nonplanned licensing moratorium longer.

Just as a change to a single administrator may improve the attention to reactor safety in the regulatory processes, so, too, may well planned evolutionary changes in NRC.

It is truly a dilemma, one which needs speedy resolution. Although each of us may personally have an opinion about which way to go, we leave this decision to those more experienced in choices of this nature.

Recommendation A.2: Establishment of an oversight committee on nuclear safety

Comment: We disagree. An oversight committee should not be established. The oversight committee will be making policy without having responsibility for the outcome. It will create much confusion as to where authority rests. The review functions proposed for the oversight committee are valid, but might be assigned to other federal agencies who already have this authority.

Recommendation A.3: The ACRS should be retained and strengthened. Members part-time.

Comment: We agree. The ACRS should remain as an independent check on safety policy. The basic functions of the ACRS should be to: (1) raise fundamental questions of broad generic significance to nuclear safety, and (2) to formulate broad technical criteria, with the support of the regulatory agency. These technical criteria should be published by the regulatory group.

The effectiveness of the ACRS could be increased if more members were to be selected from the [illegible]ienced cadre of engineers and scientists in the nuclear industry. [illegible] provide a practical complement to the excellence now provided by those from the academic and research community.

The ACRS should not exercise an independent analytical capability through an expanded staff, because it would confuse lines of authority and delay necessary actions. The ACRS can now raise any question about safety and can obtain analysis and technical response through the regulatory body. The ACRS staff should be increased only modestly to allow efficient and continuous information gathering.

The ACRS should not review each license application. We think that ACRS should be able to review, without extensive hearings, a particular license application for information, particularly if the application embodies analysis pertaining to new or generic safety issues which ACRS is considering. We do not agree that ACRS should be authorized to raise safety issues in licensing proceedings, as an intervening party. It should be allowed to raise a broad safety issue with the regulatory body pertinent to a hearing in progress; the ACRS should receive a reply appropriate to its inquiry. But, ACRS should not be given approval or veto power in the licensing process. Again, this is recommended to maintain clear lines of authority, and not to impede necessary pursuit of safety issues.

For the reasons given above, ACRS should not be given authority to participate as a party in rulemaking, nor should it be empowered to initiate rulemaking hearings.

Recommendation A.4: Regulatory agency should provide cost-safety trade-offs; should transfer jurisdiction not related to safety; it should seek assistance from other agencies.

(a) Agency should up-grade operator and supervisor licensing functions, accredit training institutions, set criteria for operator qualification, test and license for specific plant under license. Review and re-accreditation of training programs and relicensing.

Comment: We agree with reassignment of functions and with the recommendations for training, licensing, and periodic testing of supervisors and operators. This broad training function should be coordinated with the training and operations evaluations which will occur under the broad jurisdiction of the Institute for Nuclear Power Operations, recently established by the utility industry. INPO will start functioning by early 1980.

Recommendation A.4, b & c: Broader definition of safety matters should be instituted. Safety research should expand, and should include issues related to public health.

Comment: We agree that all equipment relevant to safety should be reviewed. More particularly, we hope that a "systems engineering" safety review will be established within the regulatory body. We agree that special attention should be given to improved control room design and improved instrumentation.

The proposal to include areas of public health in research is appropriate. We point out that the broad health and radiation health effects program in the U.S. Department of Energy (DOE) should be considered as part of the overall health effort and should be strengthened rather than institute a new program of health effects in a new agency. Other R&D on safety related issues should also be supported by either the NRC or DOE.

The proposed engineering review functions should be coordinated with certain of the utility-sponsored efforts in the Nuclear Safety Analysis Center. We will devote substantial attention to system design and performance. NSAC is now starting to screen all incident reports from operating reactors. Significant results of these evaluations will be transmitted to nuclear utilities.

Recommendation A.5: Responsibility and accountability for safe plant operation, including the management of the plant during an accident, rests with the licensee. Because of this, higher standards of competency should be established for the licensee.

Comment: We agree. We support the other suggestions in this section.

Recommendation A.6: New plants should be located, to the maximum extent feasible, in areas remote from population centers. Siting should be based on accidents of varying intensity.

From F.2: Accident response planning should be related to various accident release potentials, with different emergency responses for each potential exposure and population density.

Comment: We are quite concerned about how such criteria for varying accidents, radiation source terms, and population density can be analyzed into a coherent pattern for licensing. We believe that each application and its design should be reviewed for the proposed site as is done for seismic considerations.

We recognize that when all other things are equal, there are advantages of siting in a region of low population density. This practice would reduce societal consequences and costs of an evacuation, should it become necessary. But, statistically, the probability of such a circumstance is several orders of magnitude less than that of evacuation of a region below a dam, near a chemical plant, or near railroads transporting chemicals. We should determine whether our society is prepared to pay a great deal to achieve this marginal advantage.

Recommendation A.7: Agency should plan, as part of its licensing requirements, for mitigation of the consequence of accidents, including cleanup and recovery. Existing licenses should be reviewed and deadlines set to meet new requirements (referenced are specific requirements in D.2 and D.4).

Comment: See comments in section D.

Recommendation A.8: Before issuing a new construction or operating license, NRC or its successor should, on a case-by-case basis: (a) Assess need to introduce new safety improvements recommended by this report; (b) Review competency of licensee, particularly the quality of the training program; (c) Condition licensing on approval of state and local emergency plants.

Comment: We agree with (a) and (b) above; in this assessment full acccount should be taken for progress which has been made from the time of the accident. We note again that the utility industry has already recognized the importance of improvements in training by establishing it as a major purpose of INPO. Other functions of INPO, such as emergency response and periodic evaluations of operations and physical systems, are directed to assuring that all nuclear utilities are up to the standards required for safe operation.

We disagree with conditioning licensing on approval of state and local emergency plans. This proposal will create very real problems for the states, for the federal licensing agencies and for the utilities. This requirement may so delay regulatory action that a de facto nuclear moratorium will persist.

Recommendation A.9: Rule-making procedures; provisions for public participation; systematic reevaluation of rules; deadline for resolution of generic safety issues; and provisions for application of new rules to existing plants, assessment of the need for retroactive application of new safety requirements.

Comment: This section is confusing. It is our understanding that NRC can now elect to have rule-making hearings, but also has the option to enact new rules after publication for comment, or the Commission can adopt rules that are urgently needed. These option must be preserved. Without these options the resolution of urgent safety issues will be delayed, counter to the public interest.

Recommendation A.9b: Authorization, general rules

Comment: We agree that deadlines should be set for resolving generic safety issues. We note that there is a popular view that failure to solve these "generic" questions may reduce the real safety of reactor systems. This view is misleading. Many "generic" safety issues are ones which involve causal factors that develop over a period of time. They will not cause a sudden failure. They do require surveillance and programmed actions.

It is desirable and important to resolve generic safety issues. By using prudent practices during their resolution, the risks can be kept to a reasonable level.

Recommendation A.10: Licensing procedures should foster early resolution of safety issues before major financial commitments. Issues which recur in many licensings should be resolved by rule-making. Authorization should be given to issue a combined construction permit and operating license.

Comment: We agree generally that attempts should be made early in the licensing process to resolve safety issues, but an option to leave certain questions open until adequate information can be developed is in the best interest of improving safety. Next, appeals boards and adjudicators should not be allowed to raise any safety issue during an adjudicatory or appeals hearing, whether or not the issue is raised by the party to the appeal. This is patently poor procedure: the judge must not be a party to the dispute. The adjudicator (or board) becomes a party to trying issues not originally part of the case, thus becoming a regulator as well as an adversary.

Recommendation A.11a: The regulatory inspection and enforcement functions require increased emphasis and improved management.

Comment: We disagree with the wording and implication of this recommendation. Strict compliance in older systems may actually decrease safety. We agree that periodic reviews should be made, but results which indicate that an old plant does not meet new regulations must be treated with care: only issues that really have significant safety content should become the basis for required retrofits.

B. The Utility and its Suppliers

Recommendation B.1: The industry must drastically change attitudes toward safety. It must set its own standards of excellence and police itself.

Comment: We agree with this requirement. The industry has recognized this need. In addition to individual utility efforts and owner's group efforts, the industry has set up INPO and NSAC to help develop the programs and systems for raising the standard of excellence in nuclear power.

NSAC has already started the systematic gathering, review and analysis of event reports from all nuclear plants and has in operation a very rapid communication system for the dissemination of results or the handling of inquiries. The backlog of incident reports will also be reviewed for important lessons, cooperatively with NRC.

Recommendation B.2: Each nuclear operating company should have a separate safety group which reports to high-level management.

Comment: We agree. The group will also have available to it the technical experts from regional groups and from INPO and NSAC for routine guidance and for quick response in emergencies.

Recommendation B.3: Single management accountability and responsibility, with expertise, for the design, construction, operation, and emergency response within each company operating reactors.

Comment: Generally constructive in requiring close integration of plant design, construction, and operation. The turn-key approach would have provided a holistic approach to safety, but there are other arrangements for achieving this goal. Recommendation C is especially important; the AIF Subcommittee on Emergency Response Planning issued a model plan to the industry on October 23, 1979.

Recommendation B.4: Highly qualified candidates and good pay for senior operators and supervisors.

Comment: Agree.

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6"

Recommendation B.5: Increased attention to operating procedures, their content and revision. Mechanism required for resolving questions arising in plant operations.

Comment: Constructive requirement. INPO will provide cross-industry communication and provide periodic assessment of procedural adequacy.

Recommendation B.6: State rate-setting authorities should be sensitive to the effect that availability of funds can have on implementing safety-related changes.

Comment: Agree.

C. Training of Operating Personnel

Recommendation C.1: Establish accredited training institutions with high standards.

Comment: We concur. INPO will initiate accreditation and surveillance processes in 1980. Operators already licensed should periodically receive training in an accredited program and be requalified.

Recommendations C.2 and C.3: Individual operators trained by utilities after being graduated from accredited institutions. Operators must pass every portion of the licensing exams. Shift supervisors and senior reactor operators shall also have operator's training, as a minimum. Training shall continue after licensing. Emphasis shall be given to the practice of diagnosing transients and understanding reactor safety fundamentals. Simulator should be available to each nuclear utility. Operator licensing contingent on the performance on a simulator. Development of simulators to increase resemblance to reactor and to mock-up transients.

Comment: These suggestions are constructive. INPO will include the training recommendations. NSAC has initiated studies for simulator improvement. EPRI's Nuclear Power Division has a continuing man-machine interface program.

D. Technical Assessment

This section is a well conceived set of recommendations for using the experience of Three Mile Island as a basis for improving the technical design and operating characteristics of nuclear power reactors. It stresses the importance of learning how to cope technically with transients. It suggests that formal safety assurance programs be implemented. And, it recommends a carefully conceived program of data collection and analysis during the Three Mile Island cleanup. The importance of studying small-break loss-of-coolant accidents is emphasized.

Comment: Technical assessment and implementation of the resulting decisions or choices lies at the heart of nuclear safety, as it does for all technology. All the efforts spent on institutional and organizational issues are only to assure that good technical assesment is being done, and that the results are being utilized. The TMI accident and the subsequent investigations have identified a number of inefficiencies and barriers to implementation that have developed in our system. We should correct these situations.

The problems that have developed include preoccupation with the technically less important, but graphic issues like Big Break LOCA, with deterrents to plant improvements and with theoretical worst case assessments instead of best engineering estimates.

Recommendations D.1 and D.3: Equipment inadequacies...

Comment: Improved assessment of the man-machine interface should be made--especially if it applies to off-normal operation. While some specific suggestions have been made in these two recommendations, the Commission only had time for fragmentary study. More detailed recommendations should come after a more complete assessment.

Recommendation D.2: Equipment Failures

Comment: Not all of the systems cited in this section failed at TMI, due to "design and maintenance inadequacies." Some failures were due to licensing set points, some to procedures, et cetera. On the other hand, other items that did fail, like the PORV, are not listed. Thus, again, the specific items to be improved or revised will be identified from a more thorough review than provided by the Commission.

Recommendation D.4: Continued Studies

Comment: We agree. The Commission recommendation here is in order. We believe that the public health consequences of accidents have been overestimated. A major reassessment is in order, as recommended. Such a study should include data from other nuclear accidents. In addition, the use of probabilistic assessment to set priorities for both R&D and for engineering assessments should be implemented. We concur with the recommendation that Government funds be made available to accelerate this work.

Recommendation D.5: Iodine Retention

Comment: We believe this should be broadened to recommend assembling data on actual experience, which can be used for assessment rather than using the models as is current practice.

Recommendation D.6: Clean-up Lessons

Comment: The recommendations are appropriate. The nuclear industry has already started to implement them.

E. Worker and Public Health and Safety

Recommendation E.1: Expanded and better coordinated health-related effects research.

Comment:

(a) We agree that coordination in the Federal structure should be improved. However, the magnitude of radiation effects research is, considering other environmental health needs and the limitations of resources, adequate to provide orderly progress and to provide a basis for radiological protection.

(b) We agree.

(c) We agree with improvement of methods of monitoring and surveillance.

(d) & (e) We agree with development of methods to mitigate adverse health effects, but these are long term goals and are not likely to be accomplished quickly or by a crash program.

Recommendation E.2: Review of radiation-related health issues.

Comment: We agree that radiation health issues arising from NRC activities should receive competent medical review, but we are not prepared to comment on where in the Federal establishment that review should be placed.

Recommendation E.3: Education program for health professionals and emergency response personnel.

Comment: Training should be coordinated closely with the nuclear reactor staff. It must also relate to emergency plans.

Recommendation E.4: Advanced preparation for mitigation of emergencies

Comment: We agree with these recommendations.

Recommendation E.5: Stockpiling of radiation protective agents.

Comment: Stockpiling should be accompanied by well conceived policies for use of these agents.

F. Emergency Planning and Response

Recommendation 1: Condition Operating License on approval of state emergency plan which is approved by FEMA (related to A8c, which calls for approved state and local emergency plans as a condition for new construction permits and operating licenses).

Comment: After much thought, we must disagree with the proposition that licensing should be conditioned on the existence of approved emergency plans. The procedural complexities of this process will surely be an almost insurmountable impediment to licensing.

We suggest that emergency plans can only be developed at such irregular and spotty intervals that the very uncertainty will frustrate all who participate in trying to do what the regulation requires.

With no intent to demean FEMA, we suggest that the nuclear regulatory body should approve emergency plans. There may be a relationship between emergency plans, design radiation zones for the hypothetical accident, the population density, and plant containment design, if provision under F.2 are adopted. For these reasons, FEMA would be an inappropriate agency to review an emergency plan so closely linked to nuclear plants.

We are still studying this entire section on Emergency Planning and may wish to file additional comments.

G. The Public's Right to Information

Comment: We concur with the ideas and recommendations of this section. The necessity for clearly established assignments of responsibility for providing accurate and prompt information about any emergency situation involving a nuclear power plant requires no argument. It is equally clear that primary responsibility for providing such information should rest with the utility operator.

Included in the industry's response to the TMI accident has been the establishment of a crisis communications plan that closely parallels the recommendations of the President's Commission with respect to industry actions. It includes advance development of relationships between operating management and communications personnel and provides for close and continuous relationships in the event of an accident so that news briefings can be effectively managed. The plan includes provisions for establishing liaison with state and local authorities. Copies of the industry's Crisis Communications Program are available through the Atomic Industrial Forum.

But the quality of information reaching the public will be greatly enhanced, and the emergency demands on the time of knowledgeable utility staff will be minimized, if the media will develop specialists who have substantial depth of knowledge of nuclear power plant design, processes, and hazards. Such training of a body of media personnel will require a substantial investment both by the media and by the utility industry. The industry's role in large part can be supplied by such organizations as the Nuclear Safety Analysis Center, the Electric Power Research Institute, and the Institute for Nuclear Power Operations, among others.

We hope that these comments will assist your group in deciding what should be said about the Kemeny Report. Your deliberations and the resulting statements by the President will have a significant effect on the prospects for nuclear power in the United States.

I thank you for seeking our comments, and I trust that we may have an opportunity to add additional thoughts in the future.

Very truly yours,

Floyd L. Culler, Jr.

Floyd L. Culler, Jr.
President
Electric Power Research Institute

DRAFT 2
NUREG-0660
1/23/80

NRC ACTION PLANS DEVELOPED AS A RESULT OF THE TMI-2 ACCIDENT

~~8002260318~~
290 pp.

ENCL. 1

CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

SUMMARY OF NRC ACTION PLANS DEVELOPED AS A RESULT OF TMI-2 ACCIDENT

Editc:'s Note: The summary of the action plans is not included in Draft 2. It will be revised and included in Draft 3.

TABLE 1 - LICENSING REQUIREMENTS CROSS CUT OF TMI-2 ACTION PLAN

Key to Symbols

Decision Group: A = Already Approved
B = To be Approved by Approval of Action Plan
C = Separate Commission Decision Required

Priority Group: 1 = 160 - 210 points on priority ranking system
2 = 110 - 150 points on priority ranking system
3 = 20 - 100 points on priority ranking system

Regulation Group: R - Rule Change Required
D - Rule Change Desirable
U - Rule Change Unnecessary

The symbol "X" indicates that the change does not apply to licensees or the change may ultimately lead to new requirements for licensees, but in a manner not yet determined.

The dates specified in the "Plants Under Construction" column are the dates beyond which the requirements are a prerequisite for issuance of an operating license or full-power operation as specified in the action plan. The terms "FL" and "FP" in this column refer to the activities of fuel loading and full-power operation.

Applicants for construction permits will be required to commit to all task action items prior to issuance of a construction permit and will have to satisfactorily complete action items II.A.1 and II.J.3.

TABLE 1 LICENSING REQUIREMENTS CROSS CUT OF TMI-2 ACTION PLAN

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete		Regulation Group
				Operating Reactors	Plants Under Construction	
I. Operational Safety						
I.A.1 Operating Personnel and Staffing						
1. Shift Technical Advisor	A	1	NRR	On duty - 1/1/80 Fully trained - 1/1/81	On duty - FL Fully trained - 1/1/81	U
2. Shift Supervisor Admin. Duties	A	1	NRR	1/1/80	FL	U
3. Shift Manning	B	1	NRR	Personnel req. - 7/1/81 Overtime req. - 7/1/80	FL	Personnel - D Overtime req. - U
4. Codify Short-term upgrading	B	3	SD	X	X	
5. Long-term Upgrading	C	3	SD	X	X	
I.A.2 Training and Qualifications of Operating Personnel						
1. Immediate Upgrade of RO and SRO Req.	Exp. - A Edu. - C	1	NRR	Experience 4/1/81 Education 1/1/85	Same as OR	
2. Training and Qualifications of Other Personnel	B	2	NRR	5/1/81	5/1/81	
3. NRR Audit Training	B	2	NRR	X	X	
4. NRR Participate in IE Inspector Training	B	3	NRR	X	X	
5. Plant Drills	Short-term - B Long-term - C	1	NRR	Short-term - 1/1/81 Long-term - X	Short-term 1/1/81 Long-term - X	

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
6. Long-term Upgrade	C	1	SD	X	X	
7. Accreditation of Training Institutions	C	2	NRR	X	X	
I.A.3 Licensing and Requalification of Operating Personnel						
1. Revise Scope and Criteria for Exams	A	2	NRR	4/1/80	FL	
2. Personnel Selection Process	B	3	NRR	1/1/81	1/1/81	
3. NRC Operator Licensing Reforms	C	3	NRR	X	X	
4. Operator Fitness	C	2	SD	X	X	
5. Licensing of Additional Operations Personnel	C	2	NRR	X	X	
6. NRC/DOE/INPO Statement of Understanding	C	3	NRR	X	X	
I.A.4 Simulator Use and Development						
1. Initial Simulator Improvement	B	2	NRR	1/1/81	1/1/81	
2. Long-term Simulator Upgrade	B	1	SD	7/1/82	7/1/82	
3. NRC Training Simulator	C	3	RES	X	X	
4. NRC Engineering Computer	C	2	RES	X	X	

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
I.B.1 Management for Operations						
1. Organization and Management Criteria	B - NTOL C - Long-term	1	NRR	5/1/81	Special for NTOL - FL 5/1/81	U
2. Onsite Safety Engineering Group	B - NTOL C - Long-term	1	NRR	5/1/81	Special for NTOL - FL 5/1/81	U
3. Radiation Protection Organization	B	2	NRR	X	X	
4. Onsite Evaluation of Operating Experience	A	1	NRR	1/1/80	FL	
5. Loss of Safety Function	C	1	SD	1/1/81	1/1/81	
I.B.2 Inspection of Operating Reactors						
1. Revise IE Inspection Program	B	2	IE	X	X	
2. Resident Inspector - OR	A	1	IE	X	X	U
3. Regional Evaluations	B	1	IE	X	X	
4. Overview of Licensee Performance	B	2	IE	X	X	
I.C Operating Procedures						
1. Short-term Accident Analysis and Procedure Revision	A	1	NRR	Small Break - 1/1/80 Core Cooling - 1/1/80 Analysis - 7/1/80	Small Break - FL Core Cooling - FL Analysis - FP	U
2. Shift and Relief Turnover	A	1	NRR	1/1/80	FL	U

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
3. Shift Supervisor Responsibilities	A	1	NRR	1/1/80	FL	U
4. Control Room Access	A	1	NRR	1/1/80	FL	U
5. Feedback of Operating Experience	B	1	NRR	9/1/80	FL	U
6. New Core Cooling Instruments	A	2	NRR	1/1/81	1/1/81	U
7. NSSS Vendor Review	B	1	NRR	X	FP	U
8. Pilot Program - NTOL	B	2	NRR	X	FP	U
9. Long-term Program	C	2	NRR	1/1/82	1/1/82	U
I.D Control Room Design						
1. Design Review	B	1	NRR	Short-term - 3/1/81 Long-term - 3/1/82	Same as OR	
2. Safety Parameter Console	B	1	NRR	6/1/81	6/1/81	
3. System Status Monitoring	B	2	NRR	12/1/81	12/1/81	
4. Design Standard	B	1	SD	X	X	
5. Research	C	2	RES	X	X	
6. Technology Transfer Conference	A	2	RES	X	X	
I.E Analysis and Dissemination of Operating Experience						
1. Office for Analysis and Evaluation	A	1	EDO	X	X	

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete Operating Reactors	Implementation Complete Plants Under Construction	Regulation Group
2. Office Programs	A	1	EDO	X	X	
3. Data Analysis	A	1	RES	X	X	
4. Coordination of Programs	B	1	AEOD	6/1/80	FP	
5. Nuclear Plant Reliability Data System	C	2	AEOD	X	X	
6. Reporting Requirements	C	1	AEOD	12/1/81	12/1/81	
7. Foreign Sources	B	1	IP	X	X	
8. Human Error Analysis	A	2	RES	X	X	
I.F Quality Assurance						
1. Detailed Criteria	C	2	SD	X	X	
I.G Training Low-Power Testing						
1. Training Requirements	B	2	NRR	X	Plan - FL Train - FP	U
II. Siting and Design						
II.A Siting						
1. Siting Policy Rulemaking	C	1	NRR	X	X	
2. Site Evaluation	C	1	NRR	X	X	

TABLE 1 (continued)

Action Item		Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
II.B Degraded or Melted Cores							
1.	Primary System Vents	A	2	NRR	Design 1/1/80 Installation 1/1/81	Design FP Installation 1/1/81	D
2.	Shielding	A	2	NRR	Design 1/1/80 Modifications 1/1/81	Design FP Modifications 1/1/81	D
3.	Sampling	A	2	NRR	Design & Procedures 1/1/80 Modifications 1/1/81	Design & Procedures - FP Modifications 1/1/81	D
4.	Training	B	1	NRR	Program - 7/1/80 Implement - 1/1/81	Program - 7/1/80 Implement - 1/1/81	D
5.	Research	C	2	RES	X	X	
6.	Features to Cope with Core Melt Accidents at Sites with High Population Density	C	1	NRR	Selected Sites - 10/1/80	X	
7.	Containment Inerting	C	1	NRR	BWR MK I & II Containments - As Ordered	Same as OR	R
8.	Rulemaking	C	2	SD	X	X	D
9.	Conceptual Designs	C	2	NRR	Studies 4/1/81	Studies 4/1/81	
II.C.1	Reliability Engineering and Risk Assessment						

TABLE I (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete		Regulation Group
				Operating Reactors	Plants Under Construction	
1. IREP	B - NTOL Program C - NRC IREP	1	RES	Pilot July 80 Others July 83	FP	U
2. Systems Interaction	B	2	NRR	X	X	
3. Reliability Engineering	B - Short-term C - Long-term	2	NRR	X	Short-term - FP Long-term - X	U
II.D Reactor Coolant System Relief and Safety Valves						
1. Test Requirements	A	1	NRR	X	X	U
2. Test Plan and Testing	A	1	NRR	Program - 1/1/80 Testing - 7/1/81	Program - FL Testing - 7/1/81	U
3. Research	A	2	RES	X	X	
4. Auto Close Block Valve	B	2	NRR	7/1/80	FP	
5. Position Indication	A	1	NRR	1/1/80	FL	U
II.E.1 Auxiliary Feedwater System						
1. Evaluation	A	1	NRR	Short-term W & CE - 6/1/80 B&W - 9/1/80 Long-term - 1/1/81	Short-term - FL Long-term - FP	U
2. Auto Initiation and Flow Indication	A	1	NRR	Control Grade - 1/1/80 Safety Grade - 1/1/81	Control Grade - FL Safety Grade - FP	U
3. Update SRP and Issue Regulatory Guide	B	3	SD	X	X	

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
II.E.2 Emergency Core Cooling System						
1. Frequency of Challenge	B	1	NRR	1/1/81	1/1/81	
2. Research	A	1	RES	X	X	
3. Uncertainties Performance Predictions	B	1	NRR	6/1/80	6/1/80	
II.E.3 Decay Heat Removal						
1. Natural Circulation Pressure Control	A	1	NRR	1/1/80	FP	U
2. Shutdown Heat Removal Systems	B	1	NRR	X	X	
3. Alternate Concepts Research	A	2	RES	X	X	
4. Regulatory Guide	B	3	SD	X	X	
II.E.4 Containment Design						
1. Dedicated Penetrations	A	1	NRR	Design - 1/1/80 Install - 1/1/81	Design - FL Install - 1/1/81	U
2. Isolation	A	1	NRR	Signals - 1/1/80 Plan - 6/1/80 Mod - 11/1/80	Signals - FP Plan - FP Mod - FP	U
3. Integrity Check	B	2	NRR	6/1/81	6/1/81	
4. Purging	A	1	NRR	1/1/80 - Staged	FL - Staged	U

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete Operating Reactors	 Plants Under Construction	Regulation Group
II.F Instrumentation and Controls						
1. Additional Accident Monitoring Instrumentation	A	1	NRR	1/1/81	1/1/81	U
2. Inadequate Core Cooling	A	1	NRR	Procedures - 1/1/80 Subcool - 1/1/80 Level Design - 1/1/80 Level Install - 1/1/81	Procedures - FL Subcool - FL Level Design - FL Level Install - 1/1/81	U
3. Reg. Guide 1.97	B	1	SD	6/1/82	6/1/82	
II.G Electrical Power						
1. PORV, Block Valve, Level Ind.	A	1	NRR	1/1/80	FL	U
II.H TMI-2 Cleanup and Examination						
1 TMI-2 Safety	A	1	NRR	X	X	
2. Obtain Information	A	1	RES	X	X	
3. Evaluation and Feedback	A	1	NRR	X	X	
4. Socioeconomic Effect and Property Values	A	3	RES	X	X	
II.J.1 Vendor Inspection Program						
1. Inspection Priority	B	3	IE	X	X	
2. Modify Existing Program	B	3	IE	X	X	

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
3. Expand Regulatory Control	C	3	IE	X	X	
II.J.2 Construction Inspection Program						
1. Reorient Program	A	3	IE	X	X	
2. Independent Measurement	A	2	IE	X	X	
3. Resident Inspectors	A	2	IE	X	X	
II.J.3 Management for Design and Construction						
1. Organization and Staffing	C	2	IE	X	X	
II.J.4 Deficiency Reporting Requirements						
1. Revise Requirements	C	2	IE	X	X	
II.K Small-Break LOCAs and Loss of Feedwater Accidents						
1. IE Bulletins	A	1	NRR	Complete	FL	
2. Orders	A	1	NRR	1/1/81	FP	
3. Generic Review Matters	B	1	NRR	1/1/81	FP	
III. Emergency Preparations and Radiation Protection						

TABLE 1 (continued)

Action Item		Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
III.A.1	Improve Licensee Emergency Preparedness Short-term						
1.	Upgrade Emergency Preparedness	A	1	NRR	Phased 1/1/80 - 1/1/85	Phased: FL-1/1/81	U
2.	Upgrade Support Facilities	A	1	NRR	Initial - 1/1/80 Upgrade - 1/1/81	Initial - FL Upgrade - 1/1/81	U
3.	Thyroid Blocking Agent	C	3	NRR	Workers - 3/1/81 Public - X	Workers - 3/1/81 Public - X	
III.A.2	Improving Licensee Emergency Preparedness - Long-term						
1.	Rule Change	C	1	SD	X	X	
2.	Guidance and Criteria	C	3	NRR	X	X	
3.	Inspection Program	B	3	IE	X	X	
III.A.3	Improving NRC Emergency Preparedness						
1.	NRC Role	C	1	EDO	X	X	
2.	Improve Operations Centers	B	2	IE	X	X	
3.	Communications	Telephones-A Radios-B	2	IE	Telephones - 2/1/80 Radios - 1/1/81	Telephones - 2/1/80 Radios - 1/1/81	U
4.	Nuclear Data Link	C	3	IE	X	X	

TABLE 1 (continued)

Action Item		Decision Group	Priority Group	Lead Office	Implementation Complete		Regulation Group
					Operating Reactors	Plants Under Construction	
5.	Training, Drills, and Tests	A	2	IE	X	X	
6.	Interaction with Other Agencies	C	2	EDO	X	X	
III.B	Emergency Preparedness of State and Local Governments						
1.	Near-Term Actions	A	1	SP	X	X	U
2.	Longer Term Actions	C	2	SP	X	X	
III.C	Public Information						
1.	Provide Information to Public	B	3	OPA	X	X	
III.D.1	Radiation Source Control						
1.	Source Outside Containment	A	2	NRR	1/1/80	FP	U
2.	Vent-Gas Systems	B	3	NRR	9/1/80	FP	U
3.	Secondary System	B	2	NRR	Evaluation - 4/15/80 Modifications - 7/1/81	Evaluation - 4/15/80 Modifications - 7/1/81	U
4.	Large-Volume Noble Gas Recovery or Delay System	B	2	RES	X	X	
5.	Auxiliary and Radwaste Building Ventilation	B	2	NRR	Evaluation - 8/1/80 Modifications - 7/1/81	Evaluation - FP Modifications - 7/1/81	U
6.	Radioiodine Adsorber Criteria	B	3	RES	7/1/80	FL	

TABLE I (continued)

Action Item		Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
III.D.2	Public Radiation Protection Improvement						
1.	Effluent Monitoring	B	3	NRR	12/1/81	12/1/81	
2.	Radioiodine Pathway Dose Analysis	B	3	NRR	X	X	
3.	Liquid Pathway Radiological Control	B	3	NRR	12/1/80 - Phased	12/1/80 - Phased	
4.	Offsite Dose Measurements	B	3	NRR	6/1/81	6/1/81	
5.	Dose Calculation Manual	B	3	NRR	6/1/81	6/1/81	
6.	Independent Measurements	B	2	IE	X	X	U
III.D.3	Worker Radiation Protection Improvements						
1.	Radiation Protection Plans	B	2	NRR	9/1/81	9/1/81	
2.	Health Physics	Rule - C Guide - B	3	SD	X	X	
3.	Inplant Monitoring	Short-term - A Long-term - B	3	NRR	Radioiodine - 1/1/80 Addl. Monitors - 6/1/82	Radioiodine - FL Addl. Monitors - 6/1/82	U
4.	Control Room Habitability	B	2	NRR	Review - 5/1/80 Mod - 3/1/81	Review - FP Mod - 3/1/81	U
5.	Data Base	C	3	SD	3/31/83	3/31/83	

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete		Regulation Group
				Operating Reactors	Plants Under Construction	
IV. NRC Organization, Management, Practices, and Procedures						
IV.A Overall Policy and Organization						
1. NRC Policy Statement on Safety	C	2	Comm	X	X	
2. Roles of Chairman, Commission, and EDO	C	3	Comm	X	X	
3. Delegate Emergency Response Functions to a Single Commissioner	C	3	Comm	X	X	
4. Achieve Single Location - Long-term	C	2	Comm	X	X	
5. Achieve Single Location - Interim	C	1	Comm	X	X	
6. Reexamine Commission Role in Adjudication	C	3	Comm	X	X	
7. Study Elimination of Nonsafety Responsibilities	C	3	Comm	X	X	
8. Study NRC Top Management Structure and Process	C	3	Comm	X	X	
9. Reexamine Organization and Functions of NRC Offices	C	3	Comm	X	X	
10. Revise Delegations of Authority to Staff	C	3	Comm	X	X	

TABLE 1 (continued)

Action Item		Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
11.	Strengthen Role of ACRS	C	2	Comm	X	X	
12.	Study Need for Additional Advisory Committees	C	3	Comm	X	X	
13.	Improve Public and Intervenor Participation in Hearing Process	C	2	Comm	X	X	
14.	Study Construction-During-Adjudication Rules	C	3	Comm	X	X	
15.	Study Need for TMI-Related Legislation	C	2	Comm	X	X	
16.	Improve Overall Agency Attitude	C	1	Comm	X	X	
IV.B.1	Increase Emphasis on Human Factors						
1.	Reorganization of NRR	C	2	NRR	X	X	
2.	Acquisition of Expert Human Factors Advice	B	2	RES	X	X	
3.	Appoint Coordinator for Human Factors Research	B	2	RES	X	X	
IV.B.2	Increase Inspection and Enforcement Effectiveness						
1.	Increase IE Effectiveness	C	2	IE	X	X	

TABLE I (continued)

Action Item		Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
IV.B.3	Strengthen Enforcement Process						
1.	Legislative Authority	C	2	OGC	X	X	
2.	Revise Enforcement Policy	B	2	IE	X	X	
IV.B.4	Streamline NRC Practices Concerning Instructions and Information for Licensees						
1.	Develop Management Method	C	2	NRR	X	X	
IV.B.5	Extend Lessons Learned to Licensed Activities Other Than Power Reactors						
1.	Extend Lessons Learned	C	3	NMSS	X	X	
IV.B.6	NRC Staff Training						
1.	Assess Training Needs	C	2	ADM	X	X	
IV.B.7	Safety Improvement						
1.	NRR Safety Improvement	C	2	NRR	X	X	
IV.C	Improve Followup on ACRS Advice						
1.	Followup on Advice	C	3	NRR	X	X	

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
IV.D.1 Expand Research on Safety Decisionmaking						
1. Formulate Alternative Safety Criteria	C	3	RES	X	X	
IV.D.2 Early Resolution of Safety Issues						
1. Plan for Construction Permit Stage	C	3	SD	X	X	
2. Resolve Generic Issues by Rulemaking	C	2	Comm	X	X	
IV.D.3 Improve Systematic Assessments of Currently Operating Reactors						
1. Assess Currently Operating Reactors	C	2	NRR	X	X	
IV.E Improve Safety Rulemaking Procedures						
1. Develop Public Agenda	A	3	SD	X	X	
2. Periodic and Systematic Reevaluation of Existing Rules	A	3	ELD	X	X	
3. Improve Rulemaking Procedures	C	3	ELD	X	X	
4. Study Alternative for Improved Rulemaking Process	C	3	ELD	X	X	
IV.F.1 Expedite Staffing						
1. Expedite Staffing	C	1	ADM	X	X	

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction	Regulation Group
IV.F.2 Study Technical Manpower Resource Limitations						
1. Complete Study	B	1	ADM	X	X	
IV.F.3 Increase Staff Capability Through Technical Consultants						
1. Increase Capability	B	2	ADM	X	X	

GLOSSARY FOR TMI-2 ACTION PLAN

Acronym	Definition
AEOD	analysis and evaluation of operational data
AI	Atomics International
AIF	Atomic Industrial Forum
AFW(S)	auxiliary feedwater (system)
ALARA	as low as reasonably achievable
ANL	Argonne National Laboratory
ANS	American Nuclear Society
ANSI	American National Standards Institute
ARAC	Atmospheric Response Advisory Capability
ASME	American Society of Mechanical Engineers
AT&T	American Telephone & Telegraph
BCL	Battelle Columbus Laboratories
BDHT	blowdown heat transfer
BWR	boiling water reactor
CEA	Cambridge Electron Accelerator (Harvard, MIT)
CEA	Commissareat a l'Energie Atomique (France)
CP	construction permit
CY	calendar year
DAS	disturbance analysis system
DOE	Department of Energy

Acronym	Definition
ECCS	emergency core cooling system
EEI	Edison Electric Institute (Task Force on Power Reactor Health Physicists)
EIS	environmental impact statement
EMS	emergency medical services
EOC	emergency operations center
EPRI	Electrical Power Research Institute
EPZ	emergency planning zones
ESF	emergency safety features
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRS	field incident radio system
FMEA	failure mode effects analysis
FNP	floating nuclear plant
FRG	Federal Republic of Germany
GPU	General Public Utilities
HF	high frequency
HHS	
HMB	
HPC	health physics center
HPS	Health Physics Society
ICS	integrated control system
IE	(NRC) Office of Inspection and Enforcement
INPO	Institute for Nuclear Power Operations

Acronym	Definition
IRC	incident response center
IREP	integrated reliability evaluation program
LASL	Los Alamos Scientific Laboratories
LER	Licensee Event Report
LMFBR	liquid metal fast breeder reactor
LOCA	loss-of-coolant accident
LOFT	loss of fluid test
LOFW	loss of feedwater
LPGS	liquid pathway generic study
LWR	light water reactor
md	manday
mm	manmonth
MOU	Memorandum of Understanding
MSLBIC	main steam line break inside containment
mw	manweek
my	manyear
N.A. (N/A)	not applicable
NAWAS	National Warning System
NDL	nuclear data link
NEA	Nuclear Energy Agency
NIOSH	National Institute of Safety and Health
NOAA	National Oceanic and Atmospheric Administration
NPRDS	nuclear plant reliability data system

Acronym	Definition
NRR	(NRC) Office of Nuclear Reactor Regulation
NSAC	nuclear safety analysis center
NSSS	nuclear steam supply system
NTOL	near-term operating license
NWS	National Weather Service
OC	(NRC) operations center
OL	operating license
OLB	operating license board
OPA	Office of Public Affairs
OPX	Direct Dedicated Phone Lines
OR	operating reactor
ORNL	Oak Ridge National Laboratory
OSC	operational support center
PAG	protective action guidelines
PAHR	post-accident heat removal
PAS	
PBE	prompt burst experiments
PBF	Power Burst Facility (INEL)
PCS	
PHS	Public Health Service
PKL	
PORV	power-operated relief valve
PWR	pressurized water reactor
QA	quality assurance

Acronym	Definition
QC	quality control
RAB	Radiological Assessment Branch
RAC	Regional Advisory Committee (Federal)
RCS	reactor coolant system
RCIC	reactor core isolation cooling system
RERC	radiological emergency response coordination
RERO	radiological emergency response operations
RERP	radiological emergency response planning
RES	Office of Nuclear Regulatory Research
RETS	radiological effluent technical specifications
RFP	request for proposals
RHR	reactor heat removal
RO	reactor operator
RPP	radiation protection plan
RRT	(DOE RRT program)
RSR	reactor safety research
SAFER	(RES)
Sandia	Sandia Laboratories
SD	(NRC) Office of Standards Development
SOP	standard operating procedure
SP	Office of State Programs
SRO	senior reactor operator
SSER	standard safety evaluation report

Acronym	Definition
STA	shift technical advisor
TEDA	triethylene diamine
TLTA	two-loop test apparatus
TERC	Technical Education Research Center
TIO	technical integrating office (DOE)
TMI	Three Mile Island (Nuclear Power Station)
TSC	technical support center
TWG	Technical Working Group
UK	United Kingdom
UNDES	

KEY TO REFERENCES

The final paragraph of each Task Action Plan lists the reference materials related to that Task. In each instance, the first reference is to the "Report of the President's Commission on the Accident at Three Mile Island." This report is available at the U.S. Government Printing Office. It has been assigned the Library of Congress Catalog Card Number 79-25694. It is also available from Pergamon Press.

The remaining references, listed as "Other," are NRC documents. Those listed as NUREG-XXXX are available for purchase from: GPO Sales Program, Division of Technical Information and Document Control, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555 and the National Technical Information Service, Springfield, Virginia 22161. To avoid frequent repetition within this document, the NUREG reports are listed only by number. A complete list with title, author, and date of publications follows:

WASH-1400 (NUREG-75/014), "Reactor Safety Study - An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," Executive Summary, Main Report, Appendices 1-11, U.S. Nuclear Regulatory Commission, December 1975.

NUREG-75/085, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants - LWR Edition," U.S. Nuclear Regulatory Commission, 1975.

NUREG-0292, "Nuclear Power Plant Licensing: Opportunity for Improvement," U.S. Nuclear Regulatory Commission, June 1977.

NUREG-0499, "Rulemaking Statement on General Policy for Rulemaking to Improve Nuclear Power Plant Licensing," U.S. Nuclear Regulatory Commission, December 1978.

NUREG-0553, "Beyond Defense-in-Depth: Cost and Funding of State and Local Government Radiological Emergency Response Plans and Preparations in Support of Commercial Nuclear Power Plants," U.S. Nuclear Regulatory Commission, October 1979.

NUREG-0565, "Staff Report on the Generic Evaluation of Small-Break Loss-of-Coolant Accident Behavior for Babcock and Wilcox Operating Plants," U.S. Nuclear Regulatory Commission, to be issued.

NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations," U.S. Nuclear Regulatory Commission, July 1979.

NUREG-0585, "TMI-2 Lessons Learned Task Force Final Report," U.S. Nuclear Regulatory Commission, August 1979.

NUREG-0600, "Investigation into the March 28, 1979, Three Mile Island Accident by Office of Inspection and Enforcement," U.S. Nuclear Regulatory Commission, August 1979.

NUREG-0611, "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in Westinghouse Designed Operating Plants," U.S. Nuclear Regulatory Commission, to be issued.

NUREG-0616, "Report of Special Review Group, Office of Inspection and Enforcement, on Lessons Learned from Three Mile Island," U.S. Nuclear Regulatory Commission, to be issued.

NUREG-0625, "Report of the Siting Policy Task Force," U.S. Nuclear Regulatory Commission, August 1979.

NUREG-0626, "Staff Report on the Generic Assessment of Feedwater Transients and Small Break Loss-of-Coolant Accidents in Boiling Water Reactors Designed by the General Electric Company," U.S. Nuclear Regulatory Commission, to be issued.

NUREG-0632, "NRC Views and Analysis of the Recommendations of the President's Commission on the Accident at Three Mile Island," U.S. Nuclear Regulatory Commission, November 1979.

NUREG-0635, "Generic Assessment of Small Break Loss-of-Coolant Accidents in Combustion Engineering Designed Operating Plants," U.S. Nuclear Regulatory Commission, to be issued.

I. OPERATIONAL SAFETY

TASK I.A.1 OPERATING PERSONNEL AND STAFFING

A. OBJECTIVE: Complex transients in nuclear power plants place high demands on the operators in the control room. The objective of the actions described in this task is to increase the capability of the shift crews in the control room to operate the facility in a safe and competent manner by assuring that a proper number of individuals with the proper qualifications and fitness are on shift at all times. The work to improve the design of control rooms is described elsewhere in this plan.

B. NRC ACTIONS

1. Shift technical advisor.

a. Description: Technical advisors with engineering expertise and special training in plant dynamic response are required by NRC to accomplish two functions: (1) on-shift advice and assistance to the control room supervisor in the event of an accident, and (2) evaluation of operating experience. In the past, the staff has accepted the assignment of these two functions to two separate groups at the prerogative of the individual licensee. With the implementation of item I.B.1.1, the staff will require that the operating experience evaluation function be assigned to the onsite safety engineering group. The long-term need for a shift technical advisor to provide advice to the control room supervisor may be eliminated when upgraded qualifications for the control room supervisor and improved control rooms have been attained.

b. Schedule: NRR issued letters to: operating plant licensees on September 13 and October 30, 1979; pending operating license applicants on September 27, 1979 and November 9, 1979; and pending construction permit applicants and licensees of plants under construction on October 10, 1979 and November 9, 1979. NRR will review applications for operating licenses and include this requirement in technical specifications. NRR will perform retrofit of operating plant technical specifications at the earliest practicable date. IE will review implementation for operating plants in early 1980, and before fuel load for new operating licenses.

c. Resources: NRR FY80 - 0.2 my, FY81 - 0.2 my; IE FY80 - 0.5 my and $4,500, FY81 - 0.1 my and $900.

2. Shift supervisor administrative duties.

a. Description: The objective is to increase the shift supervisor's attention to his command function by minimizing ancillary responsibilities. NRR has required all operating plant licensees to review the administrative duties of the shift supervisor by the senior officer of each utility responsible for plant operations. Administrative functions that detract from or are subordinate to the management responsibility for assuring the safe operation of the plant are to be delegated to other operations personnel not on duty in the control room. The same requirement will be imposed by the licensing review staff on all operating license applicants.

b. Schedule: NRR issued letters to: operating reactors on September 13, 1979 and October 30, 1979; operating license applicants on September 27, 1979 and November 9, 1979; and pending construction permit applicants and licensees of plants under construction on October 10, 1979 and November 9, 1979. The depth of NRR review for operating license applicants will be limited to confirmation that the applicant commits to meet the requirement.

c. Resources: NRR FY80 - 0.1 my, FY81 - 0.1 my.

3. Shift manning.

a. Description: NRR will develop requirements and issue instructions to operating plant licensees and operating license applicants to assure the necessary number and availability of personnel to man the operations shifts. The requirements will include administrative procedures to govern the movement of key individuals about the plant to assure that qualified individuals are readily available in the event of an abnormal or emergency situation. They will also include new administrative procedures that limit overtime.

The interim requirements on the number and qualifications of operators to be present in the control room will include the present more conservative staff practice for minimum shift staffing of licensed plants, as described in the Standard Review Plan, Section 13.1.2, NUREG-75/087, subject to the condition that there be one reactor operator and one senior operator in the control room at all times other than during cold shutdown conditions.

These interim shift manning requirements will also include provision of an aide to the shift supervisor. The purpose of the aide is to assure that, over the long term, the shift supervisor is substantially relieved of routine administrative duties (item 2 above) and that there are sufficient support personnel in the control room to respond to non-control or command responsibilities, such as manning the telephone link to NRC and activating the onsite technical support center. An operator trainee may be considered as aide to the shift supervisor for functions that have substantial training value.

b. Schedule:

(1) NRR will have criteria ready to issue by March 1, 1980.

(2) IE will review implementation by January 1, 1981.

c. Resources: NRR FY80 - 0.2 my, FY81 - 0.1 my; IE FY80 - 0.5 my and $4,500, FY81 - 0.1 my and $900.

4. Codification of short-term upgrading.

a. Description: SD will include the short-term requirements in items 1 through 3 above in conjunction with comprehensive revisions of affected Regulatory Guides 1.33 and 1.8. The Standard Review Plan and the Standard Technical Specifications will be changed by NRR to reflect such changes.

b. Schedule: SD will issue Regulatory Guide 1.33 by September 1980. NRR will revise the Standard Technical Specifications and the Standard Review Plan by December 1981. (See item I.A.2.6 for schedule for revision of Regulatory Guide 1.8.)

c. Resources: NRR FY80 - 0.2 my, FY81 - 0.4 my, FY82 - 0.1 my; SD FY80 - 0.2 my, FY81 - 0.33 my; ADM FY81 - 0.3 my and $19,000.

5. Long-term upgrading.

a. Description: SD will develop proposed changes to 10 CFR 50 for consideration by the Commission to effect appropriate changes concerning plant staffing, including shift manning and control room presence. When revising the regulations, the staff will consider increasing the size of the shift operator complement by requiring the presence of two reactor operators and one senior reactor operator in the control room at all times during normal operations. Provisions for working tours and status checks of the plant by individual operators normally assigned to the control room will be considered. The results of the study of operator licensing (RFP-NRR-80-117) and the study of utility management and technical resources (NRC-03-80-105) will be considered. In addition, the comments of the ACRS in its letter of December 13, 1979 will be considered.

b. Schedule: SD will issue the proposed rule for comment by March 1982, and issue the effective rule by March 1983.

c. Resources: SD FY82 - 0.5 my, FY83 - 0.5 my; NRR FY82 - 0.2 my; ADM FY82 - 0.2 my and $7,000, FY83 - 0.5 my and $9,000.

C. LICENSEE ACTIONS

1. Shift technical advisor.

a. Description: Licensees will hire and train shift technical advisors.

b. Implementation: Operating reactors are required to have shift technical advisors on duty by January 1, 1980; they are to be fully trained by January 1, 1981. Operating license applicants will provide shift technical advisors before fuel loading; they are to be fully trained by January 1, 1981, or before the operating license is issued, whichever is later.

c. Resources: $500,000 per year, per site (based on 6 full-time employees plus relief).

2. Shift supervisor administrative duties.

a. Description: The senior officer will perform a review of shift supervisor duties and relieve the shift supervisor of non-safety administrative duties, either by providing an administrative assistant on back shifts or by scheduling routine administrative work for day shifts (see also item I.A.1.3).

b. Implementation: Operating reactors will complete by January 1, 1980. Operating license applicants will complete before fuel loading.

c. Resources: None, assume delegation to existing personnel.

3. Shift manning.

a. Description: Licensees and applicants will recruit and train the additional personnel for shift operations and develop overtime procedures.

b. Implementation: Operating reactors will meet personnel requirements by July 1, 1981, and overtime procedures by July 1, 1980. Operating license applicants will complete procedures and personnel requirements before fuel loading.

c. Resources: Approximately $500,000 per year on the average (based on estimate of at least two extra people per shift plus relief).

4. Codification of short-term upgrading: No licensee action is required.

5. Long-term upgrading: No licensee action is required unless rule changes increase requirements beyond those issued by the preceding NRC items I.A.1.1 through I.A.1.3.

D. <u>OTHER ACTIONS</u>: None.

E. REFERENCES

President's Commission Report: Items A.4.a and B.4

Other: NUREG-0578, Recommendations 2.2.1.a and 2.2.1.b

NUREG-0585, Appendix A, Recommendations 2 and 3

NUREG-0616, Recommendation 6

RFP-NRC-80-117, Requirements for Operator Licensing

NRC-03-80-105, Utility Management and Technical Resources

Letter from Chairman, ACRS, to Chairman, NRC, dated December 13, 1979, "Report on TMI-2 Lessons Learned Task Force Final Report"

TASK I.A.2 TRAINING AND QUALIFICATIONS OF OPERATING PERSONNEL

A. OBJECTIVE: Improve the capability of operators and supervisors to understand and control complex reactor transients and accidents, and improve the general capability of an operations organization to respond rapidly and effectively to upset conditions. The objective is to increase the education, experience, and training requirements for operators, senior operators, supervisors, and other personnel in the operations organization to substantially increase their capability to perform their duties.

B. NRC ACTIONS

1. Immediate upgrading of operator and supervisor training and qualifications.

a. Description: NRR will require all operating plant licensees and all license applicants to provide specific improvements in training and qualifications of operating personnel including shift supervisors, senior operators, and control room operators. NRR will also require that a level of corporate operations management that is higher than previously required must certify the fitness of candidates for operator licensing by NRC. The NRR staff will review the contents of revised training programs, and the IE staff will audit the implementation. NRR will indicate that licensees need to make every effort to meet the requirements as soon as possible within the time limits specified below for each change.

(1) Qualifications

(a) Shift supervisor* - Applicants for operator licenses shall meet the experience requirements of Recommendation 1 of SECY 79-330E six months after the requirement issue date. An applicant for a senior operator license shall have been a licensed operator for one year commencing one year after the requirement issue date (Recommendation 2 of SECY 79-330E). In the long term, Regulatory Guide 1.8 (and associated ANS Standard 3.1) will be revised to include the education requirements of NUREG-0585, Recommendation 1.6(2), for implementation by about 1983 (same as shift technical advisor) and implementation of Recommendation 1.6(1) by about 1985 (bachelor of science degree in science or engineering, or equivalent). Regulatory Guide 1.8 and ANS 3.1 are being revised to include specification of more detailed criteria for this longer term. The ACRS letter of December 13, 1979, offered constructive advice in the area of personnel qualifications and training to be factored into the staff's review of these revised standards.

(b) Shift senior operator (other than shift supervisor)*: The applicants for senior reactor operator shall meet license requirements for shift supervisors specified above.

(c) Control room operators: There is no immediate change required.

*Precritical applicants will be required to meet unique qualifications designed to accommodate the fact that their facility has not yet been in operation.

(2) Training

(a) Shift supervisor - Training programs for shift supervisors shall emphasize and reinforce the responsibility for safe operation and the management function to assure safety (NUREG-0578, Recommendation 2.2.1.a). Those individuals applying six months after the requirement issue date* shall have three months shift training (Recommendation 3 of SECY 79-330E).

(b) Senior operator*: Applicants shall have three months of shift training six months after the date of the requirement (Recommendation 3 of SECY 79-330E).

(c) Control room operators*: Individuals applying six months after the requirement issue date shall have three months training on shift as an extra person in the control room (Recommendation 3 of SECY 79-330E).

b. Schedule: The requirements will be issued by April 1, 1980.

c. Resources: NRR FY80 - 0.6 my; SD FY80 - 0.3 my, FY81 - 0.2 my; ADM FY80 - $3,000, FY81 - 0.1 my and $3,000; IE FY80 - 1.0 my and $9,000.

2. Training and qualification of other operations personnel.

a. Description: Each licensee will be required to review, within one year, its training program for all operations personnel, including maintenance

*Precritical applicants will be required to meet unique qualifications designed to accommodate the fact that their facility has not yet been in operation.

and technical personnel, and to justify the acceptability of training programs on the basis that these programs provide sufficient assurance that safety-related functions will be effectively carried out. Documentation of this review and justification will be retained onsite for inspection, but need not be submitted to the NRC for review. The preferred method of fulfilling this recommendation is a position task analysis, in which the tasks performed by the person in each position are defined, and the training, in conjunction with education and experience, is identified to provide assurance that the tasks can be effectively carried out. The position task analysis will include normal and emergency duties (such as maintenance activities), and place emphasis on the role played by every member of an operations organization that assures safe plant operations. All levels of the operations organization will be included.

The scope of emergency duties defined in the position task analysis will not be restricted to only the transients and accidents considered in the design basis. The training will recognize that events beyond the current licensing design basis events can occur. The training will include the use of the systems already installed at the plant to control or mitigate the consequences of accidents in which the core is severely damaged.

The staff has a contract (NRC-03-08-116) with Basic Energy Technology Associates, Inc. (BETA), that includes study of selection, training, and qualifications of maintenance personnel. The results of this study will be considered in the development of requirements in this area.

b. Schedule: NRR will issue a requirement by May 1980.

c. Resources: NRR FY80 - 0.1 my and $10,000; IE FY81 - 1.0 my and $9,000.

3. NRR audit training programs for licensed operators.

a. Description: NRR will develop criteria and procedures to be used in auditing training programs, including those provided by reactor vendors. The audit to be conducted by NRR will assure that training is formalized and structured, including the use of lesson plans, qualified instructors, qualified supervision of instructors, and proper conduct of testing. The audits will eventually be in conformance with training institute accreditation described below. Pending accreditation of training institutions, the NRR audit criteria will include a requirement that phases II, III and IV cold-training operational program instructors and all hot-training operational program instructors hold or have previously held a senior reactor operator (SRO) license or certification on a comparable nuclear power plant. These instructors will be required to successfully participate in requalification programs to retain instructor status, or possess instructor certification from INPO, provided that such a certification program has been examined by NRC and found to be acceptable. The audit criteria will also place emphasis on the instructors' ability to teach as well as their technical knowledge (NUREG-0585, Recommendation 1.4(6), Recommendation 5 of SECY 79-330E).

b. Schedule: NRR will complete criteria development by June 1980, and begin auditing by July 1980.

c. Resources: NRR FY80 - 0.5 my; FY81 - 1.3 my; ADM FY80 - 0.1 my; FY81 - 0.1 my and $7,000.

4. NRR participation in IE inspector training.

a. Description: As part of the established IE inspector training program, operator licensing and human factors personnel in NRR will provide instruction on the role and licensing of reactor operations staff, including the types of feedback of field observations needed by the NRR staff (NUREG-0585, Recommendation 1.4(1)).

b. Schedule: The inspection program will be initiated in July 1980.

c. Resources: NRR FY80 - 0.2 my, FY81 - 0.1 my.

5. Plant drills.

a. Description: NRR will require licensees to develop and conduct in-plant drills by shift operating personnel. Normal and off-normal operating maneuvers will be required to be simulated for walk-through drills on a plant-wide basis. Drills will also be required to test the adequacy of reactor and plant operating procedures (NUREG-0585, Recommendation 1.3).

Over the long term, the staff will give consideration to the need for a standard on in-plant drills analogous to the casualty drill manual used in naval reactors. The results of study NRR-80-117 will be considered in the development of long-term recommendations, as will the conduct of drills involving actual maneuvers of the plant and the desirability of initiation of drills by NRC inspectors.

b. Schedule: Issue short-term requirements by May 1980. Develop long-term standard and issue for comment by May 1981.

c. Resources: NRR FY80 - 1.0 my, FY81 - 1.0 my; ADM FY80 - $5,000, FY81 - $5,000.

6. Long-term upgrading of training and qualifications.

a. Description: SD will develop new regulations and regulatory guides for training and qualifications of reactor operators, senior operators, shift supervisors, auxiliary operators, technicians, and possibly other operating personnel.

(1) SD will revise Regulatory Guide 1.8 (ANSI/ANS 3.1) to incorporate the shorter term requirements described above and any other changes resulting from the national standards effort.

(2) Based on NRR review of study NRR-80-117, "Requirements for Operator Licensing," SD will make recommendations to the Commission and factor decisions into regulatory guide or regulation changes.

(3) SD will develop revised 10 CFR 55 for action by the Commission to incorporate short-term changes described above plus a requirement for mandatory simulator training for all applicants for licenses (Recommendation 7, SECY 79-330E), mandatory simulator training in requalification (Recommendation 11), instructor qualifications, NRC administration of requalification examinations (Recommendation 9), NRC administration of certification

examinations (Recommendation 5), release of examination results (Recommendation 14), mandatory operating tests at simulators, and criteria on exercises to be performed on the simulators (Recommendation 4, SECY 79-330E).

(4) NRR will develop a paper for Commission consideration of and decision on NRC training workshops for licensed personnel (NUREG-0585, Recommendation 1.4(5)).

(5) IE will develop inspection procedures for training programs (NUREG-0616, Recommendation 2.4.2.).

(6) NRR will establish definitive instructional requirements for the basic course in nuclear power fundamentals in licensee training programs.

b. Schedule:

(1) SD will issue revised Regulatory Guide 1.8 for public comment by June 15, 1980.

(2) SD will complete its review of study NRR-80-117 and submit a paper to the Commission by October 1, 1980; revise and reissue for comment Regulatory Guide 1.8 resulting from Commission action on study; complete public comment by March 1, 1981; and complete effective guide by February 1, 1982.

(3) SD will revise 10 CFR 55 and issue the revision for public comment by October 1, 1980; the effective rule will be issued by September 1, 1981.

(4) NRR will make recommendations to Commission by January 1, 1981.

(5) IE will develop procedures by February 1, 1982.

(6) NRR will establish instruction requirements by January 1, 1982.

c. Resources:

(1) SD FY80 - 1.2 my, FY81 - 0.33 my; NRR FY80 - 0.1 my; ADM FY80 - 0.4 my and $23,000, FY81 - 0.3 my and $31,000.

(2) SD FY81 - 0.33 my; NRR FY80 - 0.4 my and $200,000.

(3) SD FY80 - 0.1 my, FY81 - 0.5 my; NRR FY80 - 0.5 my, FY81 - 0.5 my.

(4) NRR FY81 - 0.3 my.

(5) IE FY81 - 1.33 my and $11,900.

(6) NRR FY80 - 0.3 my, FY81 - 0.1 my.

7. Accreditation of training institutions.

a. Description: NRR will complete an ongoing study of procedures and requirements for NRC accreditation. NRR will prepare an information paper concerning accreditation. SD will prepare a Commission paper presenting the pros and contras of various NRC approaches to accreditation of training institutions, coordinate with INPO to include thorough discussion and assessment of INPO programs.

b. Schedule: NRR will complete study by April 1980. NRR will complete information paper by June 1980. SD will complete a Commission action paper by May 1981.

c. Resources: NRR FY80 - 0.4 my and $80,000, FY81 - 0.2 my; SD FY80 - 0.6 my, FY81 - 1.0 my; ADM FY80 - 0.2 my and $7,000, FY81 - 0.2 my and $7,000.

C. <u>LICENSEE ACTIONS</u>

1. Immediate upgrading of training and qualifications.

a. Description: All operating license applicants and operating reactor licensees must recruit and train personnel to meet the new requirements.

b. Implementation: Licensed operators must meet the requirements for licensing and relicensing on the schedule through 1985 as defined in NRC item I.A.2.1.

c. Resources: $300,000 per year per plant for increased salaries and increased time in training.

2. Training and qualifications of other operations personnel.

a. Description: Licensees will perform position task analysis for all operations personnel and upgrade training and qualifications as found to be necessary.

b. Implementation: Operating reactors must complete analysis and conduct retraining by May 1981. Applicants for operating licenses must complete analysis and conduct retraining by May 1981 or before operating license is issued, whichever is later.

3. NRR audit training programs for licensed operators: Requires no licensee action.

4. NRR participate in IE inspector training: Requires no licensee action.

5. Plant drills.

a. Description: Licensees will establish and execute a program for in-plant safety drills that meets NRC requirements.

b. Implementation: Operating reactors will begin drills by January 1, 1981. Operating license applicants will begin drills by January 1, 1981, or before operating license issuance, whichever is later.

c. Resources: 1 my per reactor to establish program. Resources to execute program are dependent on scope of long-term program and are expected to be high (for example, long-term requirement for plant maneuvers during outage periods for retraining of new crews).

6. Long-term upgrading of training and qualification.

a. Description: Licensees will recruit or train personnel to comply with revised Regulatory Guide 1.8; make arrangements for simulator training of all operator and senior applicants; make arrangements to have personnel attend the workshop; and revise training to upgrade fundamentals course.

b. Implementation: Both operating reactors and applicants for operating licenses will meet criteria by the date specified in Regulatory Guide 1.8; meet requirements by date specified in revised 10 CFR 55; make arrangements for workshop by November 1, 1980; and provide new training in upgraded fundamentals course by 1 year after issuance of revised criteria.

c. Resources: Up to $300,000 per year in salaries for training staff and $8,000,000 capital expenses for simulator purchase.

7. Accreditation of training institutions: The intent is that all licensees would be required to use accredited training institutions once such a program is in place.

D. <u>OTHER ACTIONS</u>: None.

E. REFERENCES

President's Commission Report: Items A.4.a.(i), C.1, C.2, C.3, and C.3.d

Other: NUREG-0585, Recommendations 1.1, 1.2, 1.3, 1.4, and 1.6

NUREG-0616, Recommendations 2.4.2-1 and 2.4.2-7

RFP-NRR-80-117, Requirements for Reactor Licensing

SECY-79-330E/F Qualifications of Reactor Operators

ACRS letter dated December 13, 1979, to Chairman, NRC, "Report on TMI-2 Lessons Learned Task Force Final Report"

ACRS letter dated May 16, 1979, to Chairman, NRC Interim Report No. 3

TASK I.A.3 LICENSING AND REQUALIFICATION OF OPERATING PERSONNEL

A. OBJECTIVE: Upgrade the requirements and procedures for nuclear power plants operator and supervisor licensing to assure that safe and competent operators and senior operators are in charge of the day-to-day operation of nuclear power plants. Increase the requirements for initial issuance of licenses and for license renewals and provide closer NRC monitoring of licensed activities.

B. NRC ACTIONS

1. Revise scope and criteria for licensing examinations.

a. Description: NRR will notify all licensees and applicants of the new scope of examinations and criteria for issuance of reactor operator (RO) and senior reactor operator (SRO) licenses and renewal of licenses based on Commission Action on SECY 79-330E (Recommendations 10, 12, 13). The notification will include a new category on operator and senior operator examination dealing with thermodynamics and related subjects; establish time limits for applicants to complete the examination; increase the passing grade to 80 percent overall with a minimum grade of 70 percent in each category; require that senior operators take oral examinations; and change requalification programs to reflect new initial requirements for issuance of licenses (Task I.A.2).

b. Schedule: NRR will issue requirements by March 1, 1980, and will begin examining to the new criteria by April 1, 1980.

c. Resources: NRR FY80 - 5.5 my, FY81 - 4.3 my.

2. Personnel selection process.

a. Description: NRR will require that licensees develop auditable procedures to indicate a formal process of selecting shift supervisors and technical advisors, including input from top utility management. IE will develop procedures for auditing the process used by licensees in selecting and certifying shift supervisors and shift technical advisors. One purpose of the audit is the need for NRC to confirm that the corporate management level of the utility has established a definitive presence for itself and its responsible line operating managers in selecting, qualifying, and training key personnel (see NUREG-0585, Recommendation 1.4(4)).

b. Schedule: NRR will issue requirement to licensees by March 1, 1980. IE will begin audit by January 1, 1981.

c. Resources: NRR FY80 - 0.1 my, FY81 - 1 my; IE FY80 - 0.3 my, FY81 2 my.

3. NRC operator licensing reforms.

a. Description: NRC will develop and implement a plan to relocate operator licensing branch (OLB) examiners at Nuclear Power Plant Simulator Training Centers or in IE regions (Recommendation 1.4(7), NUREG-0585) and factor in the results of the study of RFP-NRR-80-117. A study of the staffing of the operator licensing program and the qualifications and training of examiners will be initiated (Recommendation 16, SECY 79-330E). A plan to report operator errors and to act on operator errors with respect to continuation of licensing will be developed and implemented (Recommendation 1.4(2), NUREG-0585). [Note that the specification of simulator exercises to be performed is inherent in item I.A.2.6(1). The requirements for simulator use (Recommendations 7 and 11, SECY 79-330E), for instructor qualifications, for NRC administration of requalification examinations (Recommendation 9, SECY 79-330E), and for release of examination results (Recommendation 14, SECY 79-330E) are included in item I.A.2.6(3).]

b. Schedule: A Commission paper will be submitted for consideration by July 1, 1981.

c. Resources: NRR FY80 - 1.2 my, FY81 - 2.0 my; SD FY80 - 1.6 my, FY81 - 1.0 my.

4. Requirements for operator fitness.

a. Description: A regulatory approach will be developed for Commission consideration to provide assurance that applicants for operator and operations supervisor licenses are psychologically fit (stress and malevolence), and to prohibit licensing of persons with histories of drug and alcohol abuse or with histories of criminal backgrounds. Studies, criteria development, public comment, criteria issuance, and implementation are involved. Two studies of interest are already under way in SD: (1) standards for psychological assessment of plant personnel, and (2) behavioral observation program to assure continued reliability of employees.

b. Schedule: Ongoing studies will be completed by October 1980; staff policy will be proposed to Commission by January 1981. SD will issue regulatory guide for comment by January 1982 and issue effective guide by December 1982.

c. Resources: SD FY80 - 0.15 my, FY81 - 0.25 my, FY82 - 0.25 my, FY83 - 0.25 my; ADM FY80 - $2,000, FY81 - 0.1 my and $10,000.

5. Licensing of additional operations personnel.

a. Description: NRR will continue to study the question of which plant personnel, other than reactor operators and senior operators, may need to be licensed by NRC. The study submitted to the Commission for review will include consideration of managers, engineers, auxiliary operators, maintenance personnel, technicians, and shift technical advisors. The study will also include consideration of the training, qualification, and certification efforts for such personnel undertaken by the Institute for Nuclear Power Operations. Furthermore, the study will also include consideration of the results of NRR-80-117, which is planned for completion in September 1980.

b. Schedule: NRR will report results of staff study and recommend policy for adoption by Commission by March 1, 1981.

c. Resources: NRR FY81 - 0.5 my; ADM FY81 - 0.2 my and $15,000.

6. Establish statement of understanding with INPO and DOE.

a. Description: A statement of understanding between the Institute for Nuclear Power Operations, the Department of Energy, and the NRC will be developed for consideration by the Commission. The statement will address the extent, if any, to which NRC should review or rely upon the training, certification, and other activities of the Institute and the general conditions for such reliance in the future.

b. Schedule: A Commission paper will be submitted by June 1, 1981.

c. Resources: NRR FY81 - 0.5 my; SD FY81 - 0.33 my; IE FY81 - 0.2 my.

C. <u>LICENSEE ACTIONS</u>

1. Revise scope and criteria for licensing examinations.

a. Description: Licensees will prepare applicants for new examinations and will develop and implement new examination criteria and lecture schedules for the requalification program.

b. Implementation: Operating reactors must complete by April 1, 1980; applicants for operating licenses must complete by April 1, 1980 or before operating license issuance, whichever is later.

c. Resources: Small.

2. Personnel selection process.

a. Description: Licensees will develop auditable procedures for selection of shift supervisors and shift technical advisors.

b. Implementation: Operating reactors must complete by January 1, 1981; applicants for operating licenses must complete by January 1, 1981 or before operating license issuance, whichever is later.

3. NRC operator licensing reforms: No licensee action is required.

4. Requirements for operator fitness: Licensees will be required to demonstrate fitness of operators, but the future in this area is too difficult to project at this time to provide meaningful schedules and resources.

5. Licensing of additional operations personnel: No licensee action is required.

6. Establish statement of understanding with INPO: No licensee action is required.

D. <u>OTHER ACTIONS</u>: None.

E. REFERENCES

President's Commssion Report: Recommendations C.2, C.3, and Finding F.3.b

Other: NUREG-0585, Recommendations 1.4(2), (4), (7) and 1.8

NUREG-0616, Recommendations 2.4.2-1, 2, 5

RFP-NRR-80-117, Requirements for Operator Licensing

SECY-79-330E, Qualifications of Reactor Operators

TASK I.A.4 SIMULATOR USE AND DEVELOPMENT

A. OBJECTIVE: Operators have not been well enough trained in the recognition and control of complex transients with multiple equipment failures or operator errors. The objective is to establish and sustain a high level of realism in the training and retraining of operators, including dealing with complex transients involving multiple permutations and combinations of failures and errors. Another overall objective is to improve diagnostic capability and general knowledge of nuclear power plant systems.

B. NRC ACTIONS

1. Initial simulator improvement.

a. Description:

(1) Short-term study of training simulators: NRR and RES will collaborate on a short-term study to collect and develop corrections for the presently identified weaknesses of training simulators. The short-term objective is to establish and sustain a higher level of realism in the training of operators, including dealing with transients, where such gains can be quickly made. In the study, explicit consideration will be given to the programmatic views of Admiral H. G. Rickover in his statement to the Congress on May 24, 1979, and his amplifying remarks in his memorandum to Chairman Ahearne dated December 14, 1979.

(2) Interim changes in training simulators. Based on the results of the short-term study described above, NRR will require that specific weaknesses are corrected in the simulators used to train licensed operators.

b. Schedule:

(1) Short-term study of training simulators: The short-term study will be completed by July 1980.

(2) Interim changes in training simulators: NRR will issue requirements by August 1980.

c. Resources:

(1) NRR FY80 - 0.5 my and $80,000; ADM FY80 - 0.2 my and $15,000.

(2) NRR FY80 - 0.5 my, FY81 - 0.8 my.

2. Long-term training simulator upgrade.

a. Description:

(1) Research on training simulators: Research studies will be performed to improve the use of simulators in training operators, develop guidance on the need for and nature of operator action during accidents, and gather data on operator performance. Tasks include the following:

(a) Simulator capabilities: The accident sequences in WASH-1400 and subsequent risk analyses will be reviewed to identify those combinations of equipment failures and operator errors that will be reproducible by simulators. Advanced codes will be used to calculate the physical response of plant systems during these conditions to assure that the simulators properly represent these responses.

(b) Safety-related operator action: Operating experience will be reviewed to provide data on operator response times during actual and hypothetical accident conditions. The tasks that test an operator's capability to recognize and cope with an accident situation will be analyzed. Operator training programs will be reviewed with respect to the results of these analyses and training improvements will be recommended. Recommendations will be developed relative to the degree of automation that should accompany the activation and operation of engineered safety features, as well as the resulting information display.

(c) Simulator experiments: Experiments will be designed and conducted to determine operator error rates under controlled conditions. This research can yield quantitative results on the effectiveness of proposed changes in information access and display, improved diagnostics, corrective action aids, and improved control room design.

(2) Upgrade training simulator standards: SD has prompted a review and updating of ANSI/ANS 3.5-1979, Nuclear Power Plant Simulators (this effort is currently under way).

(3) Regulatory guide on training simulators: SD will issue a regulatory guide for public comment endorsing ANS 3.5-1979. Based on the results of the short-term study (item 1 above), public comment, research (item 2 above), the revised ANS-3.5, and the study of NRR-80-117, "Requirements for Operator Licensing," SD will revise and issue the regulatory guide for acceptability of nuclear power plant simulators for use in training programs. SD will include procedures and criteria for testing simulators against the regulatory guide.

(4) Review simulators for conformance to criteria: Simulator owners will be required to submit a report that indicates a plan for compliance with a regulatory guide. Submittals from simulator owners will be reviewed and verified, through testing, to assure that the simulators conform to the regulatory guide or they utilize acceptable alternatives.

b. Schedule:

(1) Research on training simulators: The review of simulator capabilities will be initiated by May 1980, and will provide recommendations for sequences to be simulated as risk analyses and advanced codes become available. Tasks analyzing the capability of an operator to respond to accident conditions will be completed by June 1981, and recommendations will be developed by September 1981. Access to a simulator for experimental use will be obtained by January 1981. Experiments on the simulator will be designed by March 1981, and operator performance will be tested under controlled simulator conditions by December 1981.

(2) Upgrade training simulator standards: The revision of ANSI/ANS Standard 3.5-1979 will be completed by December 1980.

(3) Regulatory guide on training simulators: SD will issue a regulatory guide for comment by November 1980, and will issue the effective guide by September 1981.

(4) Review simulators for conformance to criteria: Verification of simulator conformance will be initiated by July 1, 1982.

c. Resources:

(1) RES FY80 - $400,000, FY81 - $600,000, FY82 - $900,000; NRR FY80 - 0.2 my, FY81 - 0.2 my.

(2) SD FY80 - 0.3 my; NRR FY80 - 0.1 my.

(3) SD FY80 - 0.3 my, FY81 - 0.5 my; NRR FY80 - 0.3 my; ADM FY80 - 0.1 my and $5,000, FY81 - 0.1 my and $5,000.

(4) NRR FY82 - 5.0 my; ADM FY80 - 0.1 my and $7,000, FY81 - 0.1 my and $7,000.

3. Feasibility study of procurement of NRC training simulator.

a. Description: In addition to the increased use of industry simulators for training of NRC staff (notably, the work by IE with the TVA training center simulators), a feasibility study of lease or procurement of one or more simulators to be located in the NRC headquarters area will be performed. These simulators will be used in familiarizing the NRC staff with reactor operations, in assessing the effectiveness of operating and emergency procedures and in gathering data on operator performance. The study will include development of system specifications, development of procurement and commissioning schedules, estimation of costs, and comparison with other methods of providing such training for NRC personnel.

b. Schedule: Feasibility study will be completed by March 1, 1981. Commission policy paper with recommendations will be submitted by July 1, 1981.

c. Resources: RES FY80 - $100,000, FY81 - $500,000.

4. Feasibility study of NRC engineering computer.

a. Description: The purpose of this study is to fully evaluate the potential value of and, if warranted, propose development of an engineering computer that realistically models PWR and BWR plant behavior for small break LOCA and other non-LOCA accidents and transients that may call for operator actions. Final development of the proposed engineering computer will depend on a number of research efforts. Risk assessment tasks (integrated reliability evaluation program, or IREP, for example) to define accident sequences covering severe core damage will also provide the guidelines for the experimental and analytical research programs needed to improve the diagnostics and general knowledge of nuclear power plant systems. The programs will assist the development and testing of fast running computer codes used to predict realistic system behavior for these multiple accident studies. These codes will provide the basic models for use in the improved engineering computer as well as the capability for NRC audit of NSSS analyses.

b. Schedule: Development of an engineering computer will be a major project, estimated to take about 5 years to complete. A feasibility study of this project will be performed by December 1, 1980. A policy paper, including recommendations for further action, will be submitted by February 1, 1981.

c. Resources: RES FY80 - $100,000, FY81 - $500,000.

C. LICENSEE ACTIONS

1. Initial simulator improvement.

a. Description:

(1) Short-term study of training simulators: No action is required, but those licensees who own simulators will be asked to participate.

(2) Interim changes in training simulators: Licensees and others who own and use training simulators will be required to accomplish the short-term improvements.

b. Implementation: All simulators used for licensed operators shall be upgraded by January 1, 1981.

c. Resources: $200,000 per simulator.

2. Long-term training simulator upgrades.

a. Description:

(1) Research on training simulators: No licensee action is required.

(2) Upgrade training simulator standards: No licensee action is required.

(3) Regulatory guide on training simulators: No licensee action is required.

(4) Review simulators for conformance to criteria: All simulator owners shall improve simulators and report on conformance to new criteria.

b. Implementation: All simulators shall meet requirements by July 1, 1982.

c. Resources: It is not possible to estimate accumulated cost at this time, but changes could involve hundreds of thousands of dollars per simulator.

3. Feasibility study of procurement of NRC training simulator: No licensee action is required.

4. Feasibility study of NRC engineering computer: No licensee action is required.

D. <u>OTHER ACTIONS</u>: None.

E. <u>REFERENCES</u>

President's Commission Report: Items C.3.c, C.4, and D.4

Other: SECY 79-330E, Recommendation 15

RFP-NRR-80-117, Requirements for Operator Licensing

NUREG-0585, Recommendation 7-4

Statement of Admiral H. G. Rickover before the Subcommittee on Energy Research and Production, May 24, 1979

Letter from Admiral Rickover to Chairman Ahearne dated December 13, 1979

TASK I.B.1 MANAGEMENT FOR OPERATIONS

A. OBJECTIVE: Improve licensee safety performance and ability to respond to accidents by upgrading the licensee groups responsible for radiation protection and plant operation. The areas to be upgraded include (1) staff size; (2) education and experience of staff members; (3) plant operating and emergency procedures; (4) management awareness of and attention to safety matters; and (5) numbers and types of personnel available to respond to accidents. Licensee safety performance would be further improved if (1) a full-time, dedicated, onsite safety engineering staff were established, and (2) an integrated program for the systematic review of operating experience were provided with the concurrent dissemination of information to plant personnel.

B. NRC ACTIONS

1. Organization and management criteria.

a. Description: NRC will develop criteria for onsite and offsite organizations, both management and technical, that will assure the safe operation of the plant during normal and abnormal conditions and the capability necessary to respond to accident situations.

In addition to the NRR and SD staff effort to develop acceptance criteria, a contractor has been selected (Teknekron, Inc.) and work to develop the criteria for both normal operations and accident situations has begun. Other arrangements for assistance in this area have also been made with several consultants on a personal services basis.

To eliminate scheduling problems and duplications of manpower, the following task action items are jointly considered with this task:

Task I.A.1 Operating Personnel and Staffing

Task I.A.2 Training and Qualifications of Operating Personnel

Task I.A.3 Licensing and Requalification of Operating Personnel

Task III.A.2.7 Licensee Emergency Support

Specific items being considered in the development of the acceptance criteria include (a) the competence of management and technical staff, both onsite and offsite; (b) the size of offsite staff and the degree of their involvement in plant operations; (c) types of expertise needed; (d) pooling of resources among utilities; (e) organizational arrangements for both normal and accident situations; (f) the training of management and technical personnel, both onsite and offsite (items I.A.2.1 and I.A.2.2), to assure full knowledge of plant operations and reactor safety; (g) staffing of control room personnel (item I.A.1.3); (h) the quality assurance program and its staffing; (i) financial capability (in the event reliance is placed on outside contractual assistance during the accident situation); (j) a requalification program for management and technical personnel (item I.A.2); (k) procedures for normal operations, accident conditions, surveillance, and maintenance; (l) special requirements for accident situations including control room access, onsite technical support center, and onsite operational support center; (m) implementation of preestablished plans for using available resources in the event of unusual situations; (n) provision of necessary independent technical review onsite; (o) reporting of unusual events; and (p) policy for the consideration by management of unresolved safety issues identified at all levels.

The NRC will coordinate development of the acceptance criteria with similar efforts of the Atomic Industrial Forum (AIF) and the recently created Institute of Nuclear Power Operations (INPO).

The proposed NRC activities are identified as follows:

(1) NRR will prepare draft criteria to be used by an interoffice review team.

(2) IE will establish an interoffice team and review near-term operating facilities against the draft criteria.

(3) NRR will prepare a Commission paper to issue the criteria to operating plants.

(4) NRR will issue requirements for the upgrading of management and technical resources of currently operating facilities as well as those facilities under construction. NRR will meet with utility representatives when necessary.

(5) NRR will review the information provided by licensees of operating plants and by holders of construction permits to determine the acceptability of their responses. NRR will meet with utility representatives when necessary.

(6) IE will review licensee implementation of the upgrading activities.

(7) SD will prepare proposed revisions to Regulatory Guides 1.33 and 1.8.

(8) SD will issue revised Regulatory Guides 1.33 and 1.8.

b. Schedule:

(1) NRR selected a contractor in October/November 1979 to help prepare the draft criteria by January 1, 1980.

(2) IE will manage an interoffice team to inspect near-term operating licensee sites from February 1980 to February 1981.

(3) NRR will issue a Commission paper by January 1981.

(4) NRR will issue requirements to all operating plants by March 1981.

(5) NRR will review responses by July 1981.

(6) IE will inspect licensee implementation from October 1981 to June 1982.

(7) SD will issue for comment the revised Regulatory Guides 1.33 and 1.8 by March 1981.

(8) SD will issue revised Regulatory Guides 1.33 and 1.8 by February 1982.

c. Resources: NRR FY80 - 4.3 my and $150,000, FY81 - 2.8 my; IE FY80 - 1.8 my, FY81 - 1.8 my, FY82 - 6.4 my; SD FY80 - 0.2 my, FY81 - 0.33 my; ADM FY80 - 0.3 my and $7,000, FY81 - 0.4 my and $17,000.

2. Establish onsite safety engineering group.

a. Description: NRR will develop criteria for a full-time, clearly identifiable onsite safety engineering group. NRR will consider the interaction of the safety engineering group with other committees or groups already established to oversee certain plant operational aspects to assure the effectiveness of the group and to avoid duplication of review efforts. They will consider the following characteristics of the safety group: the number of people, the areas of expertise, competence, the assigned scope of work, organizational relationships, authority, and reporting requirements. With the role of shift technical advisor being incorporated in the safety engineering group, the duties and responsibilities of the group should include (1) close coordination with the engineering groups of the nuclear steam supply system vendors and the architect-engineers, (2) careful review of reported operating experiences, and (3) review of design changes.

NRR will coordinate the development of the acceptance criteria with similar efforts performed by the AIF and the recently created Institute of Nuclear Power Operations. Industry efforts to upgrade ANSI N18.7 (ANS-3.?) will also interact with this work. The work performed by Teknekron (RFP RS-NRR-80-105) for NRR will be coordinated with the SD revisions of Regulatory Guides 1.8 and 1.33 under item 1 above.

b. Schedule: See item I.B.1.1.

c. Resources: ADM FY80 - 0.1 my and $10,000, FY81 - 0.1 my and $5,000; NRR FY81 - 0.4 my; SD FY80 - 0.7 my, FY81 - 0.4 my.

3. Establish criteria for radiation protection organization.

a. Description: NRR, SD, and IE groups will establish draft criteria for radiation protection organization. The Edison Electric Institute (EEI) Task Force on Power Reactor Health Physicists will review and comment on the proposed criteria. NRR will review the pertinent comments and incorporate criteria into the radiation protection program (RPP) description (see item III.D).

b. Schedule: IE will participate in an interoffice review of the overall organization and management of near-term operating license applicants. This review will take place from February 1980 to February 1981. The proposed draft criteria will be completed by January 1981, and the final criteria will be issued by March 1981.

c. Resources: NRR FY80 - 0.3 my; SD FY80 - 0.3 my; IE FY80 - 0.3 my.

4. Licensee onsite evaluation capability.

a. Description: NRR will issue requirements for each plant to have the onsite capability to evaluate operating experience of the plant and of plants of similar design.

b. Schedule: NRR issued letters to: operating reactors on September 13 and October 30, 1979; operating license applicants on September 27, 1979 and November 9, 1979; and pending construction permit applicants and licensees of plants under construction on October 10, 1979 and November 9, 1979.

c. Resources: NRR FY80 - 1.0 my, FY81 through FY84 - 0.1 my; ADM FY80 - 0.1 my and $7,000, FY81 - 0.1 my and $7,000.

5. Loss of safety function rule.

a. Description: SD is preparing a staff paper presenting the following options:

(1) Require licensees to immediately place plant in the safest shutdown cooling condition following a total loss of safety function if a total loss of safety function had occurred within the previous year or two. Resumption of operation would require NRC approval based on a review of the licensee's program for corrective action.

(2) Use existing enforcement options (citations, fines, shutdowns) to accomplish purpose. No rule change would be required for this option.

(3) Use non-fiscal approaches such as a point system, license probations, and license revocations. No rule change wouuld be required for this option.

b. Schedule: A paper will be sent to the Commission by February 1980.

c. Resources: SD FY80 - 0.6 my, FY81 - 0.45 my; ADM FY80 - 0.1 my and $7,000, FY81 - 0.1 my and $7,000.

C. LICENSEE ACTIONS

1. Organization and management criteria.

a. Description:

(1) Each licensee will submit a description of organization, training, and staffing required to meet acceptance criteria.

(2) Each licensee will restructure its plant organization to assure that the decision-making process is properly integrated for normal, abnormal, and accident situations and that management is aware of and involved in plant activities during plant design, construction, and operation.

(3) Licensees will supplement staff and training as necessary to provide adequate numbers of personnel, areas of expertise, and competency to meet acceptance criteria.

b. Implementation: Near-term operating license applicants will respond to inspection findings before license is issued. Operating reactors will submit a description by May 1981. Operating license applicants will submit a plan for implementation prior to operating license issuance, if issued after May 1981.

c. Resources: 4 my per utility (submittals and reviews), 25 my per utility (added staffing, training, etc.).

2. Establish onsite safety engineering group.

a. Description: The licensee will accomplish the following items to implement the new criteria:

(1) Establish an independent, onsite safety review group in accordance with the acceptance criteria and integrated with the operating experience evaluation function and management for operations function. This group may

include personnel from the operating experience group and the shift technical advisor (see item I.A.1).

(2) Provide the necessary and qualified personnel to implement the functions of the new group.

(3) Prepare the procedures to be utilized by the new group to perform its function.

b. Implementation: See item I.B.1.1.

c. Resources: 5 my per plant (estimated).

3. Criteria for radiation protection organization and staffing: See action listed in item III.F.1.d.

4. Licensee onsite evaluation capability.

a. Description: Each licensee will establish the onsite capability to evaluate the operating history of its plant and plants of similar design. This function should be part of the independent onsite safety engineering group (see Task I.B.2) and may include the shift technical advisor (see Task I.A.1).

b. Implementation: Operating reactors will establish evaluation capability by January 1980. Applicants for operating licenses will complete requirement prior to fuel loading.

c. Resources: 3 to 4 my per site for each licensee.

5. Loss of safety function.

a. Description: Licensees will take necessary steps to comply with the rule.

b. Implementation: Operating reactors will complete requirements by January 1981. Applicants for operating licenses will complete by January 1981.

c. Resources: 0.1 my per unit.

D. <u>OTHER ACTIONS</u>

1. Organization and management criteria: None.

2. Establish onsite safety engineering group: None.

3. Establish criteria for radiation protection organization.

a. Description: The Edison Electric Institute will review and comment on draft criteria.

b. Implementation: Complete by May 31, 1980.

c. Resources: 0.5 mm.

4. Onsite evaluation: None.

5. Loss of safety function: None.

E. REFERENCES

1. Organization and management criteria.

President's Commission Report: Item A.11.d (p. 66), B.2 (p. 68), and B.3.a,b,c (p. 68)

Other: NUREG-0578, 2.2.1.b (was revised LCO)
NUREG-0585, 5 (p. A-10), 1.7 (p. A-8)
NUREG-0616, 1.3.3 (p. 10, 11), 2.5.3-5 (p. 53-59), 2.6.2-3 (p. 66-69), and 2.5.5 (p. 59-63)
ACRS letter, Carbon to Hendrie, August 13, 1979

2. None.

3. Establish criteria for radiation protection organization.

President's Commission Report: Items A.5 and B.3

Other: Technical Staff Report on Health Physics and Dosimetry, pp. 31, 32, 149-156

NUREG-0600: IE TMI-2 Investigation Recommendations 21 and 22

4. Licensee onsite evaluation capability.

President's Commission Report: Items a.11.B, B.1.b, B.5.d, and D.7

Other: NUREG-0578, Recommendation 2.2.1.b

NUREG-0585, Recommendations 1.4(2), 6.2, and 6.2

5. None.

TASK I.B.2 INSPECTION OF OPERATING REACTORS

A. OBJECTIVE: Improve the safety of operations at nuclear power plants by increasing the effectiveness of the NRC inspection program as follows: (1) revise the existing inspection program, (2) implement the resident inspection program, and (3) systematically assess licensee performance so that NRC may reapportion its resources according to need.

1. Revise IE inspection program.

a. Description: The NRC will revise the inspection program to provide more direct observation and independent verification of licensee activities and reduction of inspection documentation. For plants with operating reactors, these inspections will include, on a sampling basis, such things as:

(1) Verifying the adequacy of management and procedural controls and staff discipline for the conduct of day-to-day operational and surveillance activities;

(2) Independently verifying that systems required to be operable are properly aligned;

(3) Following up on completed maintenance work orders to assure proper testing and return to service;

(4) Observing surveillance tests to determine whether test instruments are properly calibrated and that approved procedures are followed including taking equipment out of service during the test and returning it to service after the test;

(5) Verifying that the licensee is complying with technical specifications and operating parameters by daily control room observations;

(6) Observing routine maintenance to detect such things as the wrong lubricant, improper tightening of valve packing, substitution of unqualified parts, and lack of care in the protection of open systems; and

(7) Inspecting the terminal boards, panels, and instrument racks for unauthorized jumpers and bypasses and checking locations against records to ascertain whether jumpers were removed as stated in the records.

b. Schedule: IE will revise its inspection program by March 1980 and will implement its revised program by July 1980.

c. Resources: IE FY80 - 2 my (existing), FY81 - 1.0 my.

2. Resident inspector at operating reactors.

a. Description:

(1) IE will implement the approved resident inspector program by recruiting, training, and assigning the resident inspectors to provide a

minimum of two resident inspectors at each site (where there are one or two reactors) and an additional resident inspector for each additional reactor. IE will make the necessary organization changes to support this effort.

(2) IE will study the resources needed to provide a resident inspector on all shifts (24 hour/7 days), and prepare a report to the Commission.

b. Schedule: IE will place a senior resident inspector at near-term operating plants by June 1980. The selection of inspectors to man the approved program will be completed by October 1980. IE will prepare a report for the Commission discussing the resources needed for a 24 hour/7 day resident program by February 1980.

c. Resources: IE FY80 - approved program, FY81 - 1 my (study of 24 hour/7 day program); ADM FY80 - 1.5 my and $298,000, FY81 - 0.5 my and $90,000.

3. Regional evaluations.

a. Description: The NRC will establish boards in each region to annually evaluate each licensee's performance. The Licensing Project Manager will participate on the board for the facilities he manages. The board will review in detail the enforcement actions, licensee event reports, technical and management performance, licensee safety attitude, and observations by inspection supervisors and inspectors from all cognizant regional disciplines. The results of this evaluation will be documented and used to determine the adequacy of current enforcement sanctions and to redirect, as appropriate, the inspection effort and program plans. In addition, the evaluation will be used to provide a major input into the formal NRC review board discussed in item 4, below. Meetings with licensee management will be held to discuss board findings as appropriate.

b. Schedule: IE will complete its program development by April 1980 and complete its first regional evaluations by December 1980.

c. Resources: IE FY80 - 1.7 my and $30,300, FY81 - 2.3 my and $20,700, FY82 - 2.7 my and $24,300, FY83 - 2.8 my and $25,200, FY84 - 3.1 my and $37,900; NRR FY80 - 2.5 my, FY81 - 3.0 my; ADM FY81 - $998,000.

4. Overview of licensee performance.

a. Description: A formal NRC review group (composed of senior NRC personnel from IE, NRR, NMSS, SD, as required) will be appointed to provide an overview function of the regional appraisals of the licensees' performance, to determine safety adequacy, and to assess corrective actions planned by regional offices. Based on the findings, the review group will be specifically charged to recommend major enforcement sanctions or license modifications to appropriate office directors. This review group, in addition to receiving inputs from regional evaluations, will receive inputs from NRR project managers, from NRR technical support program personnel, and from other NRC offices as appropriate. The findings from the board will be made public.

b. Schedule: IE will complete the program development by June 1980 and will complete the initial evaluation by December 1980.

c. Resources: IE FY80 - 1.75 my, FY81 - 0.9 my, FY82 - 1 my, FY83 - 1.0 my, FY84 - 1.2 my; NRR FY80 - 0.5 my, FY81 - 0.5 my; NMSS FY80 - 0.2 my, FY81 - 0.2 my; SD FY80 - 0.5 my, FY81 - 0.5 my; ADM FY80 - 0.1 my and $7,000, FY81 - 0.1 my and $7,000.

C. LICENSEE ACTIONS

1. Revise IE inspection programs: No licensee action is required.

2. Resident inspector at operating reactors: No licensee action is required.

3. Regional evaluations: No licensee action is required.

4. Overview of licensee performance: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.8.b, A.11.b, A.11.e, B.1.b, and D.7

Other: NUREG-0616

TASK I.C OPERATING PROCEDURES

A. <u>OBJECTIVE</u>: Improve the quality of procedures to provide greater assurance that operator and staff actions are technically correct, explicit and easily understood for normal, transient, and accident conditions. The overall content, wording, and format of procedures that affect plant operation, administration, maintenance, testing, and surveillance will be included. A major task is to improve procedures for dealing with abnormal conditions and emergencies by improving the delineation of symptoms, events, and plant conditions that identify emergency or off-normal situations that confront the operator and, once identified, to assure (consistent with the operator's training) that correct actions to counteract undesirable symptoms, events, or conditions are included in the operating procedures.

B. <u>NRC ACTIONS</u>: It is proposed to provide immediate improvement of a few selected procedures for operating reactors and near-term operating license applicants. Specific actions will be established for near-term operations, and actions that will lead to new and better approaches to procedures will then be considered for the longer term. In these tasks, a symptoms-oriented approach to abnormal and emergency procedures will be evaluated. This effort will be coordinated with control room, simulator, and training improvements. These actions will be integrated with new operating instruments for diagnostic purposes based on the assumption that adequately trained personnel can perform the specified actions.

1. Short-term accident analysis and procedures revision.

a. Description: There is an ongoing three-phase program for improving the analysis of design basis and off-normal transients and accidents and the procedures handling such transients and accidents (see NUREG-0578, Sec. 2.1.9).

(1) Small-break loss-of-coolant accidents (LOCA's). Letters of September 13 and 27 and October 30, 1979 referencing Section 2.1.9 of NUREG-0578 were sent to all licensees of operating plants, all plants with construction permits, and all applicants for construction permits. Working with licensee-owner groups, the staff required that specific guidelines be prepared to describe analyses to be performed to develop emergency operating instructions for handling small-break loss-of-coolant accidents. Guidelines were prepared for each class of operating plants and were reviewed and approved by the NRR staff.

Detailed emergency operating instructions have been or are being prepared for each operating or near-term operating plant to implement the approved guidelines for handling small-break LOCA's. These instructions will be reviewed by NRC. An NRC audit team (with NRR leading and IE participating) will perform detailed reviews of procedures for two lead plants designed by each reactor manufacturer. Procedures for the remaining operating plants will then be reviewed by IE. For each plant that is being reviewed for an operating license, NRR and IE will review the small-break LOCA emergency operating instructions.

(2) Inadequate core cooling. In letters of September 13 and 27 and October 30, 1979, NRR required operating licensees and near-term operating

licensees to develop procedures to assist the plant operating staff to (a) recognize and prevent impending core uncovering and (b) recover from a condition in which the core has experienced inadequate core cooling. The owners' groups have developed procedures for each operating plant and the owners have implemented these procedures. An NRR team, with IE members, will review these procedures on an audit basis for lead operating plants. IE will review the procedures for the remaining operating plants.

(3) Transients and accidents. In letters of September 13 and 27 and October 30, 1979, NRR required licensees and near-term operating licensees to perform analyses of transients and accidents and to upgrade emergency procedures, including procedures for operating with natural circulation conditions. Emergency procedures are required to be consistent with the actions necessary to cope with the transients and accidents analyzed. Through discussions with the owners' groups, NRR provided guidance for the performance of this task. NRR will review the responses, which are due in early 1980.

(4) Confirmatory analyses of selected transients. In addition to the analyses performed by the reactor vendors, analyses of selected transients will be performed by NRR, using the best available computer codes, to provide the basis for comparisons with the analytical methods being used by the reactor vendors. These comparisons, together with comparisons to other data, will constitute the short-term verification effort to assure the adequacy of the analytical methods being used to generate emergency procedures. (See also item II.E.2.2.)

b. Schedule.

(1) Guidelines for handling small-break LOCA's at operating reactors were established and reviews of lead plants were completed. Reviews of the plants nearing operation will be complete by December 1980 and reviews of 13 more plants will be complete by December 1981. All other reviews will be consistent with operating license review schedules.

(2) Audits of operating plants for adequate core cooling will be completed in FY80. Near-term plants will be reviewed in FY80 and more plants in FY81. Others will be reviewed consistent with operating license review schedules.

(3) Reviews of submittals of analyses of transients and accidents are to be complete by the end of FY80.

(4) Confirmatory analyses of selected transients are to be complete by June 1980.

c. Resources: NRR FY80 - 11.5 my and $60,000, FY81 - 6 my; IE FY80 - 9.0 my and $81,000, FY81 - 1.7 my and $15,300; ADM FY80 - 0.1 my and $17,000, FY81 - 0.1 my and $17,000.

2. Shift and relief turnover procedures.

a. Description: Shift and relief turnover is required to ensure that each oncoming shift is aware of critical plant status information and system availability prior to assuming duty. Letters stating this were sent to all licensees and applicants specifying conformance to item 2.2.1.c of NUREG-0578. Plant procedures will be reviewed to assure that these functions are adequately prescribed.

b. Schedule: This work is complete except for confirming implementation.

c. Resources: IE FY80 - 0.4 my and $3,600, FY81 - 0.25 my and $2,200.

3. Shift supervisor responsibilities.

a. Description: Duties, responsibilities, and authorities of the shift supervisor and control room operators were required to be properly defined in letters sent to all licensees and applicants specifying conformance to item 2.2.1.a of NUREG-0578. Plant procedures will be reviewed to assure that these functions are adequately prescribed.

b. Schedule: This work is complete except for confirming implementation.

c. Resources: IE FY80 - 0.4 my and $3,600, FY81 - 0.25 my and $2,200.

4. Control room access.

a. Description: Letters were sent to all licensees requiring that the authority and responsibilities of the person in charge of control room access and clear lines of authority and responsibility in the control room in the event of an emergency be established in conformance to item 2.2.2.a of NUREG-0578. Plant procedures will be reviewed to assure that these functions are adequately specified.

b. Schedule: This work is complete except for confirming implementation.

c. Resources: IE FY80 - 0.45 my and $4,100, FY81 - 0.33 my and $2,900.

5. Procedures for the feedback of operating experience to plant staff.

a. Description: NRR will require that licensee procedures be reviewed and revised as necessary to assure that operating experience originating both within and outside the organization is continually provided to operators and other personnel and is incorporated into training and retraining programs.

b. Schedule: The requirement will be imposed by February 1, 1980.

c. Resources: NRR FY80 - 0.1 my; SD FY81/82 - 0.25 my.

6. Modify procedures to account for additional instrumentation.

a. Description: Licensees were required to design additional core-cooling instruments by January 1, 1980 and to install the additional instruments by January 1, 1981. It will then be necessary to modify the plant emergency operating procedures to incorporate the additional information available from these instruments.

b. Schedule: The review of designs is to be completed by March 1980. Revision of the procedures will be confirmed after the equipment is installed. This is to be completed by March 1981.

c. Resources.

(1) For operating reactors: NRR FY80 - 0.33 my, FY81 - 0.25 my; IE FY80 - 0.7 my and $7,200, FY81 - 0.7 my and $7,200.

(2) For operating license applicants: NRR FY80 - 0.25 my, FY81 - 0.20 my; IE FY80 - 0.1 my, FY81 - 0.1 my.

7. NSSS vendor review of procedures.

a. Description: Applicants for near-term operating licenses will be required to obtain NSSS vendor review and approval of low-power and power ascension test and emergency procedures (see Reg. Guide 1.33, Appendix A, Section 6) as a further verification of the adequacy of the procedures.

b. Schedule: Audit reviews will be completed prior to full-power operation.

c. Resources: NRR FY80 - 0.1 my.

8. Pilot monitoring of selected emergency procedures for near-term operating license applicants.

a. Description: An interdisciplinary NRC task force will audit emergency procedures obtained from the near-term operating license applicants. They will look especially at the sections that discuss symptoms and immediate actions. This review will provide a sense of the adequacy of the emergency procedures. In conjunction with the procedure review, this task force will also review the training related to the symptoms of the transients.

The task force will also conduct an in-depth review of selected emergency procedures. The basic elements of the review will be the following: (1) select specific procedures for review (small-break LOCA, loss of feedwater, loss of alternating current, steam-line break, steam-generator tube rupture, etc.); (2) meet with the vendor to discuss analyses and guidelines; (3) meet with the applicant to discuss procedure preparation; (4) observe a simulator walk-through of the selected procedures (with shift crew and shift technical advisor); (5) observe a plant walk-through for one of the emergency procedures (observe shift crew, shift technical advisor, technical support center operation, operational support center operation, etc.); and (6) make findings on preparedness for the accidents covered by the selected procedures.

b. Schedule: This work will be completed prior to issuing a full-power license.

c. Resources: NRR FY80 - 3 my; IE FY80 - 1.3 my and $11,700; ADM FY80 - 0.2 my and $7,000.

9. Long-term program for analysis of transients and accidents for procedure development and upgrading, including IE inspection of procedures and lead plant onsite audit.

a. Description: NRC will institute a long-term program relative to plant procedures that will integrate and expand on current efforts in the review of plant procedures. NRR will lead this effort and will receive significant support from IE, SD and RES. The major part of this task will be accomplished by an interdisciplinary review team that will manage and perform the work. The team will consist of senior individuals in system design (including instrumentation and controls), accident analyses, operator training, and maintenance and testing, with input from IE and from specialists (contractual and new staff) in human factors, crisis response, and education. The review team will also study how plant procedures should best be written, the proper interrelationships among administrative, operating, maintenance, test and surveillance procedures, and the depth and content of regulatory review.

The scope of review will include the transient analyses that form the basis of emergency procedures, reliability analysis, human factors engineering, crisis management, and operator training. Included in this review will be the identification of criteria for establishing a more effective system of verifying the correct performance of operating activities and incorporating such verification in procedures for maintenance, test, surveillance and other normal plant operational activities.

This program will also include review of the computer codes developed by the reactor manufacturers to give more realistic results. A portion of this review effort will be accomplished by RES using the best available computer codes to provide a basis for validating the analytical methods used by reactor manufacturers. The procedures developed by the licensees will be reviewed by a mix of NRR and IE personnel. A similar effort will be expended as part of the staff review of operating license applications.

The overall goal of the long-term effort is the development of procedures for handling emergency and off-normal conditions so that plant operating staff will have to deal with relatively fewer procedures than now exist. Such procedures may be symptom-oriented and would be used by the operating staff in diagnosing what had occurred and/or guiding their actions.

A study to be performed by NRR, IE, and RES will investigate event-tree sequences and transient analyses needed to develop symptom-oriented procedures and explore their advantages. This study will cover explicitly the treatment of operator actions and errors, the grouping of transients and accidents to be considered, the treatment of single and multiple active failures, and the treatment of passive failures. The review group will provide guidance on required parallel efforts by industry that may be carried out by INPO, NSAC, or others. For the analyses, NRC will use best-estimate calculational models and parameter values to lead to realistic estimates of values for the important variables of the transients and accidents analyzed.

Supporting the overall effort to improve emergency procedures will be the IREP program (see Task II.C.1). Deficiencies identified by IREP in technical specifications, procedures, surveillance, maintenance or verification that contribute to the dominant sequences will be identified and improvements suggested in IREP interim reports. This will provide input to the procedures review. In addition, the LOFT reactor technical specifications and emergency procedures will be examined to see whether they might be applicable to large power reactors and provide information to improve licensee procedures.

A final part of this phase of the long-term procedures upgrade consists of a "pilot-program" in which a lead-plant onsite audit of plant procedures developed in accordance with preliminary criteria will be conducted. The purpose of this "pilot-program" review is to assure that the intent of these improvements in procedures has been carried out and has resulted, in fact, in improvements in plant operations. It is anticipated that significant industry interaction with this team will be required in many areas and that the ACRS will be closely involved.

The culmination of the effort expended in the analysis of transients and accidents for procedure development and the long-term program for plant procedures will be the issuance of revised regulations and regulatory guides. The revised regulations and regulatory guides will delineate requirements for proper content and formatting of procedures and for the material needed for NRC review.

Emergency procedures developed in accordance with this plan will be reviewed and inspected by IE. The inspection of the upgraded procedures will assure that the quality and content meet the short-term guidelines and those resulting from this longer term effort. In addition a continuing program will be established for inspecting changes to emergency operating procedures and to examine the procedures for each plant that is granted an operating license.

b. Schedule: The plan will be developed by March 1981 and new criteria will be established by December 1982. Licensee procedures will be revised in 1983 and IE will inspect the upgraded procedures in 1983.

c. Resources: NRR FY81 - 16 my and $250,000, FY82 - 24 my and $450,000, FY83 - 6 my and $100,000; IE FY80 - 5.3 my, FY81 - 10 my and $90,000, FY82 - 10 my and $90,000, FY83 - 4 my and $36,000; SD FY81 - 1.0 my, FY82 - 2 my; ADM FY82 - 1.5 my and $80,000.

C. LICENSEE ACTIONS

1. Short-term accident analysis and procedure revision.

a. Description: The effort underway to improve design-basis and off-normal transient accident response and procedures has been coordinated through owner's groups and with individual licensee representatives. The three-phase efforts are as follows:

(1) Small-break loss-of-coolant accidents (LOCA's). Owner's groups prepared specific guidelines for the analyses required to develop emergency

operating procedures for small break loss-of-coolant accidents. After review and approval of these guidelines by NRR, detailed analyses were or are being performed and detailed procedures are being prepared for review by NRC and implementation on each operating reactor. Similar efforts will be required for each plant undergoing operating license review prior to issuance of a full-power license.

(2) Analysis of inadequate core cooling. Owner's groups representing licensees of operating plants developed procedures to assist the plant operating staff of each plant to recognize and prevent impending core uncovery and recover from a condition where the core has experienced inadequate core cooling. These procedures are being reviewed by NRC and being implemented for each operating plant.

(3) Analysis of transients and accidents. Owner's groups representing licensees of operating plants have initiated work on a comprehensive analysis of transients and accidents to develop emergency procedures for the plant operating staffs. NRC is scheduled to provide additional guidance. The owner's groups must define in detail the approach they proposed to use to develop emergency procedures. In general, the approach will be a combination of event-tree and transient analyses. After review by NRC, the licensees must perform the analyses and develop emergency procedures for each operating reactor.

b. Implementation.

(1) Short-term accident analysis and procedure revision is to be completed for operating reactors by January 1, 1980. Operating license applicants must complete the work prior to fuel loading.

(2) Analyses of inadequate core cooling are to be completed for operating reactors by January 1, 1980. Operating license applicants must complete the work prior to fuel loading.

(3) Analyses of transients and accidents are to be completed for operating reactors by July 1, 1980. Operating license applicants must complete the work prior to July 1, 1980 or a full-power operation license is granted, whichever is later.

c. Resources: FY80 - 4.6 my per plant, FY81 - 1.0 my per plant.

2. Shift and relief turnover procedures.

a. Description: Licensees are to revise plant procedures for shift and relief turnover to ensure that each oncoming shift is made aware of critical plant status information and system availability.

b. Implementation: Operating reactors are to complete revisions by January 1980. Operating license applicants are to complete this work prior to fuel loading.

c. Resources: 0.1 my per plant.

3. Shift supervisor responsibilities.

a. Description: Licensees are to revise plant procedures to assure that duties, responsibilities, and authority of the shift supervisor and control room operators are properly defined.

b. Implementation: Operating reactors are to complete revisions by January 1, 1980. Operating license applicants are to complete prior to fuel loading.

c. Resources: 0.1 my per plant.

4. Control room access.

a. Description: Licensees are to revise procedures to assure that instructions covering the authority and responsibilities of the person in charge of access and clear lines of authority and responsibility in the control room in the event of an emergency are established.

b. Implementation: Operating reactors are to complete revisions by January 1, 1980. Operating license applicants are to complete this work prior to fuel loading.

c. Resources: 0.1 my per plant.

5. Procedures for the feedback of operating experience to plant staff.

a. Description: Each licensee will review its administrative procedures to assure that operating experience from within and outside its organization is continually provided to operators and other operations personnel and is incorporated in training programs.

b. Implementation: Operating reactors will complete by September 1980. Operating license applicants will complete by September 1980 or prior to fuel loading.

c. Resources: 0.5 my per plant.

6. Modify procedures to account for additional instrumentation.

a. Description: Licensees are to install new instruments and revise procedures to incorporate the additional information available from the new core cooling instruments.

b. Implementation: Operating reactors are to complete this work by January 1, 1981. Operating license applicants are to complete these tasks by January 1, 1981 or the operating date, whichever is later.

c. Resources: 0.1 my per plant (procedures only).

7. NSSS vendor review of procedures.

a. Description: Applicants are required to obtain reactor vendor review of their low-power, power-ascension and emergency procedures as a further verification of the adequacy of the procedures.

b. Implementation: This requirement is not applicable to operating reactors. Applicants for near-term operating licenses must complete prior to full-power operation.

c. Resources: 1 my per plant.

8. Pilot monitoring of selected emergency procedures for near-term operating license applicants.

No action by licensees is required except to correct any deficiencies identified.

9. Long-term program for analysis of transients and accidents for procedures development and upgrading.

a. Description: Significant industry efforts will be required in the area of plant procedures upgrading. This may be best accomplished through owner's group participation or through INPO and or NSAC. In either case, an industry study of the analytical bases for procedures, as well as studies of human engineering and crisis management, will be required. Studies of operator

TASK I.D CONTROL ROOM DESIGN

A. OBJECTIVE: Improve the ability of nuclear power plant control room operators to prevent accidents or cope with accidents if they occur by improving the information provided to them.

B. NRC ACTIONS

1. Control room design reviews.

a. Description: NRR will require that operating reactor licensees and applicants for construction permits and for operating licenses perform control room design reviews to identify and correct design deficiencies. NRR will formulate design review guidelines to be used by each licensee and applicant to assist in the identification of design weaknesses. In addition, NRR will develop evaluation criteria to be used by the staff in judging the acceptability of the reviews performed and the design modifications implemented. Prior to promulgating these criteria, NRR will seek industry comments through public meetings and will prepare an information paper to be forwarded to the Commission that describes the criteria and the impact of their implementation.

NRR and IE will audit the licensee and applicant review process and the final reports they will prepare following completion of the reviews. Specifically, NRR and IE will visit several sites while the reviews are under way to identify review deficiencies and the need for the publication of additional review guidance by the NRC. NRR and IE will assess the review reports with the objective of determining, on a case-by-case basis, the need for further control room design modifications and the acceptability of implementation schedules.

A contract has been awarded to the Essex Corporation to develop the review guidelines and the evaluation criteria. Essex will also prepare a plan to be used by the staff in performing the onsite audits of the licensee and applicant review process.

b. Schedule:

(1) Contract to Essex Corporation issued in January 1980.

(2) Control room design guidelines and requirements for a control room design review will be issued to licensees and applicants by April 1980.

(3) NRR and IE will complete onsite audits by July 1980.

(4) NRR will issue a Commission information paper by July 2, 1980, describing the evaluation criteria, the impact of their application, and staff plans for completing the control room reviews. NRR will provide final criteria to licensees and applicants by July 15, 1980.

(5) NRR and IE will complete audit of control room design review reports submitted by licensees and applicants for operating licenses by July 1981 or prior to issuance of the operating license, whichever is later. Reports

submitted by applicants for construction permits will be reviewed on a schedule consistent with permit needs.

c. Resources: NRR FY80 - 1.5 my and $140,000, FY81 - 5.3 my and $100,000, FY82-85 - 2 my/yr and $50,000/yr; IE FY80 - 1 my and $9,000, FY81 - 1 my and $9,000; ADM FY80 - 0.1 my and $10,000.

2. Plant safety parameter display console.

a. Description: NRR will require all licensees and applicants to install a safety monitor console in the control room to provide a concise display of critical process and safety parameters (safety state vector) for each plant. IE will audit each installation to ensure compliance with NRC requirements.

b. Schedule: NRR requirements will be issued by October 1, 1980.

c. Resources: NRR FY80 - 0.20 my; IE FY81 - 0.50 my and $4,500.

3. Safety system status monitoring.

a. Description: NRR will require that all licensees and applicants not presently committed to the requirements of Regulatory Guide 1.47 monitor and verify operations, test, and maintenance activities by means of an automatic status monitoring system (such as described in Regulatory Guide 1.47, "Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems," but capable of accepting additional monitoring functions at a later date). SD will revise Regulatory Guide 1.47 to improve guidance in the area of status monitoring.

b. Schedule: NRR requirements will be completed by March 1, 1980. NRR will complete reviews of proposed designs by March 1981. SD will issue a revised regulatory guide for comment by June 1981, and will issue the effective regulatory guide in April 1982.

c. Resources: NRR FY80 - 0.3 my, FY81 - 3.0 my; SD FY81 - 0.5 my, FY82 - 0.5 my; ADM FY81 - 0.2 my and $12,000.

4. Control room design standard.

a. Description: SD will issue for comment a proposed regulatory guide based on an evaluation of industry standards (IEEE 566 and 567) that includes consideration of the applicability of standards to plants under construction. SD will urge prompt revision of IEEE 566 and 567. NRR will require compliance with the regulatory guide as required.

b. Schedule: SD will issue regulatory guide for comment by July 1981. SD will develop implementation schedule and will issue regulatory guide effective by May 1982. NRR will ensure compliance (or commitment to comply) by May 1983.

c. Resources: SD FY81 - 0.5 my, FY82 - 0.5 my.

5. Improved control room instrumentation research.

a. Description: RES has initiated a number of separate studies aimed at developing new instrumentation to enhance the performance of the control room operator. The following provides a brief description of each task.

(1) Operator-process communication - Current practice and use of lights, alarms, and annunciators in the control rooms of nuclear power plants are being reviewed to assess how well they facilitate operator-machine interaction and minimize errors. Recommendations to improve operator-machine interaction in control rooms will be developed, and supporting laboratory or field experiments will be carried out.

(2) Plant status monitoring - The information needed by the operator to establish unambiguously the status of the plant is being systematically analyzed to assist in the development of plant status monitoring requirements. This includes instrumentation to follow the course of an accident and to identify the status of engineered safety features. The starting point is the definition and description of accident sequences having a high probability of leading to core damage. These efforts supplement activities by the regulatory staff to develop and implement positions related to status monitoring (e.g., Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident"; Regulatory Guide 1.47, "Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems"; definition of plant safety state vector; and capabilities of onsite and offsite technical support centers).

(3) On-line reactor surveillance system - ORNL, under contract to RES, is constructing and testing a continuous on-line surveillance system, based on noise diagnostic techniques, to evaluate selected plant signals for anomalies in operation. Tests will be performed in an operating reactor to check and develop correlations to permit algorithm development for use in monitoring plant parameters.

(4) Process monitoring instrumentation - The feasibility of using new concepts for measuring safety-related physical parameters is being investigated. Appropriate instrumentation will be designed, laboratory-tested, and finally field-tested in nuclear power plants to ensure workability. Emphasis will be placed on possibility for retrofit, reliability, and durability. Instrumentation needs identified include water level in the core, gas bubble in steam generators, low flow rates during natural circulation, and flow through the relief valve.

(5) Disturbance analysis systems - The validity of pertinent methodologies used in computerized diagnostic systems is being identified and evaluated. The findings will help the regulatory staff to determine the need for and nature of requirements for such systems. The goals are to recommend functional requirements for computerized systems capable of diagnosing the cause of a disturbance and to confirm the adequacy of technical approaches used by the industry in developing and demonstrating such systems. Of particular interest is the feasibility and effectiveness of applying diagnostic systems to the whole plant and the potential of these systems to detect adverse interactions among systems. The effectiveness of prototype systems installed in operating power plants will be assessed. In addition, the LOFT project is upgrading its capabilities to use computers and advanced graphics to monitor the status of the reactor. The system will be helpful in testing the feasibility and effectiveness of proposed improvements in the operator-machine interface.

b. Schedule:

(1) Operator-process communication. Initial alarm and video system recommendation is to be developed by December 1980.

(2) Plant status monitoring. Status monitoring requirements are to be confirmed by December 1980.

(3) On-line reactor surveillance systems. Field tests are to be initiated by October 1981.

(4) Process monitoring instrumentation. Studies are now under way. Water level instrumentation suitable for installation in commercial nuclear power plants to be identified by July 1980.

(5) Disturbance analysis systems. Improved display and diagnostics will be installed in LOFT by May 1980. Initial performance and design criteria for disturbance analysis systems will be completed by August 1980. Adequacy of disturbance analysis methods will be verified by December 1982.

c. Resources:

(1) Operator process communication: RES FY80 - $190,000, FY81 - $400,000.

(2) Plant status monitoring: RES FY80 - $200,000, FY81 - $400,000.

(3) On-line reactor surveillance system: RES FY80 - $200,000, FY81 - $150,000; ADM FY80 - 0.4 my and $15,000, FY81 - 0.3 my.

(4) Process monitoring: RES FY80 - $230,000, FY81 - $500,000.

(5) Disturbance analysis systems: RES FY80 - $1,000,000, FY81 - $1,500,000.

6. Technology transfer conference.

a. Description: The NRC jointly sponsored with the IEEE a conference entitled, "Advanced Electrotechnology Applications to Nuclear Power Plants." The objectives of the conference were to consider the practicality of applying advanced technologies from aerospace, defense, aviation, and other industries to reactor safety and to identify areas for further study or development. Much of the conference was devoted to methods of improving the quality of the man-machine interface. This conference included consideration of personnel training and qualification issues per Commissioner Gilinsky's suggestion of December 13, 1979.

Additional meetings with representatives of these advanced technology industries will be scheduled if additional collaboration is judged to be of value.

b. Schedule: Conference held January 15-17, 1980. Proceedings and recommendations to be available by February 1980.

c. Resources: RES FY80 - 0.2 my and $50,000.

C. LICENSEE ACTIONS

1. Control room design reviews.

a. Description: Perform comprehensive review of control room using NRC human factors design guidelines and evaluation criteria. Modify to correct significant deficiencies. Issue report describing methods of review, results of review, including bases for findings made, and implementation schedule.

b. Implementation: Licensees will complete review and implement short lead time revisions by March 1981. Long lead time revisions will be completed by March 1982. Applicants for operating licenses will complete review and implement short lead time revisions by March 1981 or prior to issuance of operating license, whichever is later. Long lead time revisions will be completed by March 1982 or prior to issuance of operating license, whichever is later. Construction permit holders will complete review and implement revisions prior to submittal of FSAR. Applicants for construction permits will complete review by March 1982 or prior to issuance of construction permit, whichever is later.

c. Resources (per reactor): 2 my, $500,000.

2. Plant safety parameter display console.

a. Description: Design and install safety monitor console.

b. Implementation: Licensees will complete implementation by June 1, 1981. Applicants for operating licenses will complete by June 1, 1981, or prior to issuance of operating license, whichever is later.

c. Resources (per reactor): $200,000.

3. Safety system status monitoring.

a. Description: Submit for NRC review a report describing automatic status monitoring systems and install system.

b. Implementation: Licensees will complete implementation by December 1981. Applicants for operating licenses will complete by December 1981 or prior to issuance of an operating license, whichever is later.

c. Resources (per reactor): 0.5 my, $250,000.

4. Control room design standard.

a. Description: Licensees and applicants will alter control room designs where required to comply with industry standard and regulatory guide.

b. Implementation: Licensees will comply with regulatory guide backfit requirements where required. Applicants for operating licenses will comply with regulatory guide backfit requirements where required. Holders of construction permits will comply with regulatory guide prior to submittal of FSAR.

Applicants for construction permits will commit to meet regulatory guide prior to issuance of construction permits.

c. Resources (per reactor): 0.5 my, $100,000.

5. Improved control room instrumentation research: Requires no licensee action.

6. Technology transfer conference: Requires no licensee action.

D. OTHER ACTIONS

1. Disturbance analysis systems (Halden Reactor Project/Federal Republic of Germany/Kraftwerk Union/Bayernwerk).

a. Description: The Halden Reactor Project has demonstrated the technical feasibility of using real-time computerized systems to monitor plant status, display information, diagnose upsets, and prescribe remedial action as aids to nuclear reactor operators. The use of color cathode ray tubes for information display is well advanced and is believed to have excellent near-term potential for improving operator performance. Those facets of the disturbance analysis system (DAS) dealing with upset diagnosis and remedial action are based on detailed logic models that trace the time-dependent consequences of component failures. The difficulties in generating and verifying the accuracy of the logic models must be overcome before applying a DAS to a commercial reactor on a total plant basis. Commercial operational experience will be obtained after installation of a prototype DAS (monitoring the main feedwater system) in the

Grafenrheinfeld PWR in early 1980. NRC will monitor the progress of this activity and factor the findings into the development of regulatory positions on disturbance analysis systems.

b. Schedule: Install prototype system in Grafenrheinfeld PWR in May 1980.

c. Resources: Total program cost is estimated at several million dollars per year; exact resources are not yet available. NRC contribution to this program is negligible.

2. Disturbance analysis and surveillance systems (DOE/EPRI).

a. Description: EPRI and DOE are sponsoring identical, parallel studies by industry of the goals, design requirements, feasibility, and costs of advanced disturbance analysis and surveillance systems. Improvements in both availability and safety are being addressed. EPRI's team is led by Westinghouse with support from Sargent and Lundy, Systems Control, Inc., and Commonwealth Edison. DOE's team is led by Babcock and Wilcox with support from Burns and Roe, General Physics, and Duke Power Company.

In both cases, the participating utilities have agreed in principle to install a prototype system on an operating reactor pending the outcome of scoping studies currently under way. NRC will monitor the progress of this activity and factor the findings into the development of regulatory positions on disturbance analysis systems.

b. Schedule: Complete EPRI/DOE studies by June 1980.

c. Resources: Estimated EPRI/DOE cost for current studies is $500,000 in FY80. Estimated resources for development and demonstration of a prototype system are $3 million to $5 million in FY81-FY83.

E. REFERENCES

President's Commission Report: Items A.4.c(ii) and D.1.d.3

Other: NUREG-0585, Recommendations 5.7.1, 7.2, 7.3, and 7.5
ACRS letters: April 18, 1979
May 16, 1979 (Interim Report No. 2)
December 13, 1979 (Item 7)

TASK I.E ANALYSIS AND DISSEMINATION OF OPERATING EXPERIENCE

A. OBJECTIVE: Establish an integrated program, which involves participation by the licensees, vendors, NSAC, INPO, and the NRC and which includes foreign operations experience, for the systematic collection, review, analysis, and feedback of operating experience to NRC licensing and inspection activities and to licensees for all NRC-licensed activities. Appropriate corrective action will be taken in response to the feedback.

B. NRC ACTIONS

1. Office for Analysis and Evaluation of Operational Data (AEOD).

a. Description: AEOD analyzes and evaluates operational data associated with all NRC-licensed activities, and develops formal guidance for the agency on the collection, evaluation, and feedback of operational data. AEOD serves as the central point of coordination for data collection and analysis within the NRC and with outside organizations.

b. Schedule: The Commission approved the establishment of AEOD in July 1979. The interim office was established in October 1979. Staffing will be complete by June 1980. Interim procedures will be complete by February 1980. Formal procedures are to be completed by April 1980. Complete implementation of information dissemination is to be effective by July 1980.

c. Resources: AEOD FY80 - 20 my and $120,000, FY 81/84 - 20 my and $500,00; ADM FY80 - 0.4 my and $220,000, FY81 - 0.1 my and $100,000.

2. Program office operational data activities.

a. Description: Each major program office will perform special operational safety data analyses.

b. Schedule: NRR interim office was established in October 1979, with staffing to be completed in January 1980. IE staffing was completed in November 1979. MPA staffing yet to be determined. RES staffing to be completed by June 1980. NMSS staffing to be completed by January 1980.

c. Resources: NRR FY80/81 - 8 my; IE FY80/81 - 5 my (headquarters) and $27,000; MPA FY80/81 - 6 my; RES FY80/81 - 4 my; and NMSS FY80/81 - 1.0 my; ADM FY80 - 0.1 my and $200,000, FY 81 - $220,000.

3. Operational safety data analysis.

a. Description: In support of AEOD, RES has initiated special operational safety data analyses. At present, RES is performing studies to determine failure rates for nuclear plant components using the current Licensee Event Report (LER) file; develop and use common-cause analysis of LER's; analyze data from the Nuclear Plant Reliability Data System (NPRDS) to distinguish order-of-magnitude differences of component failure rates between such factors as plants, sizes, service environment, status at time of failure, and manufacturer; identify potentially serious reliability problems evident in the LER data; and identify potential accident precursors.

b. Schedule: Staff and contractors are now performing these functions. Data, models, and analyses are to be provided on a continuing basis in response to and in anticipation of needs.

c. Resources: RES FY80 - $1,145,000, FY81 - $1,200,000.

4. Coordination of licensee, industry, and regulatory programs.

a. Description: Licensees will be required to provide the capability, including onsite engineering, to evaluate the operating history of each plant and plants of similar design (see Tasks I.A.1 and I.B.1). Additionally, licensees will be required to review their administrative procedures to assure that operating experience is continually provided to operators and other operations personnel and is incorporated in training programs (see Task I.C.5). Industry evaluation programs will be conducted at NSAC and INPO and at vendor organizations (see Section D of this task). This action item is necessary to assure that NRC programs are coordinated with industry and licensee evaluation programs and that formal lines of communication are established. AEOD is the lead organization for this coordination.

b. Schedule: June 1980.

c. Resources: (Included with item 1 above.)

5. Nuclear Plant Reliability Data System (NPRDS).

a. Description: NPRDS is a reliability oriented data collection and reporting system for selected components and systems related to the safety of nuclear power plants. Periodic reports containing failure statistics are issued. Licensee participation is voluntary and consequently inadequate. The system itself needs serious restudy in view of the accident at Three Mile Island; NRC will undertake this restudy as a priority item. An advance notice of proposed rulemaking to make participation in the NPRDS mandatory is being prepared for public comment.

b. Schedule: An advance notice was to be issued for comment in January 1980.

c. Resources: SD FY80 - 0.5 my, FY81 - 0.5 my, FY82 - 0.25 my; AEOD FY80 - 0.5 my; MPA FY80 - 1 my and $175,000 for NPRDS.

6. Reporting requirements.

a. Description: Improved reporting requirements are necessary to assure that the information and data for the assessment of facility performance and operational safety is uniformly provided by all licensees in the most efficient manner. Interim action has been initiated by IE with the preparation of a rule for Commission action covering the immediate reporting of significant events. Additional actions include revision of Regulatory Guides 1.16 and 10.1 by SD and the modification of license conditions by NRR and NMSS. AEOD has the overall lead for coordination of this item (see also Task II.J.4).

b. Schedule: IE will issue rule for immediate reporting of significant events by February 1980. Revised regulatory guide will be issued for comment by December 1980 and in effective form by September 1981. License conditions will be modified to incorporate revised reporting requirements by 1981.

c. Resources: NRR FY80 - 1.0 my, FY81 - 3.0 my; IE FY80 - 0.4 my and $3,600; SD FY80 - 0.3 my, FY81 - 0.5 my; AEOD FY80 - 0.5 my; MPA FY80 - 0.5 my; NMSS FY80 - 0.8 my; ADM FY80 - 0.1 my and $5,000, FY81 - 0.1 my and $7,000.

7. Foreign sources.

a. Description: To supplement domestic experience of safety significance, NRC also obtains operating and design information from foreign reactors. This information is obtained through formal regulatory arrangements with governmental agencies of 16 countries. Additional efforts to be taken by IP to obtain improvement in the systematic receipt of foreign operating experience include (1) letters to each of the foreign agreement countries reemphasizing the importance of the timely and regular exchange of data on safety-significant incidents; (2) additional formal agreements authorizing an information exchange to be developed with Canada, Finland, and others; and (3) participation with the nuclear regulatory agencies of other nations in the Nuclear Energy Agency (NEA) for the exchange of operational data.

b. Schedule: IP will send letters by June 30, 1980, and will conclude new agreements by December 30, 1980. Initiation of NEA exchange will be completed by June 30, 1980.

c. Resources: IP FY80 - 1,5 my; AEOD FY80 - 0.5 my.

8. Human error rate analysis.

a. Description: Research programs are currently under way to (1) complete the analysis of field-collected data for human reliability in maintenance and calibration activities at operating nuclear power stations; (2) review abnormal occurrence reports, licensee event reports, and compliance reports to identify areas where human performance reliability is low; (3) develop probability models to predict the error rates for multiple human errors occurring as a function of coupling influences; and (4) identify patterns and basic associative factors for the human-error rates determined for basic test, maintenance, and operator actions. The information can be used to identify necessary and effective improvements in operator transcription and operational aids.

b. Schedule: The most important operator errors will be identified by September 1980. Recommendations for improvement will be completed by March 1981.

c. Resources: RES FY80 - $500,000, FY81 - $500,000; ADM FY80 - 0.1 my, FY81 - 0.1 my.

C. LICENSEE ACTIONS

1. Office for Analysis and Evaluation of Operational Data: Requires no licensee action.

2. Program Office Operational Data Evaluation: Requires no licensee action.

3. Operational Safety Data Analysis: Requires no licensee action.

4. Coordination of industry and regulatory program.

a. Description: Licensees will participate in discussions with NRC and other industry representatives to assure that licensees' programs complement the total program and establish proper mechanisms for licensees to obtain maximum benefits from the program.

b. Implementation: Operating reactors will implement by June 1980; applicants for operating licenses will implement prior to full-power operation.

c. Resources: Minimal.

5. Nuclear Plant Reliability Data System (NPRDS).

a. Description: Licensees participate in NPRDS by collecting and providing reliability data to the system from their experience. They will be requested to provide meaningful, in-depth comments on the proposed rule.

b. Implementation: Comments on proposed rule will be submitted by March 1980.

c. Resources: Licensee participation in NPRDS will require $250,000 per plant for initial effort. Continuing participation in NPRDS will require $50,000 per year per plant.

6. Reporting requirements.

a. Description: Licensees will propose technical specifications that incorporate revised reporting requirements.

b. Implementation: Complete by December 1981.

c. Resources: 0.5 my per plant.

7. Foreign sources: Requires no licensee action.

8. Human error rate analysis: Requires no licensee action.

D. OTHER ACTIONS

1. Nuclear Safety Analysis Center (NSAC).

a. Description: Industry has established a program at NSAC to systematically review available event reports and operating data. Effort will be directed toward identifying possible precursor events, trends, and problem areas; performing failure analyses; and promoting followup with licensees on identified problem areas.

b. Schedule: Activities at NSAC are currently in progress. Staffing will be completed by spring 1980. Contractual support will be completed in early 1980.

c. Resources: Estimated resources are 20 my. Contractor support will total approximately $1,000,000 per year (total resources are estimated at $8,000,000 per year and 50 my).

2. Institute of Nuclear Power Operations (INPO).

a. Description: Industry has established INPO to ensure high quality of operations in nuclear power plants. INPO will review and analyze operating experience and provide feedback to the licensees, incorporate lessons learned into training programs, and coordinate reporting and analysis with other organizations. INPO will also sponsor studies and analysis on human factors in support of reactor operations.

b. Schedule: Activities were initiated in January 1980.

c. Resources: 200 my, $11,000,000 (total program).

3. Manufacturer's program.

a. Description: Each reactor manufacturer has established a program for the review of operating experience with appropriate feedback being supplied to the licensees to improve operational safety and plant availability.

b. Schedule: Ongoing.

c. Resources: Vary with manufacturer. They are estimated to range from 6 to 8 my.

E. REFERENCES

President's Commission Report: Items A.11.B, B.1.b, B.5.d, and D.7

Other: NUREG-0578, Recommendation 2.2.1.b

NUREG-0585, Recommendations 6.1 and 6.2

ACRS May 16, 1979 Interim Report No. 3, Item 3

TASK I.F QUALITY ASSURANCE

A. OBJECTIVE: Improve the quality assurance program for design, construction, and operations to provide greater assurance that plant design, construction, and operational activities are conducted in a manner commensurate with their importance to safety.

B. NRC ACTIONS

1. Develop more detailed criteria.

a. Description: SD, NRR, and IE will develop additional criteria to relate the importance of safety-related structures, systems, and components to the safety requirements in the quality assurance (QA) program. Additional detailed QA requirements will be developed to clarify the QA function in plant design, construction, and operation. These requirements will include consideration of the following:

(1) Expand the QA list to cover equipment important to safety and rank the requirements in order of importance. The results of the integrated reliability evaluation program (IREP) and the systems interaction tasks will be used to establish the importance of equipment as it relates to safety.

(2) Assure the independence of the organization performing the checking functions from the organization responsible for performing the tasks. For the construction phase, consider options for increasing the independence

of the QA function. Include an option to require that licensees perform the entire QA/QC function at construction sites. Consider using the third party concept accompanying the NRC review and audit, and making the QA/QC personnel agents of the NRC. Consider using INPO to enhance QA/QC independence.

(3) Include the QA personnel in the review and approval of plant operational maintenance and surveillance procedures, and quality-related procedures associated with design, construction, and installation.

(4) Include the QA personnel in all activities involved in design, construction, installation, pre-operational and startup testing, and operation.

(5) Establish criteria for determining QA requirements for specific classes of equipment, such as instrumentation, mechanical equipment, and electrical equipment.

(6) Establish qualification requirements for QA and QC personnel.

(7) Increase the size of the QA staff.

(8) Clarify that the QA program is a condition of the construction permit and operating license and that substantive changes to an approved program must be submitted to NRC for review.

(9) Compare NRC QA requirements with those of other agencies (i.e., NASA, FAA, DOD) to improve NRC requirements.

(10) Clarify organizational reporting levels for the QA organization.

(11) Clarify requirements for maintenance of "as built" documentation.

(12) Define role of QA in design and analysis activities. Obtain views on prevention of design errors from licensees, architect-engineers, and vendors.

b. Schedule: A Commission paper on a proposed rulemaking will be prepared by January 1981. SD will issue the proposed regulatory guides by September 1982. The detailed requirements will be implemented by December 1982.

c. Resources: NRR FY80 - 3.1 my, FY81 - 3.0 my; SD FY80 - 1.8 my, FY81 - 2.5 my, FY82 - 2.0 my; IE FY80 - 1.4 my and $10,800, FY81 - 3.2 my and $27,900, FY82 - 2.2 my and $19,800, FY83 - 2.2 my and $19,800; ADM FY80 - 0.2 my, FY81 - 0.1 my and $2,000.

C. LICENSEE ACTIONS

1. a. Description: Develop improved "QA" list and more detailed criteria.

b. Schedule: No licensee action is required.

c. Resources: FY83 - 1.5 my per unit for implementation.

D. OTHER ACTIONS: None.

E. REFERENCES:

President's Commission Report: Recommendations A.5, B.1.a, A.4.b;

Findings E.4.a, E.4.b, E.4.c and E.4.d

President's Commission Technical Staff Analysis Report: Summary; Section 18-1

President's Commission Technical Staff Analysis Report on Quality Assurance.

Quality Assurance Findings, Section 1VB2d&5c; 1VCc&d; 1VA&B; 1VEd, e & f.

TASK I.G TRAINING DURING PREOPERATIONAL AND LOW-POWER TESTING

A. OBJECTIVE: Increase the capability of the shift crews to operate facilities in a safe and competent manner by assuring that training for plant evaluation and off-normal events is conducted by each shift. Near-term operating license facilities will be required to develop and implement intensified training exercises during the low-power testing programs. This may involve the repetition of startup tests on different shifts for training purposes. Based on experiences from the near-term operating license facilities, requirements may be applied to other new facilities or incorporated into the plant drill requirement (item I.A.2.5).

B. NRC ACTIONS

1. Training requirements.

a. Description: NRR will develop acceptance criteria for low-power test programs to provide "hands on" training for plant evaluation and off-normal events for each operating shift.

b. Schedule: NRR will have criteria ready for issuance at time of approval of this plan.

c. Resources: NRR FY80 - 0.3 my, FY81 - 0.5 my; SD FY80 - 0.15 my, FY81 - 0.5 my.

C. LICENSEE ACTIONS

1. Training requirements.

a. Description: Licensees will modify existing or future testing programs to include new requirements.

b. Implementation: Does not apply to operating reactors. Applicants for operating licenses will define plans prior to fuel loading and conduct training prior to full-power operation.

c. Resources: Does not apply to operating reactors. Applicants for operating license - 0.1 my; plants with construction permits - 0.1 my.

D. OTHER ACTIONS: None

E. REFERENCES: None

II. SITING AND DESIGN

TASK II.A SITING

A. OBJECTIVE: Provide an added contribution to safety through (1) the development of siting criteria for new power plants, and (2) the re-evaluation of facilities under construction with regard to the new siting criteria.

B. NRC ACTIONS

1. Siting policy rulemaking.

a. Description: NRC will establish, through rulemaking, (1) numerical criteria for population density, distribution (including population centers), and exclusion distance considering consequences of all classes of accidents and considering capability for evacuation; (2) numerical values for standoff distances from offsite hazards; and (3) the objectives expressed in the remaining recommendations (except Recommendations 4 and 9) of the Report of the Siting Policy Task Force (NUREG-0625). All items are specific recommendations of the NRC Siting Policy Task Force, NUREG-0625, and item (1) addresses President's Commission Recommendation A.6.

During the development of the proposed rule, the staff will identify the principal criteria for evaluating proposed sites for nuclear power stations, recommend the adoption of these criteria in an Interim Policy Statement and Proposed Rule on Siting, and prepare an environmental assessment or environmental impact statement (EIS) of the proposed revisions to meet NEPA requirements. The staff also plans to issue an Advanced Notice of Proposed Rulemaking.

This effort is related to other task action plans (TAPs) including elements of items II.B, "Consideration of Degraded or Melted Core in Safety Reviews," III.A, "NRC and Licensee Preparedness," and III.D, "Public Radiation Protection Improvements."

b. Schedule: Advanced Notice of Proposed Rulemaking will be issued by February 1980. Interim Policy Statement on Siting will be issued by June 1980. Draft rule will be published by October 1980.

c. Resources: NRR FY80 - 4.5 my and 5.0 my contractor ($400,000), FY81 - 2.0 my and 2.0 my contractor ($160,000); SD FY80 - 1.8 my, FY81 - 3.0 my; RES FY80 - 1.0 my, FY81 - 0.5 my; ADM FY80 - 0.3 my, $200,000, FY81 - 0.3 my, $200,000.

2. Site evaluation of facilities with construction permits.

a. Description: Prepare an analysis for Commission decision of the NRC staff plans to reconsider with regard to the revised siting policy facilities that already have construction permits. The analysis would take as a point of departure the criteria expressed in the Proposed Rule or Interim Policy Statement on Siting and would address a strategy for consideration of siting decisions of plants that already have construction permits. Many of the elements of this analysis would also be applicable to plants that are operating, and there must be coordination with item II.B, "Features to Cope with Core Melt Accidents at Sites with High Population Densities."

b. Schedule: Issue staff paper by June 1980.

c. Resources: NRR FY80 - 4.0 my. (This task does not address the resources needed should the Commission direct an extensive review of past siting decisions.)

C. LICENSEE ACTIONS

1. Siting policy rulemaking (NUREG-0625).

a. Description: Applicants will develop and implement procedures to incorporate siting criteria.

b. Implementation: Applicable only to construction permits filed after proposed rule is adopted.

c. Resources: Requires no substantial change.

2. Site evaluation of facilities with construction permits: No facility action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.6

Other: NUREG-0625

TASK II.B CONSIDERATION OF DEGRADED OR MELTED CORES IN SAFETY REVIEW

A. OBJECTIVE: Enhance public safety and reduce individual and societal risk by developing and implementing a phased program to include, in safety reviews, consideration of core degradation and melting beyond the design basis. The program phases are (1) short- and medium-term actions for scoping and implementation; (2) added requirements for high population density sites; (3) research programs and design studies to develop additional needed information; and (4) a rulemaking proceeding to establish long-term policy, goals, and requirements related to accidents involving core damage greater than the present design basis.

The following will be considered:

- Core coolability
  - Degraded core characteristics
  - Primary system chemistry

- Systems functionability and reliability
  - Shielding and accessibility
  - Behavior under irradiation and other environmental stresses

- Radioactivity transport and leakage
  - Leakage from auxiliary systems
  - Leak-tight high-pressure decay heat removal loop
  - Hydrogen in containment structure

Approaches to mitigating severe accidents

Core retention devices

Filtered, vented containment structure

Containment structure ultimate strength

State-of-the-art containment approaches for future plants

Containment inerting

Post-accident recovery

B. NRC ACTIONS

1. Reactor coolant system vents.

a. Description: NRR will require the installation of high-point reactor coolant system and reactor vessel head vents remotely operable from the control room. These vents are to provide the ability to deal effectively with the unexpected presence of noncondensible gases in the reactor vessel and primary coolant system, particularly in quantities that could interfere with coolant flow and distribution by providing a safe vent path. IE will inspect implementation.

b. Schedule: A letter requiring vents was issued to operating reactors on September 13, 1979. Requirements will be issued to all applicants by March 1, 1980. Lead plant review will be completed by February 1, 1980.

c. Resources: NRR FY80 - 0.4 my, FY81 - 0.2 my; IE FY80 - 0.78 my, $6,860, FY81 - 0.7 my, $6,300; ADM FY80 - 0.2 my, $7,000.

2. Plant shielding to provide access to vital areas and protect safety equipment for post-accident operation.

a. Description: NRR will require (1) a radiation and shielding design review of spaces around systems that may contain highly radioactive fluids under accident conditions, and (2) implementation of identified plant modifications that will permit access to vital areas and protect safety equipment. IE will inspect implementation.

b. Schedule: Letter issuing requirements to operating reactors was issued September 13, 1979. Requirements for all applicants will be issued by March 1, 1980. Lead plant review was completed December 21, 1979. SD will issue regulatory guide for comment by September 1980, and issue effective regulatory guide by March 1981.

c. Resources: NRR FY80 - 0.9 my, FY81 - 0.5 my; IE FY80 - 0.64 my, $7,200, FY81 - 1.76 my, $15,840; SD FY80 - 0.3 my, FY81 - 0.5 my; ADM FY80 - 0.1 my, $5,000, FY 81 - 0.1 my, $5,000.

3. Post-accident sampling.

a. Description: NRR will require (1) review of the reactor coolant and containment atmosphere sampling systems and the radiological spectrum and chemical analysis facilities, and (2) implementation of modifications necessary to permit personnel to obtain samples within 1 hour after an accident (without incurring an exposure of an individual in excess of 3 rem whole-body or 18-3/4 rem to the extremities), to analyze samples within 2 hours for radioactive noble gases, iodines, cesiums, and nonvolatile isotopes, to analyze samples within 1 hour for boron, and to analyze for chlorides within a shift. IE will inspect implementation.

b. Schedule: NRC issued requirements to operating reactors in a letter dated September 13, 1979. Letter to all applicants will be issued by March 1, 1980. Lead plant review was completed in December 1979. SD will revise Regulatory Guide 1.21 by June 1, 1980. SD will issue effective Regulatory Guide 1.21 by February 1981.

c. Resources: IE FY80 - 1 my, $8,280, FY81 - 1.16 my, $10,440; SD FY80 - 0.3 my, FY81 - 0.3 my; ADM FY80 - $5,000.

4. Training for mitigating core damage.

a. Description: NRR will require that all operating personnel be given training in the use of systems already installed at the plant to control or mitigate an accident in which the core is severely damaged (see also item I.A.2.2). IE will inspect revised training program.

b. Schedule: NRR will establish requirements for operating reactors and all applicants by February 1, 1980.

c. Resources: NRR FY80 - 0.1 my; IE FY80 - 0.7 my, FY81 - 0.7 my.

5. Research on phenomena associated with core degradation and fuel melting.

a. Description: For a number of key severe accident sequences, there are critical phenomenological unknowns or uncertainties that impact containment integrity assessments and judgments regarding the desirability of certain mitigating features. The phenomena fall into three broad categories; that is, the behavior of severely damaged fuel, including hydrogen generation; the behavior of the core melt in its interaction with water, concrete, and core-retention materials; and the effect of potential hydrogen burning and/or explosions on containment integrity. Steam explosions will also be considered in this category. Previous work in these several areas has received less attention, since they relate to accidents beyond the design basis. Additional emphasis is required. In these several areas, RES will be conducting major programs to support the basis for rulemaking and to confirm certain licensing decisions. Specific descriptions of the three broad categories are:

(1) Behavior of severely damaged fuel.

(a) In-pile studies: Fuel behavior research will include in-pile testing to help evaluate the effects of conditions leading to severe fuel damage. Such tests will be performed in the INEL Power Burst Facility (PBF) in FY81 and later in the ESSOR facility in Ispra, Italy.

In the PBF, RES will perform a series of in-reactor fuel experiments to determine the effect of cooling rate on damaged rod fragmentation and distortion. Fission product release and hydrogen generation will also be measured during the test.

Similar tests will be performed in the ESSOR facility on the longer length, larger fuel bundles possible in the Super Sara Loop. These tests will aid in the characterization of fuel rod fragments over a large radial expanse and the resulting effect on bundle blockage.

(b) Hydrogen studies: The objective of this work is to increase our understanding of the radiolytic formation of hydrogen in a reactor and to determine its consequences in terms of pressure-time histories and hydrogen deflagration and detonation. This work will also include (1) the preparation of a compendium of information related to hydrogen as it affects reactor safety, (2) analysis of radiolysis under accident conditions, (3) a review of hydrogen sampling and analysis methods, (d) effects of hydrogen embrittlement on reactor vessel materials, and (e) a review of means of handling accident-generated hydrogen with recommendations on improving current methods.

(c) Studies of post-accident coolant chemistry: The RES objective in this area is the development of a relationship between fission product release and fuel failure, and the improvement of post-accident sampling and analysis techniques. This will be accomplished by the investigation of fission product release in a variety of fuel failure experiments.

(d) Modeling of severe fuel damage: The effort in this area is the development of fuel models for fuel rods operating beyond 2200°F which suffer a loss in geometry in order to compute extensive damage phenomena (such as eutectic liquid formation, fuel slumping, hydrogen generation, fission product release, and interaction with the coolant, rubble-bed particle size, extent of fuel and clad melting, and flow blockage).

(2) Behavior of core melt. The RES fuel melt research program will develop a base and verified methodology for assessing the consequences and mitigation of fuel melt accidents. The program addresses the range of severe reactor accident phenomena from the time when extensive fuel damage and major core geometry changes have occurred until the containment has failed and/or the molten core materials have attained a semi-permanent configuration and further movement is terminated. Studies of improvements in containment design to reduce the risk of core melt accidents are also included.

The program is composed of integrated tasks that include scoping, phenomenological and separate effects tests, and demonstration experiments that provide results for the development and verification of analytical models and codes. These codes and supporting data are then used for the analysis of thermal, mechanical and radiological consequences of accidents and for decisions related to requirements of design features for mitigation and performance confirmation.

The technical scope of the program includes work in the following areas:

(a) Fuel debris behavior: The work in this area will include the study of thermal-hydraulic behavior of fuel-melt debris beds (particulate and rubble), the associated coolability limits, and the effect of extended dryout in the vessel and in the reactor cavity.

(b) Fuel interactions with structure and soil: The work in this area will include the study of thermal, mechanical, and chemical interactions of fuel melt with structures (concrete, steel, refractory and sacrificial materials and soil).

(c) Radiological source term: The work in this area will include the study of release and transport of aerosols and radionuclides in fuel-melt accident scenarios for radiological consequence assessment.

(d) Fuel-coolant interactions: The work in this area will include the study of thermal and mechanical phenomena associated with explosive interactions of molten fuel materials with reactor coolant and containment fluids and resulting loads on reactor vessel, and the loading and structural response associated with hydrogen explosions in the containment.

(e) Systems analysis codes: The work in this area will include the study of safety system/mitigation feature response performance analysis codes, and accident consequences.

(f) Mitigation features: Evaluations will be made of the feasibility of risk reduction potential, requirements for and performance of improved and alternate safety system and mitigation features (containment, vent-filters, and core retention).

(3) Effect of hydrogen burning and explosions on containment structure: A method will be developed to predict the response of containment structures to hydrogen burning and explosions. Both the loading associated with the hydrogen burning or explosion and structural response will be included.

The NRC will systematically study the uncertainties involved in the prediction of containment response to hydrogen burning and explosions. The staff will then assess the bounds of uncertainty associated with current technology.

b. Schedule.

(1) Severely damaged fuel: The PBF test on severely damaged fuel rods will begin in FY81. ESSOR tests on severely damaged fuel bundles will begin in FY82. Hydrogen studies will begin in FY80 and continue through FY83. Studies of the coolant chemistry will begin in FY80 and will continue until completed. Preliminary planning of the severe fuel damage modeling will begin in FY80 and will continue as needed. The actual code development will probably not begin until FY81.

(2) Behavior of core melt: Several key program-level milestones will be included in FY80 and FY81. Interim system codes and supporting data

base should be available by FY80-FY81. A large fuel-melt test facility should begin operation in FY80. Milestones to be achieved in FY81 include evaluations of the vent-filtered containment structure and alternate containment structure concepts, a feasibility study of a core-retention device, and an analysis of a mitigation feature-safety system interaction.

(3) Effect of hydrogen burning and explosions on containment structure. A study of these effects will begin in January 1980, with near-term assessment scheduled to be completed by September 1980 and full-term assessment to be completed by September 1982.

c. Resources: RES contracts will total $8,860,000 in FY80 and $12,035,000 in FY81. NRR estimates that it will require NRR technical assistance totalling $225,000 in FY80 and $300,000 in FY81 (NRR FY80 - 2.5 my, $225,000, FY81 - 2.5 my, $300,000.

6. Features to cope with core melt accidents in reactors at sites with high population densities.

a. Description: To ensure that the public health and safety is adequately protected, the NRC will review existing data from operating reactors located in areas of high population density to determine whether additional measures are needed to limit the consequences and reduce the residual risks from potential core degradation and core melt accidents.

Indian Point 2 and 3 and Zion 1 and 2 (ZIP) are two nuclear power plant sites that fall into the category of location near high population density. A current in-depth review of these plant sites involves the consideration of (1) improved interim operational actions, such as increased inspection, additional resident inspectors, augmented control room staffing, and improved operator qualifications and training; (2) the implementation, on a priority basis, of current licensing actions that include TMI-2 short-term lessons learned actions (as discussed in NUREG-0578 and in Bulletin and Orders Review matters); and (3) severe accident mitigation features such as filtered containment venting, core retention systems, leak-tight full-pressure residual heat removal system, "bunkered" emergency decay-heat removal system, and hydrogen control measures. This part of the action plan deals only with severe accident mitigation. Although the initial program applies to the two operating nuclear power plant sites with the highest population density in the area, some of the results of this action also apply to operating reactors at other sites close to areas of relatively high population density.

b. Schedule: The NRC issued to licensees its requirements relating to review and evaluation of severe accident mitigation on December 5, 1979. NRR will provide preliminary criteria for the design of mitigative features to licensees of operating reactors by March 14, 1980. More complete criteria will be provided by June 1980. NRR will complete its review of licensee designs by December 31, 1980. By April 15, 1980, a Commission Paper will be issued recommending the implementation of design features to mitigate the consequences of severe accidents in the Zion 1 and 2 and Indian Point 2 and 3 plants. The paper will provide the basis for the need of such features.

c. Resources: NRR FY80 - 6 my, $100,000, FY81 - 3 my, $150,000; IE FY80 - 0.5 my, $4,320; RES FY80 - 2 my.

7. Containment inerting.

a. Description: Certain small LWR containment structures may have to be inerted to prevent their being overpressurized as a consequence of burning hydrogen during a severe accident involving extensive reaction between fuel cladding and reactor coolant. Some containment structures, particularly those with a large volume and high design pressure, may not need inerting. In other containment structures, it may be appropriate to use features and procedures other than inerting to cope with the generation of hydrogen.

b. Schedule: By February 15, 1980, a Commission Paper will be prepared that recommends a suspension of the part of 10 CFR 50.44 that limits the level of hyrogen generated in an accident, recommends inerting of BWR Mark I and Mark II containment structures, and provides the basis for continued operation of other reactors while the problem is being studied further.

The order to inert BWR Mark I and II containment structures should be issued by March 15, 1980. By March 1, 1980, NRC will require licensees and applicants with containments other than BWR Mark I and II containment structures to initiate studies to identify possible means to prevent overpressurization of containment due to hydrogen burning when hydrogen is generated at levels in excess of the levels specified in 10 CFR 50.46. Studies will be completed by June 30, 1980. By March 1, 1980, the NRC will initiate studies to find means that will safely deal with the hydrogen generation levels exceeding the limits in 10 CFR 50.46 and the hydrogen levels in the containment structure exceeding the limits in 10 CFR 50.44. NRC will complete its studies by June 30, 1980. By August 30, 1980, the NRC will issue a Commission Paper reporting the results of NRC and licensee studies, specifying recommendations for consequential actions, and indicating whether actions on containment inerting or use of other features to control hydrogen can be deferred to rulemaking on degraded core and melted core accidents.

c. Resources: NRR FY80 - 1.0 my, $130,000, FY81 - 2.0 my, $130,000; IE FY80 - 0.5 my, FY81 - 0.5 my.

8. Rulemaking Proceeding.

a. Description.

(1) The NRC will issue a notice of intent to conduct rulemaking to solicit comments on the issues and facts relating to the consideration of design features necessary to mitigate the consequences of degraded core and core melt accidents. Specific areas for comment should include, but not be limited to, the objectives as well as the characteristics of possible design features to mitigate the consequences of these types of accidents; additional and supplemental means of preventing core damage or core-melt accidents, in lieu of such features, through improved engineered safety features; the probabilities and consequences of the various sequence of events that could cause the release of significant amounts of radioactivity to the environment; the

expected effectivness and performance of suggested means to reduce the consequences of such events (in particular, the systems for controlled filtered venting of the containment and for preventing the uncontrolled combustion of hydrogen, molten core retention systems, and decay heat removal and radwaste systems designed to function under degraded core conditions); and the possible modification of other requirements, particularly those for siting, emergency plans and procedures, if such design features were required.

(2) The NRC will implement a rulemaking proceeding as specified in NUREG-0585, Appendix A, Item 10, and revise the related rules and/or regulatory guides as necessary. In connection with this rulemaking proceeding, the NRC will require the licensed industry to address the feasibility of filtered vented containment and molten core retention systems.

b. Schedule: The NRC will publish an advance notice of proposed rulemaking by April 1980, and will publish the proposed rule by March 1981.

NRC will evaluate the comments received and research results to establish an effective rule or second-round proposed rule. The rule will be submitted to the Commission by December 1981 if no hearing is scheduled, and by December 1982 if a hearing is scheduled.

c. Resources: SD FY80 - 8.15 my, FY81 - 9.4 my, FY82 - 0.5 my, FY83 - 0.5 my; NRR FY80 - 1.1 my, FY81 - 3.1 my, FY82 - 1.0 my, FY83 - 0.5 my; ADM FY81 - 0.3 my, $275,000, FY82 - 0.3 my, $275,000, FY 83 - 0.1 my, $25,000.

9. Conceptual designs for the mitigation of severe core accidents.

a. Description: The NRC will determine whether all licensees holding construction permits or operating licenses should provide conceptual designs for (1) a filtered vented containment, and (2) a core retention system for their plant(s). If approved, the NRC would perform analyses of conceptual designs to include achievable safety improvements; additional introduced hazards, if any; proposed design basis; and proposed cost and schedule. The licensees would examine both passive and active core retention systems that either delay significantly core melt-through penetration of the containment or permanently retain core debris within the confines of the containment building. The analysis should include the effect that a core retention device has on the containment building pressure, temperature and hydrogen concentration transients, as well as the subsequent radiological releases, both above and below ground, for various core-degraded accident scenarios. The NRR conceptual design program will be initiated to establish design criteria and requirements and to provide feedback to related RES programs.

b. Schedule: By March 1, 1980, the NRC will issue a Commission Paper that will consider this question and may recommend that conceptual design studies of filtered vented containment and core retention systems be undertaken by licensees holding operating licenses and construction permits for their plant(s).

c. Resources: NRR FY80 - 2.2 my, technical assistance - $250,000, FY81 - 2.2 my, technical assistance - $375,000; ADM FY81 - $10,000, FY82 - $10,000, FY83 - $10,000.

C. LICENSEE ACTIONS

1. Reactor coolant system vents.

a. Description: Licensees will be required to install a high point reactor coolant system and reactor vessel heat vents that can be remotely operated from the control room, and demonstrate by analysis that direct venting does not result in violation of combustible gas concentration limits.

b. Implementation: Licensees with operating reactors were required to complete design by January 1, 1980, and will be required to complete installation by January 1, 1981. Applicants for operating licenses are required to complete design prior to full-power operation and to complete installation by January 1, 1981, or prior to full-power operation, whichever comes later. Applicants with construction permits will be required to complete design prior to licensing for operation and to complete installation prior to fuel loading.

c. Resources: 0.5 my per plant, $100,000 per operating reactor or licensee, $50,000 per construction permit.

2. Plant shielding to provide access to vital areas and protect safety equipment for post-accident operation.

a. Description: Licensees will be required to perform radiation and shielding design review of spaces around systems that may contain highly radioactive fluid, and to implement plant modifications to permit adequate access to vital areas and protect safety equipment.

b. Implementation: Licensees with operating reactors were required to complete design review by January 1, 1980, and will be required to complete implementation of plant modifications by January 1, 1981. Applicants for operating licenses will be required to complete design review prior to full-power operation, and to complete plant modifications by January 1, 1981, or prior to full-power operation, whichever is later. Applicants with construction permits will be required to complete design review prior to applying for an operating license, and to implement modifications prior to fuel loading.

c. Resources: 1.0 my and $50,000 per plant.

3. Post-accident sampling.

a. Description: Licensees will be required to review the reactor coolant and containment atmosphere sampling systems, and the radiological spectrum and chemical analysis facilities. They will be required to submit proposed modifications and procedures and to modify the plant as necessary to meet the requirements.

b. Implementation: Licensees of operating reactors were required to complete their reviews and submit proposed modifications and procedures by January 1, 1980. All modifications must be completed by January 1, 1981. Applicants for operating licenses are required to complete their review and submit proposed modifications and procedures prior to full-power operation, and will be required to complete modifications by January 1, 1981, or prior to full-power operation, whichever is later. Applicants with construction permits will be required to submit proposed modifications and procedures with their FSAR, and to complete modifications prior to applying for an operating license.

c. Resources: 1.0 my and $100,000 per plant.

4. Training for mitigating core damage.

a. Description: Licensees are required to develop a training program to teach the use of installed equipment and systems to control or mitigate accidents in which the core is severely damage. They must then implement the training program.

b. Implementation: Licensees with operating reactors will develop a training program by July 1, 1980, and implement the program by January 1, 1981. Applicants for operating licenses are required to develop a training program prior to fuel loading and to implement the program prior to full-power operation. Applicants with construction permits will be required to train all shifts prior to applying for an operating license.

c. Resources: 0.3 my per plant.

5. Research on phenomena associated with core degradation and fuel melting: No licensee action is required.

6. Features to cope with core melt accidents in reactors at sites with high population densities.

a. Description: Licensees of the Zion Station Unit 1 and Unit 2 and Indian Point Station Unit 2 and Unit 3 are conducting an in-depth site study. This study will evaluate measures to mitigate the effects of core melting and to reduce the probability of a severe accident. The licensees will submit the results of this evaluation to the staff on completion.

After the NRC establishes specific features and related design criteria, the licensees will be required to follow these guides to design mitigating features.

b. Implementation: Licensees will be required to submit the results of their evaluations to the NRC staff by February 15, 1980; to undertake designs for "mitigating features" by March 15, 1980; and to complete their designs by October 1, 1980.

c. Resources: Until the NRC determines the specific mitigating features to be required, the resources needed are unknown. Initial estimates of the total cost per plant for a filtered vented containment range from $10,000,000 to $50,000,000 depending on the venting rate, the buildings required, and other design features.

7. Containment inerting.

a. Description: Licensees will be required to inert BWR Mark I and Mark II containment structures in response to Commission instructions. They will also be required to conduct studies to learn how to deal with hydrogen.

b. Implementation: Licensees are required to inert BWR Mark I and II containment structures as ordered, and to conduct studies by June 30, 1980.

c. Resources: Inerting, not estimated; studies - 1 my per plant.

8. Rulemaking.

a. Description: Selected licensees or owners' groups will be required to address the feasibility of mitigating features arising from severe accident considerations (for example, filtered vented containments, core retention features, and hydrogen control capabilities).

b. Implementation: FY80.

c. Resources: 0.5 my for each facility evaluated (Note: This effort is to be accomplished in parallel with the NRC research effort described in item II.B.5.b.).

9. Conceptual designs for the mitigation of severe core accidents.

a. Description: Licensees may be required to conduct conceptual design studies for a filtered vented containment and a core retention system. The formation of owners' groups of similar plants are foreseen as part of effort to consolidate similar activities.

b. Implementation: Licensees will complete studies if requested by April 1, 1981.

c. Resources: core retention system - 20 my per group; filtered vented containment - 20 my per group.

D. OTHER ACTIONS

1. through 4: None.

5. Research on phenomena associated with core degradation and fuel melting: The Electric Power Research Institute has a program relevant to this topic. If rulemaking is announced, the program is likely to expand and accelerate.

6. Features to cope with core melt accidents in reactors at site with high population densities: None.

7. Containment inerting: This may involve the Electric Power Research Institute.

8. Rulemaking: The Electric Power Research Institute involvement is discussed above, and other industry components will participate. If a hearing is scheduled, the resources requirement may be high. For the ECCS rulemaking hearing, hundreds of industry man-years and many millions of dollars were spent.

9. Conceptual designs for the mitigation of severe core accidents: This may involve the Electric Power Research Institute.

E. REFERENCES

President's Commission Report: Items A.7, A.8, D.2, and D.4

Other: NUREG-0578, Secs. 2.1.5(a)(b)(c); 2.1.6(a)(b); 2.1.8(a)(b); 2.1.9
NUREG-0585, Appendix A, Recommendations 9, 10
NUREG-0600, C.1.c(7), C.1.e(3)

ACRS Reports, Memos, Letters:

(1) M. Carbon to J. Hendrie, "Status of Generic Items Relating to LWR's: Report No. 7," 3/21/79, items 3, 59

(2) M. Carbon to J. Hendrie, "Interim Report No. 3 on TMI-2," 5/16/79

(3) M. Carbon to J. Hendrie, "Short-Term Recommendations of TMI-2 Lessons Learned Task Force," 8/13/79

(4) M. Carbon to J. Hendrie, "Studies to Improve Reactor Safety," 8/14/79

(5) M. Carbon to P. Bradford, "Identification of NRC Regulatory Requirements Which Need Changing," 12/13/79

(6) M. Carbon to J. Ahearne, "Report on TMI- 2 Lessons Learned Task Force Final Report," 12/13/79; item 10 (page 3) and item 4 (page 5)

Related tasks in this document:

I.A.2 - Training and Qualifications of Operating Personnel

II.A - Siting

II.C.1 - Reliability Engineering, and Risk Assessment

II.E.4 - Containment Design

II.F - Instruments and Controls

III - Emergency Preparedness and Radiation Effects

TASK II.C.1 RELIABILITY ENGINEERING AND RISK ASSESSMENT

A. OBJECTIVE: Improved systems-oriented approaches to safety review will be developed and implemented. In particular, NRC will employ risk assessment methods to identify particularly high-risk accident sequences at individual plants and determine regulatory initiatives to reduce these high-risk sequences. A cadre of experienced practitioners of system reliability and risk assessment methods will be developed in the NRC, its contractors, and in the industry. Also, a library of accident sequence and system reliability models will be developed for application to analysis of operating experience data, research programs, and evaluation of safety versus cost tradeoffs.

Reliability requirements and the single failure criterion will be improved, and requirements for station blackout and "nonsafety" systems important to risk will be developed. Consideration will be given to improving the "systems interaction" issue in regulatory requirements.

There is abundant evidence from recent experience that quantitative reliability or risk assessment is a valuable tool for the regulation of nuclear reactors. Analysis of this type can provide great insight into the relative safety significance of reactor plant systems and design features and is valuable in assessing the merits of prospective changes in such systems and features. Unfortunately, thorough quantitative reliability analyses, such as were performed on only two plants in the Reactor Safety Study (WASH-1400), are very costly and time consuming, taking dozens of man-years of effort per plant.

Resources and time are clearly not available to conduct a completely integrated reliability evaluation program on each operating reactor and those plants that will operate in the near future -- perhaps 80 plants in all, over the next few years. Consequently, the Interim Reliability Evaluation Program (IREP) described in item 1, below, was conceived to obtain the most significant safety benefits of reliability evaluation on all these plants over the next fews years using available resources in government and industry with, at the most, 10 man-years of effort per plant.

In many respects the quantitative IREP program has much in common with the Systems Interaction (SI) program described in item 2, below. The SI program, which has been under way at NRC for some time, is a qualitative assessment program. As both the IREP and SI programs go forward, there will be serious effort to combine them or share resources to the maximum degree in order to eliminate wasteful redundancy and confusion. As a corollary, criteria and procedures will be developed to apply reliability engineering practices to nuclear plant activities on a comprehensive and consistent basis (item 3, below).

B. NRC ACTIONS

1. Interim reliability evaluation program (IREP).

   a. Description:

(1) NRC IREP: For each reactor, event-tree analysis will be employed to develop a taxonomy of accident sequences suitable for qualitative analysis and for use in probabilistic analyses of core-melt accidents. The initial NRC program will be directed toward operating reactors and near-term operating license applications. System reliability analyses will be performed for the principal systems challenged in these accident sequences. Algebraic expressions for the expected frequency of core melt will be developed for the accident sequences in terms of event probabilities, utilizing the system reliability models (fault trees) and common-cause failure analysis. This effort is similar to, but of much broader scope, than the auxiliary feedwater system reliability study discussed in Item II.E.1. A tentative quantification of sequence frequency will be made to distinguish the risk-dominant sequences and provide for comparative risk and system reliability assessments.

These analyses will include single active and passive and multiple active failures, unavailability due to testing and maintenance, and operator errors associated with standby status, testing, and maintenance, but will exclude maloperation errors by operators during the event. Initiating events will include a wide range of transient and LOCA events. In the interim program, seismic or other natural phenomena sequence initiators will not be considered, nor will plant-to-plant differences in operating staff be weighed.

System reliability models will be developed for the following systems: subcriticality systems, emergency feedwater systems, reactor core isolation cooling system (PWR and BWR), ECCS injection and recirculation systems, shutdown cooling system, containment cooling and spray systems, safety features actuation systems, and auxiliary systems upon which these depend (alternating and direct current, compressed air, essential service water or cooling systems, and heating, ventilating, and air conditioning).

IREP will consist of an initial or pilot study of a single plant (Crystal River Unit 3), followed by a scaled up study of six plants, in parallel with standardization of the methodology. Then there will be an integrated study of the remaining plants.

Following the pilot study, the six plant study, and at annual intervals thereafter (for the duration of the IREP program), interim summary reports will provide information necessary to develop: generic requirements to reduce high-risk accident frequency or consequences; improvements to the single failure criterion; requirements for "nonsafety-grade" equipment important to risk reduction; requirements needed to assure high reliability of engineered safety features and support systems; improvements to the resolution of generic safety issues (blackout, d-c power, systems interactions, ATWS, etc.); improvements in the limiting conditions for operation; improvements in operator training and in plant operating, maintenance, and emergency procedures; requirements to address the B&W reactor sensitivity issue; requirements to address incidents of excessive feedwater flow; and improvements in the focus of safety research programs.

Following each plant study in the IREP program, a set of plant-specific recommended alterations in design, procedures, and technical specifications will be prepared, as necessary, to reduce the expected frequency of particularly high-risk accident sequences and to rectify any identified safety weaknesses.

(2) Applicant/licensee IREP: In parallel with program development, applicants for near-term operating licenses will be required to perform an interim study similar in principle to the NRC IREP studies. Upon completion of the pilot program, each applicant for an operating license will be required to perform an IREP study prior to issuance of the license. This study will provide assurance that the new plant's design does not include notable reliability deficiencies.

NRC will develop and provide to applicants for operating licenses criteria and references for conduct of IREP studies. NRC will review the results of the studies.

b. Schedule:

(1) NRC IREP: The first IREP plant study (Crystal River Unit 3) is currently under way and will be completed by March 1980. Six teams consisting [illegible] ES and NRR analysts will then perform IREP studies in parallel on six s[illegible]ons. Selection of the six plants will be made by the end of January 1980. These studies will begin in February 1980 and will be completed in July 1980.

The remaining operating reactors will be studied beginning in September 1980, with the studies to be complete by January 1983. The details of this implementation will be based on the results of the preceding studies and decisions to be taken later about division of the work between NRC and industry. During the initial and pilot studies, discussions will be held with reactor owners and industry groups to explore possible efforts by industry in IREP. Consideration will be given to conducting this phase of the study by NRC alone, by industry alone, or by both NRC and the industry acting separately.

Initial draft recommendations based on the generic IREP findings are to be available in May 1980 after the pilot study and in September after the six-plant study. Regulatory evaluation and requirements for implementation of the generic findings of the pilot study will be completed in July 1980 and in January 1981 for the six-plant study. Overall regulatory evaluations and requirements for implementation of the generic IREP findings will be completed at annual intervals (January 1982 and January 1983).

Plant-specific IREP findings will be prepared as procedures and technical specifications during writeup of generic findings and released simultaneously with plant-specific reports (pilot study, March 1980; six-plant study, July 1980). NRC staff will identify required changes and implementation schedules within 6 months following completion of plant-specific reports.

(2) Applicant/licensee IREP: NRC will provide criteria to applicants by March 1980. Results of the applicant studies will be reviewed as received. It is assumed that three would be received in FY80 and three in FY81, with the first one available in June 1980.

c. Resources:

(1) NRC IREP: (a) Conduct of RES pilot study: RES FY80 - 2 my and contractor 4 my; (b) procedures for six plant studies: RES FY80 - 1.0 my and

contractor 2.0 my; (c) conduct of six plant studies: NRR FY80 - 6 my; RES FY80 - 9 my and contractor 12 my; (d) study of remaining plants: 1 my NRC staff per plant and 1 my contractor per plant, if NRC does the studies. Total funding (including pilot study, six-plant study and follow-on program): RES FY80 - $2,600,00, FY81 - $2,600,000 (see item C, "Licensee Actions," for resources based on licensees doing the studies); (e) draft and implement recommendations of generic IREP findings: NRR FY80 - 2.6 my, FY81 - 4.3 my; IE FY80 - 5 my, FY81 - 8 my; (f) draft and implement recommendations of plant-specific IREP findings: NRR FY80 - 1.8 my, $10,000, FY81 - 10 my, $80,000; IE FY80 - 0.9 my, FY81 - 5 my; ADM FY80 - 3.2 my, $138,000, FY81 - 3.2my, $688,000, FY82 - 1.0, $5,200,000.

(2) Applicant/licensee IREP: (a) Develop and provide criteria: RES FY80 - 0.2 my, NRR FY80 - 0.2 my; (b) review applicant IREP results: NRR FY80 - 0.3 my, FY81 - 0.3 my.

2. Systems interaction (USI A-17).

a. Description: Phase I of this program was initiated in May 1978 to develop a systematic procedure for identifying the impacts of systems on other systems. A fault-tree method was developed and is being applied to a reference plant. This technique addresses interactions that could compromise the subcriticality function, the shutdown c ling function, or the integrity of the reactor coolant pressure boundary. There is some apparent overlap of this effort with the IREP described in the preceding section. As the two programs go forward, there will be serious efforts to combine them or share resources to the maximum degree in order to eliminate wasteful redundancy and confusion.

Fault-tree interaction methodology will be extended to generalize fault trees and to develop procedures for broad-scale applications of the systems interaction methodology.

In a systems interaction follow-on study, requirements will be developed for reactor designs differing from the reference facility design and the requirements will be transmitted to licensees and near-term license applicants to implement modifications emanating from the systems interaction study. A regulatory guide will be developed to provide the NRC position on application of systems interaction methodology.

A plan is being prepared for discussion with ACRS to implement a two-part alternative approach proposed by ACRS to a systems interaction study to be conducted at Indian Point Unit 3. First, a failure mode effects analysis (FMEA) would be conducted based on intermediate failure conditions for interconnecting electrical or mechanical systems; that is, degraded voltage or partial fluid flow versus no voltage or no flow. Then a compartment-by-compartment examination of the plant would be conducted to inspect for potential systems interaction due to failure of systems in close proximity to safety systems; for example, pipe break effects.

In a study of seismic effects, the NRC staff will evaluate for a severe earthquake at Diablo Canyon the overall effects of failure of nonseismic equipment, failure of components and structures, and maloperation on safety system function. The mechanism for this evaluation will be a failure mode effects analysis (FMEA). Consideration is being given to incorporating fault-tree methodology into the FMEA evaluation.

b. Schedule: Phase I of the systems interaction study is to be complete in January 1980. By June 1980 procedures are to be developed for broad application of systems interaction methodology. Requirements for modifications emanating from the studies will be issued by August 1980 and followed by a draft regulatory guide in December 1980 which will be effective in June 1981.

An alternative approach proposed by ACRS is being studied and will be discussed with ACRS in March 1980.

The seismic effects study of Diablo Canyon will be completed prior to fuel loading.

c. Resources:

(1) Phase I study: NRR FY80 - 1.6 my; SD FY80 - 0.1 my; ADM FY80 - 0.1 my, $17,000; FY81-0.1 MY, $12,000.

(2) Extension of fault-tree interaction methodology: NRR FY80 - 0.5 my, $120,000; SD FY80 - 0.2 my.

(3) Design requirements and regulatory guide: NRR FY80 - 1.0 my, FY81 - 0.5 my; SD FY80 - 0.1 my, FY81 - 0.2 my; IE FY81 - 2 my, $18,000.

(4) Consideration of ACRS proposed approach: NRR FY80 - 0.6 my, $240,000 for contract.

(5) Seismic effects evaluation of Diablo Canyon: NRR FY80 - 1.2 my, $20,000 for contract.

3. Reliability engineering.

a. Description: Reliability engineering techniques can complement quality assurance and provide a disciplined approach to multidisciplinary systems engineering in the design of nuclear plants, the development of startup test procedures, the development of operating, maintenance, and emergency procedures, and in operations. Criteria and procedures will be developed to apply reliability engineering practices to nuclear plant activities on a comprehensive and consistent basis.

During the early months of plant operation (shakedown period), transients are more frequent than experienced at mature plants. Equipment outages for maintenance and equipment failure probabilities also tend to be higher during the early months of operation. In a short-term program, a requirement for a reliability assurance program will be developed to track the reliability with which shutdown cooling systems start on demand to verify that shakedown problems do not compromise safety. This activity may be absorbed by the NRC IREP effort described above.

In a longer term effort, specifications will be developed for acceptable reliability assurance programs to be implemented by operating license holders, construction permit holders, and future construction permit applications. The role of applicant-supplied probabilistic safety or reliability analysis in future safety analysis reports will be defined in this program. Reliability assurance program requirements will be promulgated by a new regulatory guide.

b. Schedule: For the short-term program, criteria will be developed and issued by March 1980. Program results will be reviewed as they become available.

For the longer term program, the scoping and scheduling study will be complete by April 1981, requirements will be drafted by October January 1981, and phased implementation will be determined. A draft regulatory guide will be issued in March 1982.

c. Resources:

(1) Short-term program: RES FY80 - 0.2 my, FY81 - 0.1 my; NRR FY80 - 0.1 my; IE FY80 - 0.2 my, $900, FY81 - 0.1 my, $450.

(2) Longer term program: NRR FY80 - 1 my, FY81 - 0.5 my; RES FY81 - 3.0 my and $415,000 for contractor; SD FY80 - 0.3 my, FY81 - 0.3 my.

C. LICENSEE ACTIONS

1. Interim reliability evaluation program (IREP).

a. Description:

(1) NRC IREP: Owners of the plants studied in IREP will be requested to supply the design data and the operating, maintenance, and emergency procedures needed to provide input to IREP analyses. Members of the IREP study team will interview operations and maintenance personnel and will require walkdown of accessible systems in the plants studied.

(2) Applicant/licensee IREP: Applicants will receive criteria for minimum requirements from NRC and conduct study over a 3- to 6-month period. The results will be reported to NRC.

b. Implementation:

(1) NRC IREP: The licensee actions will be required at the same time as the NRC IREP studies and subsequent to the issue of licensing orders based in IREP findings.

(2) Applicant/licensee IREP: Applicants will receive criteria from NRC by March 1980 and will be expected to report their results when they are ready, but prior to full-power operation.

c. Resources:

(1) NRC IREP: 1 mw for document collection and reproduction and possibly high costs for implementation of findings in some cases.

(2) Applicant/licensee IREP: 6 my per facility.

2. Systems interaction (USI A-17).

a. Description: Requirements will be placed on licensees and near-term license applicants to implement modifications based on the systems interaction study. A regulatory guide will be provided to give the NRC position on application of systems interaction methodology.

A two-part alternative approach is to be tried. First, a failure mode effects analysis (FMEA) will be conducted and then the plant will be inspected for potential systems interactions.

In a study of seismic effects, licensees will conduct FMEA or a combination fault-tree and FMEA study of the effect of severe earthquakes on nonsafety equipment and the effect of the failure of those systems on safety systems.

b. Implementation: The systems interaction required modifications will be conducted when specified. This effort may be consolidated with licensee actions in NRC IREP.

The alternative approach studies are to be completed by April 1, 1981.

The seismic effects study of Diablo Canyon is to be completed prior to fuel loading.

3. Reliability engineering.

a. Description:

(1) Short-term program: Near-term operating license applicants will develop and submit for NRC approval an interim reliability assurance program for the first year of operation.

(2) Longer term program: Applicants and operating license holders will be required to develop reliability assurance programs for NRC approval and implementation.

b. Implementation:

(1) Short-term program: NRC approval will be required prior to full-power licensing.

(2) Longer term program: The schedule will be defined in the reliability assurance specifications to be published in October 1981.

c. Resources:

(1) Design: Of the order of 10 my per plant will be required for reliability studies. However, streamlined design reviews and a reduced incidence of out-of-schedule design changes are expected to reduce overall design and construction costs.

(2) Procurement: Reliability qualification requirements will be placed on selected components. There may be a compensatory relaxation of nonperformance-oriented pedigree requirements.

(3) Construction: Little impact is expected.

(4) Startup testing and checkout: The use of preservice reliability verification, now required of emergency diesel generators, will be extended to additional equipment.

(5) Operations: 1 my per plant year is anticipated for monitoring and analyzing equipment availability/reliability performance revealed by surveillance testing, status monitoring, and genuine demands.

D. <u>OTHER ACTIONS</u>

1. Interim reliability evaluation program (IREP).

a. Description: NSSS vendors will be requested to provide realistic analyses of key phenomena governing the avoidance of severe core damage or meltdown for several accident sequences identified by the NRC IREP study team.

b. Implementation: The NSSS vendor actions will be required at the same time as the NRC IREP studies.

c. Resources: 1 mm per reactor design.

E. REFERENCES

President's Commission Report: Items A.4.b, A.4.c, D.4, and D.4.2

Other: NUREG-0585, Recommendations 8 and 9

NUREG6-0600, TMI-OPS C.1.c(3), C.1.c(5), C.1.e(7), C.1.e(8), and D.1

ACRS letter of May 16, 1979

ACRS letter of August 14, 1979, Items 1, 2, 3, 4, 7, 10, and 12

ACRS letter of October 11, 1979

ACRS letter of October 12, 1979, Items 1 and 2

ACRS letter of December 13, 1979, Item 8

TASK II.D REACTOR COOLANT SYSTEM RELIEF AND SAFETY VALVES

A. OBJECTIVE: Demonstrate by testing and analysis that the reactor coolant system overpressure protection system (relief and safety valves, block valves and associated piping) is qualified for the full range of operating and accident conditions. Anticipated transients without scram (ATWS) may be considered in later phases of the test program. In addition, the necessary design changes or modifications will be made that provide positive indication of valve position and provide for automatic closure of the PORV block valve on low reactor coolant system pressure.

B. NRC ACTIONS

1. Issue testing requirement.

a. Description: All operating plant licensees were issued the NRR requirement to meet the testing portion of the objective by September 13, 1979. This requirement was amplified by a letter of November 9, 1979. All applicants for operating license and construction permits were sent the same requirements on September 27, 1979, and October 10, 1979, and the requirements were amplified by letter of November 9, 1979.

b. Schedule: Action completed.

c. Resources: Completed.

2. Review of testing plan and testing.

a. Description: NRR will review licensee submissions (most likely to be an EPRI generic program) and require changes as needed. Following conclusions of the test programs, NRR will translate results into requirements as needed. IE will include in their inspection requirements, any additional plant specific testing program(s) not covered in the generic test program. RES will provide technical surveillance of models and experiments as specified in item 3. NRR and SD will explore the feasibility of developing a new national standard or modifying an existing standard to incorporate valve qualification requirements based on the results from this task.

b. Schedule: Review of the proposed generic test program will be completed by April 1, 1980. . Inspection and research review will be performed in FY80 and FY81. Additional test requirements will be developed during or after completion of the generic test program, as necessary.

c. Resources: NRR FY80 - 0.4 my, FY81 - 0.3 my; IE FY80 - 0.4 my, $3,960, FY81 - 1.0 my, $9,000; SD FY80 - 0.1 my, FY81 - 0.2 my.

3. Research on safety valve test requirements.

a. Description: RES will sponsor one of the national laboratories as a systems integrator to technically monitor and analyze the planned industry valve test and analytical program (EPRI), and collect, analyze and compare information from foreign tests; develop, improve or verify available flow discharge and structural response models using the above information; determine the need for a valve testing program by NRC with the main focus to be on subcooled and two-phase discharge and on determining operability; and conduct additional tests as necessary to assure that the response to the full spectrum of fluid conditions that would be expected to result from anticipated operational occurrences and ATWS events have been adequately characterized.

b. Schedule: RES will follow industry tests through 1981, and assess the need for NRC tests in December 1980.

c. Resources: RES FY80 - $150,000, FY81 - $2,100,000.

4. Automatically closing block valve for power-operated relief valves (PORV's).

a. Description: NRR will require PWR plants to modify the circuitry for the block valve actuator on the PORV relief line so that it will automatically close on low RCS pressure. IE will inspect compliance with this requirement.

b. Schedule: The requirement will be sent to operating plant licensees and applicants by March 1, 1980, instructing them to comply by July 1, 1980.

c. Resources: NRR FY80 - 0.2 my; IE FY80 - 0.7 my, $3,900, FY81 - 1.5 my, $9,000.

5. Relief and safety valve position indication.

a. Description: Positive indication in the control room of reactor system relief and safety valve position must be derived from a reliable valve position indication device or a reliable indication of flow in the discharge pipe.

b. Schedule: IE FY80 - 0.4 my, $3,780, FY81 - 1 my, $9,000; NRR FY80 - 0.1 my.

c. Resources: None.

C. LICENSEE ACTIONS

1. Issue testing requirement: No licensee action is required.

2. Review of testing plan and testing.

a. Description: Licensees and their agents (probably EPRI contractors) will plan and carry out the model development and test program. Consideration of ATWS conditions will be included in the test planning. Actual testing under ATWS conditions may not be carried out until subsequent phases of the test program are developed.

b. Implementation: Industry representatives will submit a program description and schedule by January 1, 1980, a final testing plan by July 1, 1980, and will complete testing by July 1, 1981. Operating license applicants will comment on the program by July 1, 1980, or before fuel loading, and complete testing by July 1, 1981, or operating date, whichever is later. Construction permit holders will comment on the program by July 1, 1981, and complete the testing program by the operating date.

c. Resources: FY80 - $5 million, FY81 - $1 million.

3. Research on safety valve test requirements: No licensee action is required.

4. Automatic closing block valve for power-operated relief valve (PORV).

a. Description: Licensees will install controls to automatically close PORV block valve upon low RCS pressure.

b. Implementation: Operating reactors will implement by July 1, 1980; operating license applicants will implement prior to full-power operation; and construction permit holders will commit to install controls prior to operation.

c. Resources: $100,000 per plant.

5. Relief and safety valve position indication.

a. Description: The industry (EPRI) is developing valve indication design.

b. Implementation: Operating reactors will complete design modifications by January 1, 1980. Operating license applicants will complete installation prior to fuel loading. Construction permit holders will commit to complete design prior to operation.

c. Resources: $150,000 per plant.

E. REFERENCES

President's Commission Report: None

Other: NUREG-0578, Section 2.1.2
NUREG-0600, C.1.c(2)

TASK II.E.1 AUXILIARY FEEDWATER SYSTEM

A. OBJECTIVE: Improve the reliability of the auxiliary feedwater system (AFWS).

B. NRC ACTIONS

1. Auxiliary feedwater system evaluation.

a. Description: NRR is requiring each operating plant licensee and each operating license applicant to reevaluate their PWR plant auxiliary feedwater system. They are to (1) perform auxiliary feedwater system reliability analyses that use event-tree and fault-tree logic techniques to determine the potential for AFWS failure under various loss of main feedwater transient conditions, with particular emphasis being given to determining potential failures that could result from human errors, common causes, single point vulnerabilities, and test and maintenance outages; (2) complete a deterministic review of the auxiliary feedwater system using the acceptance criteria of Standard Review Plan Section 10.4.9 as principal guidance; and (3) reevaluate the AFW system flow design bases and criteria.

Letters have been issued to licensees with Westinghouse and Combustion Engineering operating plants requiring implementation of short-term and long-term recommendations for improving auxiliary feedwater system reliability. All operating Babcock and Wilcox plants were ordered to shut down shortly after the TMI-2 accident. As part of the shutdown order, each B&W plant completed short-term AFWS modifications and established emergency procedures to improve AFWS availability. As part of the long-term action, each B&W licensee is performing an AFWS reliability analysis and will be required to complete a deterministic evaluation as described above. NRR will evaluate these B&W plant analyses and will require each licensee to implement staff recommendations to improve AFWS reliability.

Letters have been issued to operating Westinghouse (W) and Combustion Engineering (CE) plants requesting additional information for staff evaluation to verify that the design bases for AFWS flow requirements and pump capacities are current and adequate with respect to the various plant transients and postulated accident conditions that each plant must be able to withstand safely. Similar information will be requested of B&W operating plants in conjunction with the AFWS reliability analyses and deterministic evaluation discussed above.

NRR will require all PWR operating license applicants to (1) evaluate AFWS reliability; (2) provide a deterministic AFWS evaluation; and (3) provide AFW flow design basis information for NRR review. NRR will establish AFWS recommendations (similar to those for operating plants) for implementation by applicants.

b. Schedule: The NRC staff will complete its review and evaluation of operating plant responses to staff recommendations for improving AFWS reliability and requested information on AFWS flow design bases in time to support licensee implementation of (1) short-term recommendations by June 1980 for W and CE operating plants and by September 1980 for B&W operating plants, and (2) long-term recommendations for all operating plants by January 1981.

NRR will send requirements to applicants for operating licenses by February 1, 1980, requesting them to submit the AFWS reliability analysis, deterministic evaluation and flow design basis information described above. NRR will complete the review and evaluation of applicant submittals in time to support applicant implementation of short-term staff recommendations by initial fuel loading and long-term staff recommendations by full power operation.

c. Resources: NRR FY80 - 6.5 my, $96,000 for contract technical assistance, FY81 - 5.7 my, $16,000 for contract technical assistance; IE FY80 - 9 my, FY81 - 9 my, FY82 - $16,000 for contract technical assistance.

2. Auxiliary feedwater system automatic initiation and flow indication.

a. Description: NRR will require that the auxiliary feedwater system for each operating PWR plant start automatically and provide indication of auxiliary feedwater flow to each steam generator in accordance with the short- and long-term lessons learned Recommendations 2.1.7.a and 2.1.7.b in NUREG-0578. NRR will also require that each operating license applicant meet these requirements.

Operating plant licensee responses to NUREG-0578 indicate that there are eight PWR sites (nine plants) with manually initiated AFW systems and 22 sites (31 plants) with automatically initiated AFW systems. NRR has issued letters to the licensees of plants with manually initiated AFW systems requesting them to (1) submit design proposals to meet NUREG-0578 Recommendations 2.1.7.a and 2.1.7.b, and

(2) analyze a potential unresolved safety issue (identified by some of these licensees) that relates to automatic AFW initiation with a postulated main steam line break inside containment (MSLBIC) and its effect on containment pressure design capability and return to reactor power. NRR will review and evaluate the above information and issue license amendments to implement the short-term recommendations. NRR will complete its review of the remaining operating plants to verify that they meet the criteria of short-term Recommendations 2.1.7.a and 2.1.7.b. NRR will also review the PWR operating license applications to verify that the AFW system meets these recommendations.

b. Schedule: The NRR staff will complete by June 1980 its review and evaluation of the designs proposed by operating plants to modify the manual initiation of the AFW system to automatic initiation. The staff will also complete its analysis of main steam line breaks inside containment to support licensee implementation of control-grade (short-term) AFW automatic initiation and AFW flow indication by June 1980. By June 1980, the staff will complete its review of operating plants with automatically initiated AFW systems to verify that these plants satisfy the control-grade criteria of short-term Recommendations 2.1.7.a and 2.1.7.b. All AFW systems in operating PWRs will be reviewed to support licensee implementation of safety-grade (long-term) designs by January 1981.

The NRC will issue requirements to applicants for operating licenses by February 1, 1980, specifying that their AFW system designs meet NUREG-0578 Recommendations 2.1.7.a and 2.1.7.b. The NRC staff will complete its review and evaluation of applicant AFW designs to verify that they meet control-grade design criteria by initial fuel loading and safety-grade design criteria by full-power operation.

c. Resources: NRR FY80 - 2.9 my, FY81 - 1.4 my.

3. Update Standard Review Plan and develop regulatory guide.

a. Description: NRR will update Standard Review Plan Section 10.4.9 and criteria for a regulatory guide on auxiliary feedwater systems that will possibly endorse ANSI/ANS-51.10.

b. Schedule: NRR will issue for comment the updated Standard Review Plan (Section 10.4.9) by June 1980. SD will issue the proposed Regulatory Guide for comment by September 1980, and the final Regulatory Guide by March 1980.

c. Resources: NRR FY80 - 0.2 my, FY81 - 0.2 my; SD FY80 - 0.25 my, FY81 - 0.25 my; ADM FY80 - 0.2 my, $7,000, FY81 - 0.2 my, $7,000.

C. <u>LICENSEE ACTIONS</u>

1. Auxiliary feedwater system evaluation.

a. Description: Licensees of Westinghouse and Combustion Engineering plants must respond to the staff requirements for short-term and long-term AFWS actions and provide information describing how the recommendations are being implemented. They must also provide the additional information requested by the staff to verify the applicability and adequacy of the AFWS flow requirements.

Licensees of Babcock and Wilcox operating plants must complete and submit for staff review the AFW system reliability evaluations currently in progress.

Following staff review of the AFW reliability evaluations, the licensee must inform the staff how AFW short-term and long-term recommendations are being implemented. They must also provide the additional information requested by the staff to verify the applicability and adequacy of AFWS flow requirements.

Operating license applicants must respond to NRC requirements to be issued as stated above prior to power operation.

b. Implementation: W and CE operating plants will be required to implement short-term recommendations by June 1980. B&W operating plants will be required to implement short-term recommendations by September 1980. All operating plants will be required to implement long-term recommendations by January 1981. Applicants for operating licenses will be required to implement short-term recommendations by initial fuel loading and long-term recommendations by full power operation.

c. Resources: FY80 - 0.6 my per plant ($30,000 per plant).

2. Auxiliary feedwater system automatic initiation and flow indication.

a. Description: PWR plants with manually initiated AFW systems are to submit design proposals and accident analyses described in the NRC actions (item 2) and implement NUREG-0578 Recommendations 2.1.7.a and 2.1.7.b. PWR operating plants with an automatically initiated AFW system and applicants for operating licenses are to provide sufficient detailed information for the staff to complete its verification that their designs meet the acceptance criteria of Recommendations 2.1.7.a and 2.1.7.b.

b. Implementation: Operating PWR plants with manually initiated AFW systems are to (1) submit design proposals and accident analysis by February 15, 1980, and (2) implement control-grade designs of Recommendations 2.1.7.a and 2.1.7.b by June 1980. All operating plants are to submit safety-grade designs of Recommendations 2.1.7.a and 2.1.7.b by September 1980 to support implementation of NRR-reviewed designs by January 1981. All operating license applicants are to implement control-grade designs prior to fuel loading and to implement safety-grade designs prior to full-power operation.

c. Resources: FY80 - 0.4 my per plant ($20,000 per plant).

3. Update Standard Review Plan and develop regulatory guide: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: None

Other: NUREG-0578, Sections 2.1.7.a and 2.1.7.b
Bulletins and Orders
NUREG-0600, C.1.a(8), C.1.b(2), C.1.b(7) and C.1.e(6)
ACRS letter August 14, 1979 (item 11)

TASK II.E.2 EMERGENCY CORE COOLING SYSTEM

A. OBJECTIVE: Decrease frequency of challenges to emergency core cooling system (ECCS); improve reliability; ensure that the ECCS design basis is consistent with operational experience; reach better technical understanding of ECCS performance; and ensure that the uncertainties associated with the prediction of ECCS performance are properly treated in small break evaluations.

B. NRC ACTIONS

1. Determine and decrease frequency of ECCS challenges.

a. Description: NRR will instruct all licensees and applicants to provide a report that details experience with ECCS actuation (conditions, cause, frequency, results, etc.), compares cumulative experience with design bases for ECCS, and assesses the reliability of the system to perform its intended function under these conditions.

b. Schedule: NRR was to issue a requirement to all licensees and applicants by February 1, 1980. NRR and IE will review responses by September 30, 1980. Consideration will be given to changes in operating procedures or technical specifications if warranted. If required, all operating reactors, and operating license applicants will be required to implement changes by January 1, 1981, or prior to full-power operation, whichever is later.

c. Resources: NRR FY80 - 1 my, FY81 - 0.5 my; IE FY80 - 0.7 my, $6,480, FY81 - 0.7 my, $6,300; ADM FY80 - 0.1 my, $5,000, FY 81 - 0.1 my, $5,000.

2. Research on small-break LOCAs and anomalous transients.

a. Description: This research focuses on small breaks and transients. It includes experimental research in loss of fluid test (LOFT), systems engineering, and materials effects programs, and includes analytical methods development and assessment in the code development program.

The LOFT test series for FY80 has been reordered to include six small-break experiments and three operational transients.

The Semiscale small-break test series will provide experimental data on natural circulation, core uncovery, heat transfer, assessment of recovery procedures, and the ability of typical process instruments to provide accurate and sufficient information to operating personnel. The system will then be dismantled and modified to more accurately represent a scaled PWR system.

The ORNL blowdown heat transfer (BDHT) separate effects program will conduct bundle uncovery tests in the thermal-hydraulic test facility.

The two-loop test apparatus (TLTA, an integral test facility designed to investigate the blowdown and early ECC injection phases of a BWR LOCA) is being configured to allow a limited number of small-break tests.

The FLECHT SEASET system effects test facility will be used to study modes of post-accident core cooling related to both small and large break transients.

RES is coordinating plans for tests on small breaks, transients, flow blockage, and natural circulation with Japan and FRG. In the 3D program, FRG has agreed to include two test series on small breaks in their large-scale PKL facility.

Research will also sponsor a study on the effects of localized thermal shock coincident with internal pressure on vessel crack propagation. Post-thermal shock tests have considered only generalized thermal shock without internal pressure.

Research on analytical methods development and assessment is proceeding along three paths: (1) development and application of advanced codes for small-break LOCA and other accident analyses; (2) analyses of thermohydraulic phenomena in LWR plants in presence of heavy core damage; and (3) development of an engineering simulator for LWR plants (described in item I.A.4.8).

b. Schedule: For the LOFT facility, nine tests will be performed in FY80 and six tests in FY81. The initial Semiscale experiments will be conducted in FY80, and system modification will begin in late FY80. The core water level experiments at the ORNL BDHT facility will be conducted in FY80, with tests begun in December 1979. The current small break tests on the TLTA began in December 1979. Testing is scheduled for completion by March 1980. The natural circulation test at the FLECHT SEASET facility will begin in June 1981, and end in August 1981. The schedules for the advanced codes for small-break LOCA and transient analyses are as follows: <u>TRAC-PF1</u> - December 1980, <u>TRAC-BF1</u> - December 1981, <u>TRAC-PF2</u> - December 1981, and <u>TRAC-BF2</u> - December 1982.

c. Resources (RES):

	FY80	FY81
LOFT (small-break and transient tests)	$33,500K	$29,500K
Separate effects and integral system tests (small breaks and transients)	10,200	11,700
Thermal shock tests (internal pressure)	300	1,000
Analysis development (small breaks and transients)	3,900	3,600
Total RES	$47,700K	$45,800K
Total NRR	1.5 my	1.5 my
Total ADM	$600K	$800K

3. Treatment of uncertainties in ECCS performance predictions for small-break LOCAs.

a. Description: Small-break LOCA analyses performed by the LWR vendors to develop operator guidelines have shown that large uncertainties may exist in system thermal-hydraulic response due to modeling assumptions and/or inaccuracies. It is necessary to establish that these assumptions and/or inaccuracies are properly accounted for in determining the acceptability of the ECCS performance. NRR will issue instructions to holders of approved ECCS evaluation models to evaluate the uncertainty of small-break ECCS performance calculations. NRR will evaluate these uncertainties. If changes are needed in the present analysis methods to properly account for these uncertainties, recommendations will be made to the Commission to adopt such changes.

b. Schedule: NRR will issue request to holders of approved ECCS evaluation models by February 1, 1980. NRR will complete its evaluations by June 1, 1980. NRR will review vendor responses by August 1, 1980. NRR will prepare a Commission paper, if needed, by September 1, 1980.

c. Resources: NRR FY80 - 1 my, $100,000 computer cost.

C. <u>LICENSEE ACTIONS</u>

1. Determine and decrease frequency of ECCS challenges.

a. Description: The licensee will develop experience analysis and conclusions on ECCS operations, and identify intended changes and implementation schedule.

b. Implementation: Operating reactors will complete requirements by January 1, 1981. Applicants for operating licenses and construction permit holders will complete by January 1, 1981, or before achieving full-power operation, whichever is later.

c. Resources: 1 my per plant.

2. Research on small-break LOCAs and anomalous transients.

a. Description: Implement changes in requirements that result from research program.

b. Implementation: As appropriate with research schedule.

c. Resources: Not presently known.

3. Treatment of uncertainties in ECCS performance predictions for small-break LOCAs.

a. Description: Holders of approved evaluation models will evaluate the uncertainty of small-break ECCS performance calculations.

b. Implementation: Licensees' evaluations will be completed by June 1, 1980.

c. Resources: 1.5 my per evaluation model assessed at $200,000 computer costs per evaluation model assessed.

D. <u>OTHER ACTIONS</u>: None.

E. REFERENCES

President's Commission Report: Item D.4

Other: NUREG-0578, Sections 2.1.1 and 3.1

NUREG-0600, C.1.a(12), C.1.b(6), C.1.c(6), and C.1.c(8)

ACRS Letters: April 7, 1979; April 18, 1979; May 16, 1979 (Interim Report No. 2); NUREG-0572

TASK II.E.3 DECAY HEAT REMOVAL

A. OBJECTIVE: Improve the reliability and capability of nuclear power plant systems for removing decay heat and achieving safe shutdown conditions following transients and under post-accident conditions involving a degraded core and highly radioactive fluids.

B. NRC ACTIONS

1. Maintenance of primary coolant system at hot standby conditions.

a. Description: NRR issued requirements for (1) upgrading the pressurizer heater power supply and associated motive and control power interfaces, and (2) establishing new procedures and training for maintaining the reactor coolant system (RCS) at hot standby conditions with only onsite power available. IE will inspect the resulting implementation.

b. Schedule: A letter was issued to operating reactors on September 13, 1979 and to pending operating license applicants on September 27, 1979. NRC completed its review of operating reactors by December 21, 1979. NRC review of operating licenses will be completed prior to licensing.

c. Resources: NRR FY80 - 0.4 my staff, FY81 - 0.1 my; IE FY80 - 0.8 my, $6,740, FY81 - 0.7 my, $6,300.

2. Evaluation of capability and reliability of shutdown heat removal systems.

a. Description: NRR will conduct a generic study to assess the capability and reliability of conventional shutdown heat removal systems under various transients and degraded plant conditions including complete loss of all feedwater. Deterministic and probabilistic methods will be used to identify design weaknesses and possible system modifications that could be made to improve the capability and reliability of these systems under all shutdown conditions (i.e., startup, hot standby, shutdown, etc.)

b. Schedule: NRR will complete its studies by August 1981.

c. Resources: NRR FY80 - 0.5 my, contractor $125,000, FY81 - 0.25 my, contractor $150,000.

3. Alternate decay heat removal concepts.

a. Description: RES is sponsoring a specific study related to the usefulness of installing an add-on decay heat removal system in existing nuclear power plants to improve the overall operational reliability of decay heat removal. Such a study will entail a review of the detailed design of a decay heat removal system (to be designed under DOE auspices), and will produce suggested system performance and safety design criteria, as well as a value-impact analysis. In addition, scoping studies will be performed to develop further information regarding the usefulness of other alternate concepts proposed for decay heat removal systems.

b. Schedule: The program was initiated in FY79 and the "add-on" study will be completed by the end of FY81.

c. Resources: RES FY80 - $200,000, FY81 - $400,000; NRR FY80 - 0.25 my, FY81 - 0.5 my.

4. Revise regulatory guide for residual heat removal.

a. Description: Revision 1 of Regulatory Guide 1.139, "Guidance for Residual Heat Removal to Achieve and Maintain Cold Shutdown," includes changes to upgrade the residual heat removal (RHR) system to safety-grade and to reflect the impact of TMI-2 (e.g., the effect of highly radioactive source on system functional requirements, noncondensibles, core debris, leakage, etc.). Efforts are under way to coordinate this revision of the guide with a proposed standard being developed by industry.

b. Schedule: Revised guide will be issued by August 1, 1980.

c. Resources: SD FY80 - 0.4 my; NRR FY80 - 0.1 my.

C. LICENSEE ACTIONS

1. Maintenance of primary coolant system at hot standby conditions.

a. Description: Licensees were required to upgrade pressurizer heater power supply and associated motive and control power interfaces, and establish new procedures and training for the revised system.

b. Implementation: Operating reactors were to complete the requirements by January 1, 1980. Applicants for operating licenses will be required to complete efforts prior to full-power operation.

c. Resources: FY80 - 1 my per plant, $100,000 per plant; FY81 - 1 my per plant, $25,000 per plant.

2. Evaluation capability and reliability of shutdown heat removal systems: No licensee action is required.

3. Alternate decay heat removal concepts: No licensee action is required.

4. Revise regulatory guide on residual heat removal: No licensee action is required.

D. <u>OTHER ACTIONS</u>: None.

E. <u>REFERENCES</u>

President's Commission Report: Item D.4

Other: NUREG-0578, Sections 2.1.1 and 3.2
NUREG-0600, C.1.c(4)
ACRS Letters: April 18, 1979, May 16, 1979, August 14, 1979, December 13, 1979.

ACRS memo for R. Fraley from H. Denton, "Requirements for Shutdown and Decay Heat Removal Using Safety-Grade Equipment," September 7, 1979

ACRS letter from M. Carbon to J. Hendrie, "Studies to Improve Reactor Safety," August 14, 1979

TASK II.E.4 CONTAINMENT DESIGN

A. <u>OBJECTIVE</u>: Improve the reliability and capability of nuclear power plant containment structures to reduce the radiological consequences and risks to the public from design basis events and degraded-core and core-melt accidents by preventing and/or controlling containment structure failure. (See also Task II.B for degraded-core considerations.)

B. <u>NRC ACTIONS</u>

1. Dedicated penetrations.

a. Description: NRR will require that plants with external hydrogen recombiners be provided with redundant dedicated containment penetrations so that the recombiner systems can be connected to the containment atmosphere without having to open large containment purging ducts or otherwise jeopardize the containment function. IE will review the implementation.

b. Schedule: Letters were issued to operating plants on September 13, 1979 and October 30, 1979. NRR completed its first review of an operating plant on December 21, 1979. NRR will complete all plant design reviews by October 1, 1980. IE will complete the implementation reviews by February 1, 1981. Letters were issued to construction permit holders and operating license applicants in September, October, and November 1979. IE will complete its review of implementation by July 1981.

c. Resources: NRR FY80 - 0.5 my, FY81 - 0.5 my; IE FY80 - 0.8 my, $6,580, FY81 - 0.7 my, $6,290.

2. Improve containment isolation dependability.

a. Description: NRR issued instructions to licensees requiring a systems evaluation of containment isolation, including adequacy of signals to initiate and maintain isolation. Specific requirements were to (1) include the diverse signals provisions of Standard Review Plan Section 6.2.4; (2) include isolation of air purge valves on high airborne radiation signal, in addition to other closure signals such as containment pressure or ECCS actuation; and (3) have administrative controls that govern "sealed closed"* valves for those containment purge valves that do not satisfy the criteria set forth in Branch Technical Position CSB 6-4 during operational conditions 1, 2, 3, and 4. Furthermore, NRR requires that these valves be verified to be closed at least once per shift. NRR will review licensee designations of essential versus nonessential systems that have lines penetrating the containment structure and will develop guidance for industry use and for SD use in the preparation of a regulatory guide.

b. Schedule: Letters requiring licensees of operating reactors to include provisions for diverse signals and isolation of air purge valves on high airborne radiation signal were issued on September 13, October 15, and

*Item II.3.f of Standard Review Plan Section 6.2.4 provides the staff's definition of "sealed closed" valves.

October 30, 1979. Requirements for operating reactor to have administrative controls for "sealed closed" valves will be issued by March 1, 1980. Letters requiring applicants for operating licenses to include provisions for diverse signals and isolation of air purge valves were issued on September 27 and November 11, 1979. Requirements for applicants.for operating licenses to have administrative controls for "sealed closed" valves will be issued by March 1, 1980. Similar notices to construction permit holders and applicants discussing the three requirements will be issued by March 1, 1980. SD will issue Revision 1 to Regulatory Guide 1.141, "Containment Isolation Provisions for Fluid Systems," by February 1980. SD will issue Revision 2 to Regulatory Guide 1.141 to include the designation of essential versus nonessential systems by June 1981.

c. Resources: NRR FY80 - 0.25 my, FY81 - 0.25 my; IE FY80 - 0.8 my, $6,660, FY81 - 0.7 my, $6,120; SD FY80 - 0.25 my, FY81 - 0.40 my.

3. Gross containment integrity check.

a. Description: NRR will develop criteria for performing a low-pressure, short-duration test to determine containment integrity after each cold shutdown and thus ensure that there are no gross openings prior to power operation.

b. Schedule: NRR will develop criteria by September 1980 and issue requirements by November 1980.

c. Resources: NRR FY80 - 1.0 my, FY81 - 0.5 my.

4. Establish requirements and restrictions on purging.

a. Description: NRR will reassess containment purging and venting for operating reactors to establish performance adequacy of valves and appropriate balance of occupational and public exposure. NRR will also establish the radiological consequences of an accident during purging of the containment volume. These actions involve the following:

(1) NRR issued a letter to licensees of operating plants on this generic subject on November 28, 1978, requesting limited purging and a justification for any additional purging. Since applicants for operating licenses are required to comply with these provisions prior to receiving their licenses, letters to the applicants were not issued.

(2) NRR issued a letter on October 15, 1979, to licensees of operating plants on the subject of containment purging during normal plant operation requesting information concerning isolation valve performance. Current applicants for operating licenses are expected to comply with these provisions before the operating license is issued. IE will verify this compliance.

(3) NRR issued a letter on September 27, 1979, to licensees of operating plants on the subject of containment purging and venting during normal operation and guidelines for valve operability. Current applicants for operating licenses are expected to comply with these provisions before the operating license is issued.

(4) NRR will generically evaluate (by technical assistance contract) the radiological consequences offsite of purging and venting during normal operation and a range of accidents exceeding technical specification conditions through design basis accidents.

b. Schedule: NRR will complete the generic evaluation of radiological consequences offsite by April 1980. Purging and venting requirements will be documented by December 1981.

c. Resources: NRR FY80 - 1.0 my, contractor $50,000, FY81 - 1.0 my, contractor $50,000.

C. LICENSEE ACTIONS

1. Dedicated penetrations.

a. Description: The licensee will modify and implement the design as necessary.

b. Implementation: Operating reactors were to plan and commit by January 1, 1980, and complete implementation by January 1, 1981. Applicants for operating licenses will provide design prior to fuel loading and will implement prior to full-power operation on January 1, 1981, whichever is later. Construction permit holders and applicants for construction permits will complete prior to licensing for operation.

c. Resources: 0.2 my per reactor, minimal capital cost.

2. Improve containment isolation dependability.

a. Description: The licensees will evaluate present installations for isolation dependability and for purge valve closure on high airborne radiation signal, and modify present installations as needed.

b. Implementation: Operating reactors were to complete implementation of diverse signals provisions of Standard Review Plan Section 6.2.4 by January 1, 1980, and will complete their evaluations by June 1, 1980; operating reactors will complete modifications by November 1, 1980. Applicants for operating licenses and construction permit holders will complete before full-power operation.

c. Resources: 0.2 my per plant, $100,000 per plant (average).

3. Gross containment integrity check.

a. Description: Licensees will prepare procedures and modifications as needed to comply with requirements.

b. Implementation: Operating reactors will complete by June 1981. Applicants for operating licenses and construction permit holders will complete by June 1981 or prior to full-power operation, whichever is later.

c. Resources: 0.2 my per plant, plus any implementation expenses.

4. Establish requirements and restrictions on purging.

a. Description: Licensees will complete the following requirements:

(1) Restrict purging and justify any unrestricted purging and verify by letter to NRR;

(2) Evaluate performance of purging and venting isolation valves against accident pressure and respond to NRR;

(3) Implement interim NRC guidance on valve operability; and

(4) Adopt procedures and restrictions consistent with revised requirements.

b. Implementation: Operating reactors will complete item (1) by January 1, 1980, and item (4) by December 1982. Items (2) and (3) were to be completed by December 1, 1979. Applicants for operating licenses will complete items (1), (2), and (3) before full-power operation, and will complete item (4) by December 1982. Construction permit holders and applicants for operating licenses will complete items (1), (2), and (3) before operating license is granted and will complete item (4) by December 1982 or prior to filing of operating license application, whichever is later.

c. Resources: Items (1), (2), and (3) - 0.3 my per plant, capital costs not known. Item (4) not known.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items D.2(ii), D.2(v), and D.4

Other: NUREG-0578, Sections 2.1.5(a,b,c), 3.2, and 3.3

NUREG-0600, C.1.6(5) and C.1.e(1)

ACRS letters of May 16, 1979 and August 14, 1979

TASK II.F INSTRUMENTATION AND CONTROLS

A. OBJECTIVE: Provide instrumentation to monitor plant variables and systems during and following an accident. Indications of plant variables and status of systems important to safety are required by the plant operator (licensee) during accident situations to (1) provide information required to permit the operator to take preplanned manual actions to accomplish safe plant shutdown; (2) determine whether the reactor trip, engineered safety features systems, and manually initiated systems are performing their intended functions (i.e., reactivity control, core cooling, maintaining reactor coolant system integrity, and maintaining containment integrity); (3) provide information to the operator that will enable him to determine the potential for causing a breach of the barriers to radioactivity release (i.e., fuel cladding, reactor coolant pressure boundary, and containment) and if a barrier has been breached; (4) furnish data for deciding on the need to take unplanned action if an automatic or manually initiated safety system is not functioning properly or the plant is not responding properly to the safety systems in operation; and (5) allow for early indication of the need to initiate action necessary to protect the public and for an estimate of the magnitude of the impending threat.

B. NRC ACTIONS

1. Additional accident monitoring instrumentation.

a. Description: Instruments are to be provided on all plants to measure (1) containment pressure, (2) containment water level, (3) containment hydrogen concentration, (4) containment radiation intensity (high range), and (5) high range noble gas effluent monitors.

b. Schedule: Requirements for additional accident monitoring instrumentation were submitted to (1) operating reactor licensees in NRR letters dated September 13, 1979 and October 30, 1979; (2) operating license applicants in NRR letters dated September 27, 1979; (3) licensees of plants under construction in NRR letters dated October 10, 1979; and (4) construction permit applicants in NRR letters dated October 10, 1979. IE will audit the implementation.

c. Resources: Everything except the IE audit is complete. IE will incorporate the audit as part of routine inspection efforts (FY81 - 1.4 my, $6,300).

2. Identification and recovery from conditions leading to inadequate core cooling.

a. Description: NRR has developed requirements for specific equipment to detect and aid in recovery planning for conditions with a potential that could lead to inadequate core cooling. The specific instruments are subcooling meters in PWR's and direct reliable indicators of inadequate core cooling, such as status of coolant level in the reactor vessel or the existence of core voiding that would indicate degraded core cooling in PWR's.

b. Schedule: Requirements for specific equipment were submitted to (1) operating reactor licensees in NRC letters dated September 13, 1979 and October 30, 1979; (2) operating license applicants in NRR letters dated September 27, 1979;

(3) licensees of plants under construction in NRR letters dated October 10, 1979; and (4) construction permit applicants in NRR letters dated October 10, 1979. IE will audit the implementation.

c. Resources: NRR FY80 - 0.5 my; IE FY81 - 0.7 my, $6,300. [NOTE: See Item I.D.5(4).]

3. Instruments for monitoring accident conditions (Regulatory Guide 1.97)

a. Description: Appropriate instrumentation will be required for accident monitoring with expanded ranges and a source term that considers a damaged core, capable of surviving the accident environment in which it is located, for the length of time its function is required based on Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident." The guide also specifies design criteria and the range for each instrument.

b. Schedule: Draft Regulatory Guide 1.97 was issued for public comment on December 4, 1979. NRR will issue requirements for operating plants and for plants under review by August 1980. IE will audit the implementation.

c. Resources: NRR FY80 - 0.5 my, FY81 - 2.0 my, FY82 - 1.0 my; SD FY80 - 0.6 my, FY81 - 0.5 my; IE FY81 - 1.4 my $9,450. [NOTE: See Item I.D.5(4).]

C. LICENSEE ACTIONS

1. Additional accident monitoring instruments.

a. Description: Licensees will replace or procure additional instrumentation to measure containment pressure, containment water level, containment hydrogen concentration, containment radiation intensity (high range), and high range effluent monitor.

b. Implementation: Operating reactors will complete this work by January 1, 1981; applicants for operating licenses will complete by January 1, 1981.

c. Resources: FY80 - $250,000 per reactor.

2. Identification of and recovery from conditions leading to inadequate core cooling.

a. Description: Procedures to be used by reactor operators to detect and recover from conditions leading to inadequate core cooling will be developed and implemented. A primary coolant subcooling meter and an instrument to detect conditions with a potential that may lead to inadequate core cooling will be installed. Any additional equipment that could be used to indicate inadequate core cooling will be installed.

b. Implementation: Operating reactors will complete this work by January 1, 1980; applicants for operating licenses will complete before fuel loading.

c. Resources: FY80 - 1.0 my and $250,000 per reactor.

3. Instruments for monitoring accident conditions.

a. Description: A program to install or upgrade the necessary equipment will be developed and implemented.

b. Implementation: Operating reactors will complete selected items (i.e., items 1 and 2 above) in accordance with the schedule in items 1 and 2 above and complete the balance by June 1982. Operating license applicants will complete selected items (i.e., items 1 and 2 above) in accordance with the schedule in items 1 and 2 above and complete the balance by June 1982. Operating license applicants are not required to complete this work before the operating reactor implementation date of June 1982 because, like operating reactors, the requirements in items 1 and 2 above are sufficient for the interim period.

c. Resources: Up to $5,000,000 per plant, depending somewhat on the attention given to this area in the original design.

D. <u>OTHER ACTIONS</u>: None.

E. <u>REFERENCES</u>

President's Commission Report: Items D.2, D.3, E.4.a (see Item I.D for Control Room Design)

Other: NUREG-0578, Recommendations 2.1.3.a, 2.1.3.b, 2.1.7.b, 2.1.8.a, and 2.1.8.b

NUREG-0585, Recommendation 5

NUREG-0616, Recommendations C.1.a(1-17) and C.1.b(1-3)

ACRS letters dated April 7, 1979; April 18, 1979; May 16, 1979 (two letters); and August 13, 1979

TASK II.G ELECTRICAL POWER

A. OBJECTIVE: Increase the reliability and diversification of the electrical power supplies for control room indicators and recorders and for safety-related equipment.

B. NRC ACTIONS

1. Power supplies for pressurizer relief valves, block valves, and level indicators.

a. Description: The short-term lessons learned implementation program requires that the power supplies for the pressurizer relief valves, block valves, and level indicators be improved; that is, level indicators are to be powered from vital buses, motive and control components are to be designed to safety-grade criteria, and electric power is to be provided from emergency power sources.

The NRC staff is currently studying the reliability of electrical power supplies through various alternatives. The study of status monitoring of electrical systems has been contracted. Failure modes and effects analyses for the direct current power systems are being performed under contract as part of Generic Task A-30, and, for the alternating current power systems, as part of Generic Task A-44. The staff is also studying potential degraded offsite power conditions and corrective measures as well as diesel generator upgrading based on recommendations from a recent report prepared by the University of Dayton.

b. Schedule: Requirements for improved power supplies were submitted to (1) operating reactor licensees in NRR letters dated September 13, 1979 and October 30, 1979; (2) operating license applicants in NRR letters dated September 27, 1979; (3) licensees of plants under construction in NRR letters dated October 10, 1979; and (4) construction permit applicants in NRR letters dated October 10, 1979.

c. Resources: NRR FY80 - 1.0 my, FY81 - 0.1 my; IE FY80 - 0.6 my, $5,000, FY81 - 0.5 my, $4,500.

C. <u>LICENSEE ACTIONS</u>

1. Power supplies for pressurizer relief valves, block valves and level indicators.

a. Description: Procedures and modifications will be developed and implemented to upgrade motive and control components to safety-grade criteria and electric power from emergency power sources for the power supplies for pressurizer relief valves, block valves, and level indicators.

b. Implementation: Operating reactors will complete this work by January 1, 1980; operating license applicants will complete before fuel loading.

c. Resources: $350,000 per plant (for plants further than 50% built).

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item D.2

Other: NUREG-0578, Secs. 2.1 and 3.2

NUREG-0600, TMI-OPS, C.1.c(3) and C.1.a(17)

ACRS letter dated May 16, 1979

TASK II.H TMI-2 CLEANUP AND EXAMINATION

A. OBJECTIVE: Maintain safety and minimize environmental impact of post-accident operation and cleanup of TMI-2; obtain and factor into regulatory programs safety-related and environmental information from the TMI-2 cleanup.

B. NRC ACTIONS

1. Maintain safety of TMI-2 and minimize environmental impact.

a. Description: This task covers the efforts by NRR and IE to monitor, review, and assess the safety and environmental impact of the post-accident operation, cleanup, and possible recovery operations at TMI to assure that (1) the plant is maintained in a safe condition at all times; (2) the cleanup and recovery operations are performed in such a manner that the health and safety of onsite personnel and the public are protected; and (3) the environmental impact of the recovery operations is minimized.

Included in the task are (1) coverage of onsite 24-hour systems and health physics; (2) preparation as required of environmental assessments for major cleanup activities; (3) review and approval of operating procedures; (4) preparation of a Programmatic Environmental Impact Statement for the cleanup activities; (5) activities associated with the TMI cleanup; (6) issuance of revised technical specifications as necessary; and (7) other activities such as approval of system modifications, response to TMI correspondence, holding public information meetings, coordinating research associated with cleanup activities, etc.

b. Schedule: Our current schedule estimate is to issue a final environmental impact statement by December 1980, decontaminate the containment structure by FY82, remove the fuel by FY83, and complete decontamination of the reactor containment structure by FY83-84. However, the schedule may change significantly depending on such factors as availability of funds to the licensee for cleanup operations, the applicability of current regulatory criteria in meeting the demands of the public interest in the locale affected by the TMI-2 accident, the condition of the reactor building and fuel, and the hearings necessary.

Supplemental Funds

c. Resources:

	Manpower (my)		Supplemental Funds	
	NRR	IE	NRR	IE
FY80	14	4.6	$2,040,000	$41,000
FY81	12	7.4	1,500,000	66,200
FY82	14	7.4	2,000,000	66,200
FY83	14	7.4	2,000,000	66,200
FY84	7	7.4	500,000	66,200

2. Obtain technical data on the conditions inside the TMI-2 containment structure.

a. Description: Obtain pertinent technical information on the conditions of the TMI facility as cleanup operations proceed by RES participation in a joint DOE/NRC/GPU/EPRI TMI-2 Examination Task Force. The task force is headed by a Joint Coordinating Group that has appointed a Technical Working Group (TWG) from among personnel belonging to each organization's staff. The Technical Working Group comprising these DOE/NRC/EPRI/GPU personnel is translating the goals of the Coordinating Group into detailed plans. The specific plans will be carried out on site by the GPU recovery contractor under the guidance of an onsite technical integrating office (TIO) staffed by DOE for this purpose. Pertinent technical information to be obtained is described below:

Certain efforts are directed toward gathering information prior to gaining access to the primary system. Other efforts specifically address data gathering after gaining primary system access. In the first category, information will be developed on instrumentation and electrical equipment survivability under the accident conditions. Information will also be obtained on the environmental conditions both in the auxiliary building and in the containment structure, particularly as it relates to (1) fission product release, transport, and deposition; (2) technology required for decontamination and radiation dose reduction; and (3) radioactive waste handling (including waste volume reduction). Damage assessments will be made of the reactor building and equipment, and the amount and types of debris found in and around the containment sump will be characterized. A data bank and transmittal system will be devised and planning for and taking of archival samples will be arranged.

After access to the primary system is obtained, the primary system pressure boundary will be characterized including the steam generators, pumps, and other mechanical and structural components. Techniques will be developed for a nondestructive assay of fuel distribution in the primary system, for assessing criticality control during examination and cleanup operations, and for fuel removal, packaging, shipment and disposal. There will also be detailed pre-access reactor and core damage assessments followed by careful in situ and away-from-site fuel and reactor internals examinations.

b. Schedule: The action plan for data recovery will be completed by January 1981. Details of the Technical Working Group (TWG) first draft plans were reviewed for presentation to the Joint Coordinating Committee during a working meeting held December 10 through 12, 1979. Initial containment entry is planned in early 1980. Pertinent plans keying to that date are being expedited.

c. Resources: Primary funding for the examination activities will come from DOE; personnel efforts for the Technical Working Group are the responsibility of each cooperating organization. The operation of the site office for implementation of the plans (TIO) is funded by DOE. Specific examination efforts being planned by the TWG and NRC/RES involve NRC supplemental funds as follows: RES FY80 - $500,000, FY81 - $1,100,000, FY82 - $5,000,000, FY83 - $4,000,000, FY84 - $2,500,000; IE FY80/84 - 0.4 my, $2,250 each year.

3. Evaluate and feed back information obtained from TMI.

a. Description: NRR will evaluate the research and analysis results from TMI cleanup programs for safety significance, revise regulatory programs as appropriate, establish backfitting and forward-fitting criteria, and implement.

b. Schedule: Various milestones to be completed include cleanup and evaluation of progress made between 1981 and 1984.

c. Resources: NRR FY80 - 1 my, FY81 - 3 my, $40,000, FY82 - 4 my, $100,000, FY83 - 4 my, $100,000, FY84 - 3 my, $40,000; IE FY80/84 - 0.4 my, $2,250 each year.

4. Determine impact of TMI on socioeconomic effects and effect on real property values.

a. Description: RES is sponsoring the following studies: (1) the effect of the TMI accident on the value of real property in the Harrisburg, Pennsylvania, area, and (2) the socioeconomic impact of the TMI accident on the region in south-central Pennsylvania which surrounds TMI. These are separate studies being conducted by different contractors.

b. Schedule:

(1) RES will complete study in FY81 with some results being reported in FY80.

(2) RES will complete study in FY80.

c. Resources: RES FY80 - $410,000 for both contracts.

C. <u>LICENSEE ACTIONS</u>

1. Maintain safety of TMI-2 and minimize environmental impact.

a. Description: Efforts by licensee and his contractors are to be directed to ensuring safety of the plant and minimizing environmental impact of cleanup operations.

b. Implementation: 4 to 5 years.

c. Resources: Preliminary estimate for cleanup and recovery is $400,000,000.

2. Obtain technical data on the conditions inside the TMI-2 containment structure: A large program is being conducted by the TMI licensee, the architect-engineer, the vendor, and others.

3. Evaluate and feed back information obtained from TMI: No licensee action is required.

4. Determine impact of TMI on socioeconomic effects and effect on real property values: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.7, D.4.b, D.6

Other: ACRS Interim Report No. 3, May 16, 1979

TASK II.J.1 VENDOR INPSECTION PROGRAM

A. OBJECTIVE: Improve vendor-supplied components and services through a modified and more effective vendor inspection program.

B. NRC ACTIONS

1. Establish a priority system for conducting vendor inspections.

a. Description: A contractor will develop an integrated information system to establish priorities for the inspection of vendors. Priorities will be based on the relative safety significance of products and services as determined from licensee event reports (LER's), deficiency reports from holders of construction permits and non-licensees and other relevant information (related to IREP; see item II.C.1).

b. Schedule: Contractor bids are due by January 1980. The contract will be awarded by April 1980 and completed by May 1981.

c. Resources: IE FY80 - 0.1 my, contractor $150,000.

2. Modify existing vendor inspection program.

a. Description: The NRC will improve existing vendor inspection procedures by including more routine technical assessments of products by expanding the scope to reflect operational and construction feedback experience, and by placing greater emphasis on design control and the use of independent measurements. Increased vendor inspection staff will be required to fully implement the expanded scope of this program.

b. Schedule: Procedures will be completed by June 1981.

c. Resources: IE FY80 - 2 my for procedure development, FY80 - 2 my for program implementation, FY81 - 4 my.

3. Increase regulatory control over present nonlicensees.

a. Description: The NRC will study the need to extend its licensing authority over vendors who supply components and services to licensees. The nuclear steam system suppliers, architect-engineers, constructors, and desginated vendors will be included in this group. When the study is complete, the staff will present a paper to the Commission for a decision on the subject.

b. Schedule: The NRC will complete its study and present a Commission Paper by June 1981.

c. Resources: IE FY81 - 1 my.

4. Assign resident inspectors to reactor vendors and architect-engineers.

a. Description: The NRC will evaluate the desirability of assigning resident inspectors at nuclear steam system suppliers (NSSS) and architect-engineers (AE). The staff will prepare a Commission Paper describing a proposed trial program to be applied to selected nuclear steam system suppliers and architect-engineers.

b. Schedule: The staff will complete its trial program proposal by October 1980.

c. Resources: IE FY80 - 1 my, $4,500, FY81 - 4 my, $18,000.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES: None.

TASK II.J.2 CONSTRUCTION INSPECTION PROGRAM

A. OBJECTIVE: Provide greater assurance that nuclear plants are properly constructed by improving construction inspection program.

B. NRC ACTIONS

1. Reorient inspection program more toward direct observation, proper work performance, and verification of as-built configurations versus design.

a. Description: IE will change its reactor construction inspection program and its Inspection Manual to require increased observation of work activities, more attention to the involvement of licensees in construction activities, independent verification that as-built conditions meet design requirements, and follow up of reported incident information as applicable from operating reactors (including TMI-2).

b. Schedule: IE will complete its revisions by June 1980.

c. Resources: IE FY80 - 2.8 my, $12,600.

2. Increase emphasis on independent measurement in the construction inspection program.

a. Description: IE will evaluate trial programs involving independent measurements (nondestructive examination) at construction sites. NRC is buying a van that is being fitted with equipment to conduct ultrasonic, liquid penetrant, and magnetic particle nondestructive examinations. If the evaluations are successfully made from the use of the equipment-fitted van, additional vans may be purchased for use at each Regional Office. In addition, a contract was recently awarded to the Franklin Research Center to provide services involving independent assessment (destructive testing) of material samples. Data from this assessment will supplement the testing to further verify conformance with licensee commitments, specifications and/or codes, and standards requirements. Five uniquely qualified inspectors will be assigned full-time to each van to assure maximum use of the vans.

b. Schedule: The NRC will buy its first van and evaluate its independent contractor in FY80.

c. Resources: IE FY80 - 8 my, $183,000, FY81 - 19 my, $1,184,000, FY82 - 29 my, $1,293,000.

3. Assign resident inspectors to all construction sites.

a. Description: IE will expand the resident inspector program to include one inspector at each power plant construction site. Recent experience has shown the need for inspection at all stages of construction. This conclusion contradicts earlier criteria that delayed the assignment of resident inspectors to the plant site until 50 percent of the construction was complete.

b. Schedule: IE will continue its implementation plan during FY80. The goal of having an inspector at each construction site should be reached by October 1981.

c. Resources: IE FY80 - 37 my, $166,500 (authorized), FY81 - 37 my, $166,500 (total required to man all anticipated construction sites by end of FY81); ADM FY80 - 1.0 my, $268,000; FY81 - 0.5 MY, $280,000, FY82 - 0.5my, $280,000.

C. LICENSEE ACTIONS

1. Reorient inspection program: No licensee action is required.

2. Increase emphasis on independent measurement: No licensee action is required.

3. Assign resident inspectors to construction sites.

a. Description: The licensee will be required to provide space for the inspectors.

b. Schedule: As appropriate.

c. Resources: Small.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.11.d

Other: NUREG-0616, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.6.2, 2.6.3.

Memorandum from H. D. Thornburg to Roger J. Mattson et al., "Analysis of Alternatives for Conducting Independent Verification Testing of Environmentally Qualified Equipment," dated November 7, 1979.

TMI II.J.3 MANAGEMENT FOR DESIGN AND CONSTRUCTION

A. OBJECTIVE: Improve the qualification of licensees for operating nuclear power plants by requiring greater oversight of design, construction, and modification activities.

B. NRC ACTIONS

1. Organization and staffing to oversee design and construction.

a. Description: NRR will develop criteria requiring license applicants and licensees to improve the oversight of design, construction, and modification activities so that they will gain the critical expertise necessary for the safe operation of the plant. Items to be considered include (1) the technical resources needed by the utility to oversee the design and construction of the plant (including modifications to operating plants) by considering the number of people to be used as well as the areas of expertise, competency, and scope of work to be performed; and (2) the degree of management and technical control to be exercised by the utility during design and construction, including the preparation and implementation of procedures necessary to guide the effort.

b. Schedule: NRR will develop the criteria by September 1, 1980, and will issue a notification to licensee by October 1, 1980, advising them of the pending issuance of a regulatory guide that will cover the criteria.

c. Resources: NRR FY80 - 0.5 my.

2. Issue regulatory guide.

a. Description: SD will issue a regulatory guide that codifies the requirements for technical resources and controls during the design, construction, and modification phases.

b. Schedule: SD will issue a regulatory guide by June 1, 1981.

c. Resources: NRR FY81 - 0.2 my; SD FY80 - 0.25 my, FY81 - 0.5 my; ADM FY80 - $5,000.

C. <u>LICENSEE ACTIONS</u>

1. Organization and staffing.

a. Description: The licensee will submit a description of the organization, training, and staffing it proposes to meet the criteria. The licensee will restructure its organization to assure that the decision-making process is integrated during design, construction, and modification phases and to assure that management is aware of and involved in these activities. The licensee will supplement its staff to provide adequate technical and management resources to oversee design, construction, and modifications.

2. Issue regulatory guide. No licensee action is required.

D. <u>OTHER ACTIONS</u>: None.

E. REFERENCES

President's Commission Report: Item B.3.a

TASK II.J.4 REVISE DEFICIENCY REPORTING REQUIREMENTS

A. OBJECTIVE: To clarify construction and non-licensee reporting requirements to obtain uniform reporting and earlier identification and correction of problems.

B. NRC ACTIONS

1. Revise construction and non-licensee deficiency reporting requirements.

a. Description: The NRC will improve the event reporting requirements (10 CFR Part 50.55(e) for holders of construction permits and Part 21 for non-licensees) to assure that all reportable items are reported promptly and that information submitted is complete. In addition an IE Bulletin will be issued to clarify interpretations of current requirements. The reports received as a result of these actions will provide increased information on component failures that affect safety so that more prompt and effective corrective action can be taken. The information will also be used as input to an augmented role of the NRC's vendor and construction inspection programs.

b. Schedule: IE will issue a Bulletin in March 1980, and initiate the rule changes (Part 50.55e, Part 21) by March 1980.

c. Resources: IE FY80 - 0.3 my, $1,400; SD FY80 - 0.40 my, FY81 - 0.75 my.

C. LICENSEE ACTIONS

1. Revise construction and non-licensee deficiency reporting requirements.

a. Discussion: Licensee will be required to report deficiencies in accordance with new guidelines.

b. Implementation: Licensee will comply with requirements issued in March 1980.

c. Resources: 0.2 my per plant.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.11

Other: GAO Report, Chapter 4, Number 18, p. 29

TASK II.K MEASURES TO MITIGATE SMALL-BREAK LOSS-OF-COOLANT ACCIDENTS AND LOSS OF FEEDWATER ACCIDENTS

A. OBJECTIVE: Effect changes in systems reliability analyses, emergency operating procedures, and operator training to improve the capability of plants to mitigate the consequences of the small-break loss-of-coolant accidents (LOCA) and loss of feedwater events.

B. NRC ACTIONS

1. IE Bulletins.

a. Description: From April 1, 1979, to July 26, 1979, the Office of Inspection and Enforcement (IE) issued nine bulletins to operating plants for action. The review of licensee responses to the action items was conducted by the NRR Bulletins and Orders Task Force. The responses of each licensee to the action items have been evaluated and determined to be acceptable. Separate evaluation reports have been prepared and issued to some licensees. The effort to complete these reports for all licensees is continuing.

NRR will require near-term operating license applicants to evaluate their plants against the applicable IE Bulletins and take corrective actions as necessary prior to fuel loading. Over the long term, these requirements will be codified and required of all plants as preconditions for receipt of an operating license.

b. Schedule: NRR will complete the Bulletin Evaluation Reports for operating plants by March 31, 1980.

c. Resources: NRR FY80 - 0.5 my, FY81 - 0.5 my.

2. Commission Orders on Babcock and Wilcox plants.

a. Description: In April 1979, a task group was established in NRR to perform a generic assessment of feedwater transients in B&W-designed operating plants in light of the accident at TMI-2. The study concluded that the staff did not have reasonable assurance that the B&W plants could continue to operate without undue risk to the health and safety of the public and that the plants should be shut down until certain actions were completed to the satisfaction of the staff. The B&W licensees committed to perform these actions and confirmatory Orders were issued to formalize the agreements reached with the licensees.

The Orders included both short-term and long-term actions. The NRR Bulletins and Orders Task Force reviewed the licensee responses to the short-term actions in the Orders and issued safety evaluation reports lifting the Orders in the period between May 18, 1979, and July 6, 1979. However, four additional items were identified in the review that required additional work by the licensees. These were (1) analysis of thermal-mechanical conditions in the reactor vessel, (2) power-operated relief valve and safety valve lift frequency and reliability, (3) additional small-break analyses, and (4) analysis of loss of feedwater and other transients. The review of item (1) and the completion of the review of item (3) remain to be done for B&W operating plants.

The long-term actions required by the Orders are to (1) continue to upgrade the auxiliary feedwater (AFW) system (see item II.E), (2) study the failure modes and effects analysis of the integrated control system (ICS), (3) upgrade anticipatory trips to safety grade, and (4) continue to analyze transients, develop procedures and train and drill operators for the management of small breaks (see items I.A and I.C). Review of each of these items is continuing within NRR and evaluations of licensee actions to comply with the required actions of the confirmatory Orders will be documented.

Near-term operating license applicants will be required by NRR to demonstrate conformance with these requirements prior to full-power operation, or on the schedules stated elsewhere for items I.A, I.C, and II.E. Over the long term, these requirements will be codified and required of all plants as preconditions for receipt of an operating license.

b. Schedule: NRR will complete the evaluation of operating plant licensee implementation of residual actions originating from short-term actions and the implementation of long-term actions of the confirmatory Orders by January 1, 1981.

c. Resources: NRR FY80 - 3 my, FY81 - 2 my; IE FY80 - 0.5 my, FY81 - 0.5 my.

3. Generic review matters.

a. Description: The Bulletins and Orders Task Force has conducted generic reviews of the loss of feedwater (LOFW) and small break loss-of-coolant events on operating PWRs designed by B&W, Westinghouse (W), and Combustion Engineering (CE), and on operating BWRs. These reviews consisted of an evaluation of systems reliability analyses, guidelines for emergency procedures, and operator training related to these events. From these reviews, a number of recommendations for improvements have been developed and will be issued in reports (NUREG-0565 (B&W), NUREG-0611 (W), NUREG-0626 (GE), NUREG-0635 (CE)).

Upon approval of these recommendations, NRR will notify licensees of those actions to be taken with respect to system modifications, additional analyses, improved emergency procedures, and improved operator training related to the loss of feedwater and small break LOCA events. The ACRS will advise NRR in mid-February 1980, after which NRR will review and evaluate licensee commitments and/or actions required.

On a case-by-case basis, NRR will propose the schedule on which these generic requirements must be met by near-term operating license applicants (i.e., fuel load, full power, or later). Over the long term, these generic requirements will be applied to all plants as preconditions for receipt of an operating license.

b. Schedule: NRR will issue requirements to operating plant licensees by March 1, 1980, and will review responses by January 1, 1981. Near-term operating license applicants are being advised of the specific requirements in this area on a case-by-case basis.

c. Resources: NRR FY80 - 12 my, FY81 - 4 my.

C. LICENSEE ACTIONS

1. IE bulletins.

a. Description: All applicants must respond to the NRC requirements (to be issued) and describe how the actions required by the IE Bulletins are (or will be) implemented.

b. Implementation: Near-term operating license applicants will be required to implement the requirements prior to fuel loading.

c. Resources: 0.2 my per application.

2. Commission Orders on Babcock and Wilcox plants.

a. Description: Licensees must complete residual actions originating from short-term actions in the confirmatory Orders and long-term actions in the confirmatory Orders. All applicants must respond to the NRC requirements (to be issued) and describe how the actions required by the confirmatory Orders are (or will be) implemented.

b. Implementation: B&W operating reactors must complete actions by January 1, 1981. Operating license applicants must complete actions prior to full-power operation, or on schedules specified for items I.A, I.C and II.E, whichever is sooner.

c. Resources: To be provided January 21, 1980.

3. Generic review matters.

a. Description: Licensees must complete actions originating from the generic reviews of the small-break loss-of-coolant accident and loss of feedwater events by the dates set forth in NRC requirements (to be issued). All applicants for plants and designs must resolve all applicable actions specified in NRC requirements (to be issued) and describe how the required actions are (or will be) implemented.

b. Implementation: Operating reactors must complete actions by January 1, 1981. Near-term operating license applicants must complete actions on schedules to be determined on a case-by-case basis.

c. Resources: To be provided January 21, 1980.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: None

Other: Inspection and Enforcement Bulletins 79-05, 79-05A, 79-05B, 79-05C, 79-06, 79-06A, 79-06A (Revision 1), 79-06B, 79-06C, and 79-08.

Commission Orders to Duke Power Company dated 5/07/79, Sacramento Municipal Utility District dated 5/07/79, Florida Power Corporation dated 5/16/79, Toledo Edison Company dated 5/16/79, and Arkansas Power & Light Company dated 5/17/79.

Letters lifting Orders to Duke Power Company dated 5/18/79, Arkansas Power & Light Company dated 5/31/79, Sacramento Municipal Utility District dated 6/27/79, Florida Power Corporation, dated 7/06/79, and Toledo Edison Company dated 7/06/79.

NUREG-0565, NUREG-0611, NUREG-0626, NUREG-0635, and NUREG-0645.

III. EMERGENCY PREPAREDNESS AND RADIATION EFFECTS

TASK III.A.1 IMPROVE LICENSEE EMERGENCY PREPAREDNESS - SHORT TERM

A. OBJECTIVES: Immediately improve and upgrade licensee emergency preparedness by requiring improvements in facilities, plans, procedures, offsite support, technical assistance, equipment and supplies required to adequately respond to and manage an accident.

B. NRC ACTIONS

1. Upgrade emergency preparedness.

a. Description: Six NRC teams were formed in September 1979 to implement the "Action Plan for Promptly Improving Emergency Preparedness" (SECY 79-450). The action plan identifies the elements required for promptly improving licensee emergency preparedness and for ensuring the capability of offsite agencies to take appropriate emergency actions. The teams are making an integrated assessment of licensee, local and state capabilities and interfaces based on:

(1) a review of existing plans and a meeting in the site area to communicate upgraded criteria and identify to licensees and local and state organizations the areas requiring improvements. This will include an opportunity for expression of concerns by the public. An objective of the team is to help improve working relationships and communications concerning emergency plan development among all parties.

(2) a review of upgraded licensee, local and state plans submitted by the licensee five weeks after the site visit which will result in the team findings being summarized in a safety evaluation report. This will include an identification of areas requiring improvement, a schedule for implementation of the improvements, and a specification of any required interim measures. The review of upgraded plans will encompass the points in SECY-79-450 and will reflect any input from the Federal Regional Advisory Committees (RAC). Items in local or State plans requiring improvement to meet upgraded criteria but which are adequate to meet the essential planning elements of NUREG-75/111, and Supplement 1 thereto, will be identified as not being required for concurrence in State plans before January 1, 1981.

NRR has sent letters to operating reactors, operating license applicants, and holders of construction permits requesting information regarding time estimates for evacuation of areas around plants (to determine the difficulty of implementing protective measures for the public).

The above actions are in progress and will be completed in FY 1980. In the longer term, beginning in FY 1981, an integrated assessment of the implementation of the plans will be performed. This assessment will take into account comments and reviews by the RAC as a result of State plan concurrence efforts, including critiques of emergency exercises. The results of the Office of Inspection and Enforcement (IE) special team efforts to evaluate licensee health physics programs during 1980-81 will be factored into the review. This longer term review of emergency preparedness will consist of three parts:

(1) a review of implementing procedures, including inplant and offsite personnel and equipment. The review of these procedures will be done by the team. Subsequently, periodic reviews and inspections will be performed by IE (see item III.A.2.3).

(2) conducting and critiquing of exercises involving licensee, local and State capabilities.

(3) within about 5 years (before January 1, 1981, for new operating license applicants) conducting and critiquing exercises involving licensee, local, State and Federal capabilities.

b. Schedule: The review of plans for operating reactors and near-term operating license applicants will be completed by August 1980. The evaluation of implementation will be completed by September 1981.

c. Resources:

(1) NRR FY80 - 13 my (now being applied), $1.2 million, FY81 - 6 my, $1.0 million.

(2) IE FY80 - 6 my (now being applied), $54,000, FY81 - 12 my, $108,000.

(3) SP FY80 - 8 my, FY81 - 8 my.

2. Upgrade licensee emergency support facilities.

a. Description:

(1) Technical Support Center (TSC). NRR issued a letter requiring a habitable TSC, separate from but in close proximity to the control room, with the capability of displaying and transmitting plant status to persons responsible for management and engineering support of reactor operations in the event of an accident. Upon activation in emergencies, this facility will provide the main communications link between the plant, the Operational Support Center (item (e), below), the near-site Emergency Operations Center (item (3), below), and the NRC. The TSC will be staffed by plant management and technical personnel. Details and requirements were described to operating reactor licensees in NRR letters of September 13 and October 30, 1979, and to operating license applicants and holders of construction permits in letters of September 27 and November 9, 1979.

NRR will review commitments and implementation schedules in the responses to its letters. NRR will revise Standard Review Plan Sections 2.3.3, "Onsite Meteorological Programs"; 6.4, "Habitability Systems"; 9.4.1, "Control Room Ventilation Systems"; 9.5.2, "Communication Systems"; 12.2, "Radiation Sources"; 12.3, "Radiation Protection Design Features"; and 12.5, "Health Physics Programs"; as appropriate.

The emergency preparedness review teams (see item III.A.1.1, above) will review the work done to establish the center during the team visits to sites.

IE will inspect to confirm conformance to new criteria once the center is finally established according to NRR requirements and schedules.

(2) Onsite Operational Support Center (OSC). NRR issued a letter requiring that an OSC be established separate from the control room. The OSC will be a staging or assembly area where, during an emergency, operations support personnel will report and assemble. The OSC will be provided with dedicated communications with the control room, the TSC (item (1), above), and the near-site EOC (item (3), below). (Details and requirements were provided in the NRR letters described in item III.A.1.1, above.)

NRR will review commitments and implementation schedules in the responses to its letters. It will then revise Section 13.3, "Emergency Planning," of the Standard Review Plan (SRP).

Actions of the emergency preparedness review teams and of IE will be as described in item III.A.1.1 above.

(3) Near-site Emergency Operations Center (EOC). NRR issued a letter requiring that an EOC be established. The EOC is to be provided with dedicated capability for communication with the onsite Technical and Operational Support Centers, NRC, and other agencies and organizations required to respond to and provide support during plant emergency conditions. The EOC is to be able to access information on plant parameters; it will be sized to provide space for support of responding agencies; and it will be able to operate as a base for logistical support of onsite operations and provide information to the public.

b. Schedule:

(1) Technical Support Center (TSC): Initial requirements were issued to operating reactor licensees, operating license applicants, and construction permit holders in NRR letters completed September 13 and 27, and October 30 and November 9, 1979. NRR will revise the SRP by December 1980. Inspection of the TSC is covered in the schedules under items III.A.1.1 and III.A.2.3.

(2) Operational Support Center (OSC): Initial requirements were issued to operating licensees, operating license applicants, and construction permit holders in NRR letters completed September 13 and 27, and October 30 and November 9, 1979. NRR will revise the SRP by December 1980. Inspection of the OSC is covered in the schedules under items III.A.1.1 and III.A.2.3.

(3) Emergency Operations Center (EOC): Initial requirements were issued to operating licensees, operating license applicants, and construction permit holders in NRR letters completed November 9, 1979. NRR will revise the SRP by December 1980. Inspection of the EOC is covered in the schedules under items III.A.1.1 and III.A.2.3.

c. Resources:

(1) Technical Support Center (TSC): NRR FY80 - 0.5 mm per plant to evaluate responses, 3 mm for SRP revision; IE FY80 - 1 my, $9,000, FY81 - 4 my, $36,000, if implementation schedule requires separate inspection, 1 mm per site to inspect for adequacy.

(2) Operational Support Center (OSC): NRR FY80 - 1.1 my, FY81 - 1.0 my; IE FY80 - 0.5 my, $4,500, FY81 - 2 my, $18,000; separate inspection resources included in TSC.

(3) Emergency Operations Center (EOC): NRR FY80 - 0.3 my, $200,000; IE same as for TSC; separate inspection resources included in TSC.

3. Maintain supplies of thyroid blocking agent (potassium iodide).

a. Description:

(1) Workers: NRC will require licenses to have adequate supplies of potassium iodide available for onsite personnel and for offsite emergency response support personnel, including offsite agencies.

(2) Public: An evaluation will be made of HEW and EPA recommendations regarding general use of potassium iodide. Various accident scenarios will be examined with and without the use of potassium iodide. The degree of exposure reduction will be compared to cost of maintenance and distribution of potassium iodide stocks for various distances from reactor sites. The results of the analyses will establish the design objective distance at which potassium iodide would be made available to the public. The cost-benefit study is underway at Sandia Laboratories. The responsibility for distributing and maintaining the potassium iodide stockpile for general public use will be determined.

b. Schedule:

(1) Workers: NRR will issue requirement by July 1980.

(2) Public: The study by Sandia has been completed and the staff briefed on the results; the written report will be completed by March 1980. Recommended distances for potassium iodide stockpiling will be established by March 1980.

c. Resources:

(1) Workers: NRR FY80 - 0.1 my.

(2) Public: NRR FY80 - 0.2 my; $20,00 contractor effort.

C. <u>LICENSEE ACTIONS</u>

1. Upgrade emergency preparedness.

a. Description: Licensees will upgrade emergency preparedness in accordance with the requirements described in the NRC "Action Plan for Promptly Improving Emergency Preparedness" (SECY 79-450), which was distributed to all licensees during regional meetings in August 1979, and in accordance with subsequently issued acceptance criteria. These actions include:

(1) Preparing and submitting upgraded plans which satisfy the NRR supplemental acceptance criteria provided by the NRC emergency preparedness review teams, with special attention to the establishment of emergency action levels in accordance with NUREG-0610, "Basis for Emergency Action Levels for Nuclear Power Facilities."

(2) Implementing the short-term emergency planning recommendations of NUREG-0578.

(3) Establishing an onsite Technical Support Center, an onsite Operational Support Center, and a near-site Emergency Operations Center.

(4) Establishing improved offsite radiological monitoring capability, in accordance with the NRR/RAB technical position.

(5) Providing planning assistance to appropriate Federal, State, and local governments to assure that their emergency response roles are properly coordinated with the facility plan and that such plans satisfy the NRC acceptance criteria.

(6) Providing resources as necessary to State and local governments for implementing the emergency planning zone concept, in accordance with NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants."

(7) Participating in a periodic joint exercise involving Federal, State, and local government emergency response organizations.

b. Implementation: The schedule for emergency preparedness improvements and commitments required for operating reactors and near-term operating license applicants is given in Enclosure 1 of SECY 79-450.

c. Resources: Industry estimates range from $4.8 to $11.4 million, with the range indicating an upgrade of emergency preparedness programs and site-specific variations in the cost of support facilities (see item III.A.1.2, below).

2. Upgrade emergency support facilities.

a. Description:

(1) Technical Support Center (TSC): In the near term, licensees and applicants will establish a TSC as described in NRR letters of October 30 and November 9, 1979. In the near term, the center will be established, provisions made for plans, procedures, staffing, and communications, and a plan and schedule submitted to NRR for final upgrading of the center to specifications given in the NRR letters.

(2) Operational Support Center (OSC): Licensees and applicants will establish an OSC, as described in the NRR letter of October 30, 1979, unless such a center has already been established.

(3) Emergency Operations Center (EOC); Licensees and applicants will establish an EOC as described in the NRC actions of this task.

b Implementation:

(1) Technical Support Center (TSC): The near-term requirements were to be completed by operating reactors by January 1, 1980, by operating license applicants prior to licensing, and by construction permit applicants as a condition of the permit. Final action to upgrade the center will be completed by operating reactors by January 1, 1981, by operating license applicants prior to licensing or January 1, 1981, whichever is later, and by construction permit applicants as a condition of the permit.

(2) Operational Support Center (OSC): Operating reactors were to establish the OSC by January 1, 1980; operating license applicants are to establish the OSC prior to licensing; and for construction permit applicants, the OSC will be a condition of the permit.

(3) Emergency Operations Center (EOC): Operating reactors will establish an EOC by January 1980 and upgrade it by January 1981; operating license applicants will establish an EOC prior to licensing and upgrade it by January 1981; constuction permit applicants will establish an EOC prior to licensing.

c. Resources: See estimates under item III.A.1.1.

3. Maintain supplies of thyroid blocking agent (potassium iodide).

a. Description:

(1) Workers: Purchase and maintain a stock of potassium iodide sufficient for staff and all response personnel, including responding offsite support agencies.

(2) Public: No further action is required until completion of NRC review.

b. Implementation:

(1) Workers: Operating reactors will complete by March 1981, and operating license applicants will complete prior to full-power operation or March 1981, whichever is later.

(2) Public: This requirement will not be defined until the NRC position is defined.

c. Resources:

(1) Workers: 2 mm per plant at a cost of approximately $5,000 per plant.

(2) Public: This requirement will not be defined until the NRC position is defined.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items E.4.b; E.5; F.1.a, c, and d; F.2.a; F.2.b; F.4; G.1; G.2; G.3; and G.5.

Other: NUREG-0578, 2.1.3.b, 2.1.8.a, 2.1.8.b, 2.1.8.c, 2.1.6.b, 2.2.2.a, 2.2.2.b, and 2.2.2.c.

NUREG-0616, 3.9.1.1, 3.13.5.2, 3.7.1, 3.13.8, 3.9.2, 3.11.1, 3.11.3, 3.11.5, 3.13.5, 3.13.7.1, 3.13.9, 3.13.10, 3.11.4, 3.11.10.

NUREG-0600, 1a, 1b, 1c, 2, 7, 8, 9a, 9b, 9c, 10, 13, 14, 18, 19, 24, 38, 6, 17, 32, 42.

SECY 79-450.

NRR letters of September 13, October 10, and October 30, 1979.

TASK III.A.2 IMPROVING LICENSEE EMERGENCY PREPAREDNESS - LONG TERM

A. OBJECTIVE: To upgrade the emergency preparedness of nuclear power plants.

B. NRC ACTIONS

1. Amend 10CFR50 and 10CFR50, Appendix E.

a. Description:

(1) Proposed amendments to the rules were published for public comment in the Federal Register dated December 19, 1979 (44 FR 75167). Comments are due by February 19, 1980.

(2) The staff is conducting a series of the four public regional meetings with state and local authorities and licensees participating in the formulation of recommendations for final effective rules. Workshops are being held in New York, Chicago, San Francisco, and Atlanta.

(3) The Office of Standards Development (SD) will prepare a final Commission Policy Paper recommending the adoption by the Commission of effective rules. The final rule will consider staff experience gained in item III.A.1.1, comments on the proposed rule, input obtained at the regional meetings, and appropriate recommendations of the President's Commission and the NRC Special Inquiry.

b. Schedule:

(1) The proposed rule was published in the Federal Register on December 19, 1979.

(2) The last of the four regional meetings is scheduled for January 24, 1980.

(3) The Commission paper recommending the adoption of the effective rules will be completed by June 30, 1980.

c. Resources: NRR FY80 - 0.5 my; SP FY80 - 3 mm (total cost for workshops is estimated to be $90,000); SD FY80 - 0.9 my, $90,000, FY81 -0.3 my.

2. Development of Guidance and Criteria.

a. Description:

(1) The Steering Committee on Emergency Preparedness (the "guiding group" for the team review effort in item III.A.1.1) is working with FEMA to develop and publish a set of "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." These criteria are directed to NRC licensees and operators of commercial nuclear power reactors and to state and local governments.

The criteria for NRC licensees are based on (1) Regulatory Guide 1.101 (and will replace this guide); (2) letters from NRC to power reactor licensees dated October 20 and November 23, 1979; (3) proposed NRC rule changes (10CFR50 and Appendix E) published in the Federal Register; and (4) NRC NUREG-0610, "Draft Emergency Action Level Guidelines for Nuclear Power Plants."

The guidance for state and local governments is based in large part on the NRC Guide and Checklist, NUREG-75/111 and its Supplement No. 1, and the guidance on the planning basis contained in the report of the NRC/EPA Task Force Report on Emergency Preparedness, NUREG-0396/EPA 520/1-78-016.

FEMA and the NRC staff will use the interim guidance and upgraded criteria in judging the adequacy of nuclear power plant operator, state and local government emergency plans and preparedness until the time that final agency requirements and guidance are promulgated. The final agency guidance may take the form of regulations.

(2) The Office of Standards Development is monitoring contract work for the development of guidance on test exercise scenarios. This guidance will be published as an NRC NUREG report to be used for the planning and conduct of exercises to test emergency preparedness of NRC licensees and state and local governments.

b. Schedule: The NRC/FEMA criteria will be published in the Federal Register for interim use and public comment by February 28, 1980. A NUREG report providing guidance on test exercise scenarios will be published by January 30, 1981.

c. Resources: NRR FY80 - 2 mm (NUREG report for test exercises); SD FY80 - 1 my, FY81 - 1 my. The resources for NRC/FEMA criteria are included in item III.A.1.1.

3. Inspection program.

a. Description: The IE inspection program will be revised to cover upgraded requirements in the changes to NRC rules (item III.A.2.1) and the NRC/FEMA criteria (item III.A.2.2). The routine emergency preparedness inspection program has been deferred during FY80 to divert manpower to the team review effort in item III.A.1.1. The routine inspections under the revised program will be phased back in during FY81 as the team review efforts are completed, and will be entirely in place by FY82. The upgraded regulatory requirements and criteria and the need for the NRC to adequately perform its function of evaluation of licensee emergency preparedness, including intensive team efforts for evaluation of test exercises, dictates an increase in resource requirements.

b. Schedule: The IE inspection program is to be revised by January 1981. The new program and schedule will be phased in during FY81. Implementaion of the revised program will be completed by FY82.

c. Resources: IE FY80 - 6 my (now being applied in item III.A.1.1), FY81 - 12 my (resources are included in item III.A.1.1), FY82 - 24 my.

C. LICENSEE ACTIONS

1. Amend 10CFR50 and 10CFR50, Appendix E.

a. Description: Licensee implementation of the new rule and criteria will require (1) revised emergency plans to meet new requirements; (2) extensive coordination and planning efforts with state and local officials; (3) new and/or revised implementing procedures submitted for NRC review; and (4) acquisition of new equipment and instrumentation. These amended rules should not significantly add additional design requirements on licensees and near-term operating license applicants whose emergency preparedness programs are already being upgraded through the NRC actions described in item III.A.1.

b. Implementation: Operating plant licensees will be required to implement the rule no later than 6 months after effective date of the rule. Near-term operating license applicants will be required to implement the applicable new rules before the plant is authorized to operate at full power. Construction permit applicants will be required to implement the applicable new rules before a permit is issued.

c. Resources: Estimates are those in item III.A.1.1.

2. Development of guidance and criteria.

a. Description: Licensees will participate in the development of guidance and criteria.

b. Implementation: The implementation will be published in the guidance and criteria.

c. Resources: Estimates are included in item III.A.1.1.

D. <u>OTHER ACTIONS</u>: None.

E. <u>REFERENCES</u>

President's Commission Report: Items 1.3.c, B.3.c, E.5, F.1.a, c, and d, F.2.a, F.2.b, F.4, G.1, G.2, G.3, G.4, and G.5.

Others: NUREG-0553.

NUREG-0578, 2.2.2.a, b, and c.

NUREG-0600, 1a, 1b, 1c, 8, B.2f.

NUREG-0616, 3.4.4.4, 3.5, 3.6.1, 3.6.2, 3.13.1.2, 3.13.1, 3.13.6.1, 3.13.6.2, 3.13.7.2, 3.13.8., 3.13.8.3., 3.13.2, 3.13.3, 3.13.4.

SECY 79-591.

TASK III.A.3 IMPROVING NRC EMERGENCY PREPAREDNESS

A. OBJECTIVE: To enable the NRC, in the event of a nuclear accident at a licensed reactor facility, to (1) monitor and evaluate the situation and potential hazards, (2) advise the licensee's operating staff as needed, and (3) in an extreme case, be able to issue orders governing such operations.

B. NRC ACTIONS

1. Develop NRC role in responding to nuclear emergencies.

a. Description:

(1) A contract with the MITRE Corporation was issued to identify the operational implication of alternate NRC roles in incidents involving licensees.

(2) The staff will meet with the Commission to obtain input on current efforts to revise the incident response program based on definition of the NRC role.

(3) The IE staff will prepare a Commission paper to provide opportunity for further Commission guidance on the revised incident response program.

(4) The IE staff will revise NRC Manual Chapter 0502 and other agency procedures for implementation of the incident response program based on the Commission paper and other inputs from NRC offices.

(5) The NRC organization for emergency response will be established based on the overall NRC role.

(6) NUREG-0610, "Action Level Guidelines," will be revised to indicate the NRC response role.

b. Schedule: The NRC staff will meet with the Commission in February 1980 and will complete its study. The staff paper to the Commission will be sent in March 1980, and NUREG-0610 will be revised. The NRC Manual Chapter 0502 will be revised and the NRC response organization established in April 1980, and IE Manual Chapter 1300 will be revised by May 31, 1980.

c. Resources: IE FY80 - 3 my, $181,400, FY81 - 2 my, $140,300; NRR FY80 - 0.2 my; SD FY80 - 0.1 my; SP FY80 - 0.5 my, $200,000, FY81 - 0.5 my, $200,000.

2. Improve operations centers.

a. Description: The NRC Operations Center (OC) in Bethesda, Maryland will be upgraded to support activities in response to a major accident. The expansion of the OC is dependent on the communications and information retrieval systems to be developed under items III.A.3.3 and III.A.3.4. Regional operations centers will be established concurrently to receive initial licensee notifications, perform required accident assessments, and support regional activities until the regional IE response team has arrived at the licensee's near-site Emergency Operations Center (EOC). In addition, the regional OC will normally function to track or monitor unusual situations (i.e., hurricanes, etc.) in an "alert mode." Regional response capabilities will be modified or expanded, as appropriate, to reflect the NRC and IE response roles as defined under item III.A.3.1.

b. Schedule: The functional requirements will be established in January 1980 and the concept will be complete by March 1980. Final modifications of the NRC Operations Center are dependent upon several other factors outside the scope of the Action Plan (e.g., the question of NRC consolidation in a single location). Final Regional OC modifications will be completed by January 1981.

c. Resources: IE FY80 - 4.5 my and $250,000 for contract.

3. Communications

a. Description: Direct dedicated telephone lines (OPX) have been installed at each operating power plant and selected fuel facilities; these lines are for immediate notification and continuous communication with NRC concerning facility status. A second direct and dedicated network for health physics and environmental information is currently being installed.

Communication capability will be improved by providing high frequency (HF) radios at each site, regional office, and the NRC Operations Center to ensure uninterrupted communication during events such as earthquakes, hurricanes, floods, and sabotage. This system is part of the FEMA radio network with NRC and licensee transceivers. Also, the system will be installed in Regional response mobile laboratories and emergency vehicles.

Dedicated short-range radio communication systems (Field Incident Radio System - FIRS) will be obtained for the use of NRC field personnel during emergencies. Specifications have been developed, a supplier obtained, and a request made to the Controller for money to procure the equipment.

The availability of communication equipment from other federal agencies to supplement the FIRS will be determined, and formal arrangements will be made. NRC will work with DOE and the Forest Service in upgrading their capability to assist NRC in an emergency, and better preplanning between NRC and other agencies will be developed.

A National Warning System (NAWAS) drop will be required at each reactor, and each regional office and Headquarters OC will be equipped with NAWAS.

NRR will coordinate wih the National Oceanic and Atmospheric Administration (NOAA) to obtain authorization for teletype circuits and to obtain access capability to NOAA forecast offices. NRR will also coordinate with the Federal Emergency Management Agency (FEMA) and the States to establish communication channels for coordination of meteorological information and assessments of transport and diffusion.

b. Schedule: By February 1980, the OPX telephone lines and the health physics and environmental network will be installed. The radio equipment will be available by September 1980. The field radio system requires 120 days for delivery from the procurement date. The ongoing liaison with the Forest Service and DOE for backup radio and communications support will continue. Coordinating efforts for meteorological information will be completed by July 1980; liaison will be a continuing effort.

c. Resources: For communication to facility: ADM FY80 - 0.1 my for telephone hotlines, $1.2 million for annual maintenance of telephone hotlines, 0.3 my for HF radio, $500,000 for HF radio, FY81 - 0.1 my for telephones, $1.2 million for telephone maintenance; IE FY80 - 2 my for HF radio.

NRC field radio system: ADM FY80 - $500,000.

Meteorological data: NRR FY80 - 0.2 my, $100,000, FY81 - 0.4 my, $100,000.

Forest Service and DOE communications support: IE FY80 - 0.5 my and $50,000, FY81 - 0.5 my and $250,000.

4. Nuclear data link (NDL).

a. Description: "Nuclear data link" is the term given to a system that remotely accesses facility data and transmits the data and displayed information in the NRC Operations Center. The information will allow NRC to analyze and evaluate the plant situation in emergency conditions and to develop or evaluate proposed accident-mitigating actions. Sandia has been contracted as system integrator for developing the concept for data acquisition from licensed facilities and for upgrading the NRC operations center at headquarters.

The program Sandia develops will define the scope for an NRC nuclear data link. NRC links with the various nuclear facilities, methods of transmission, and the display and arrangement of the upgraded NRC headquarters operations center will be studied. Consideration will be given in the initial development to a series of alternate data inputs (i.e., 20-100-500 parameters monitored) and associated problems and implications of availability (i.e., from plant computer, is hardwiring to monitor/sensor necessary, is signal in analog or digital form, what form should output signal be in?).

A status report on the Sandia study will be presented to the Commissioners in February 1980. A final design report on available NRC options will be presented to the Commissioners by April 1, 1980. Future funding will be decided based upon these presentations.

b. Schedule: The NDL system Phase I study, including development of implementation schedule and cost estimates, will be completed by April 1, 1980.

c. Resources: IE FY80 - $150,000 (also possible $300,000 from supplemental); RES FY80 - $300,000. Future resources are dependent on Commission decisions.)

5. Training, drills and tests.

a. Description: Headquarters drills and exercises presently being conducted will continue. The scope of the exercises will be slowly expanded to include regional offices, licensees, state and local agencies, and federal response capabilities. A schedule for the frequency of drills and exercises involving various levels of participation by these parties will be developed. Training of staff of NRC and other agencies concerning NRC incident response program will be continued.

b. Schedule: This is a continuing effort. A schedule for the exercises will be established by March 1980.

c. Resources: IE FY80 - 1 my, FY81 - 1 my; NRR FY80 - 9 my, $500,000, FY81 - 16 my, $1.0 million.

6. Interaction of NRC with other agencies.

a. Description:

(1) International. The Office of International Programs will complete agreements with Canada and Mexico for mutual cooperation and assistance during significant emergency events. Specific arrangements with Canadian provinces may be necessary to provide for protective measures for the ingestion pathway for accidents at U.S. plants located near the Canadian border. Also, arrangements will be made to provide notification and information to U.S. jurisdictions for accidents at Canadian facilities. Part of this may be accomplished through the Great Lakes Water Quality Treaty provisions.

(2) Federal. There will be an overall Federal response plan involving FEMA, DOE, EPA, HEW, DOD, and DOT, as well as NRC. This plan will describe the NRC role relative to other agencies under various nuclear emergency situations.

(3) State and local. As the role of the NRC becomes defined (item III.A.3.1), all state and local governments will be informed of the role of NRC, and the interactions and responsibilities of NRC as discussed in item

III.A.3.6.2; this will be done in the NRC team reviews under item III.A.1.1 and IE efforts under item III.A.2.3. Accidents involving nuclear materials, directly and indirectly related to TMI, can impact on unprepared government bodies who must know proper emergency procedures.

b. Schedule: The international agreements will be complete by December 1980. The schedule for the Federal plan is controlled by FEMA. The actions to inform state and local agencies of the NRC role are dependent on completing item III.A.3.1, which is scheduled for April 1980.

c. Resources: International agreements, IP FY80 - 0.33 my; Federal plan, IE FY80 - 0.33 my; state and local, SP FY80 - 0.33 my.

C. LICENSEE ACTION

1. Develop NRC role in responding to nuclear emergencies. No licensee response is required.

2. Improve operations centers. No licensee response is required.

3. Communication

a. Description: A NAWAS link to the State/NRC network will be installed to notify NRC of significant events at operating power reactors.

b. Implementation: Ongoing.

c. Resources: 0.5 my per plant; NAWAS $2,000 per plant (estimated).

4. Nuclear data link (NDL).

a. Description: Licensee will provide equipment and interface with the NRC data acquisition system.

b. Schedule: To be defined.

c. Resources: Unknown, depends on final design of the NDL system.

5. Training, drills and tests.

a. Description: The licensee will participate in drills with offsite agencies, NRC, and other federal response organizations.

b. Implementation: Licensee conduct of and participation in drills and exercises will continue; limited NRC participation in scheduled exercises will start in 1980.

c. Resources: Estimated 2 my per year.

6. Interaction of NRC with other agencies: No licensee action is required.

D. OTHER ACTIONS

1. Other Federal agency participation in emergency response drill exercises. Major drills will be started in FY81. DOE and FEMA estimates will be developed in consultation with these agencies after the drill and exercise schedules are developed in March 1980. Other State and local agencies will participate.

2. Communication equipment assistance.

a. Description: Other federal agencies will upgrade their communications for specific NRC requirements. The American Telephone and Telegraph Co. (AT&T) will preplan their response capabilities to support NRC communication requirements.

b. Resources: Other Federal agencies FY80 - 3 mm, FY81 - 6 mm; AT&T FY80 - 9 mm, FY81 - 24 mm.

3. Promulgation of protective action guides. Pursuant to Federal Interagency Agreements (40 FR 59494, December 24, 1975), the Environmental Protection Agency (EPA) and the Public Health Service (PHS) are the lead Federal agencies for developing protective action guidelines (PAGs) for use in radiological emergency planning and response. PHS and EPA should place a high priority on the development or revision of PAGs and their promulgation as Federal guidance.

E. REFERENCES

President's Commission Report: Items F.1, F.6, and G.1.

Other: NUREG-0610, "Draft Emergency Action Level Guidelines for Nuclear Power Plants."

NUREG-0585, Recommendation 13.

Gossick to Ahearne memorandum, November 8, 1979, "Supplement to Action Level Guidelines."

NUREG-0616, Recommendations 3.9.4, 3.9.5, 3.11.2, 3.11.10, 3.12.1, 3.4.2, 3.3.3-1, 3.14.5, 3.2-2, 3.2-3, 3.3.1, 3.3.4, 3.14-1-1, 3.4.4, 3.3.2, 3.3.3, 3.3.5, 3.11.6, 3.11.8, 3.11.9, 3.13.10.5, 3.14-2, 3.14.3, 3.14.4, 3.14.7, 1.3.8, 3.3.5-2, 3.4.3, 3.14.2, 3.14.6, 3.10.5, 3.4.1.

Report of EDO Task Force on Emergency Planning, Recommendations A-5, A-2, E-1, B-2, E.5.1, E-6, E-5.2 (IE Rev. 1).

NUREG-0600, OPS C.5a, B.2e.

NUREG-0600, HP 56, 60, 15, 65.

TASK III.B EMERGENCY PREPAREDNESS OF STATE AND LOCAL GOVERNMENTS

A. OBJECTIVES: To upgrade the state of emergency preparedness of state and local governments affected by nuclear facilities. (FEMA was given lead by the President on December 7, 1979.)

B. NRC ACTIONS

1. Near-term actions.

a. Description: NRC has entered into a Memorandum of Understanding (MOU) with FEMA to achieve a prompt improvement in the state of emergency preparedness and to ensure effective transfer of responsibility. SP has provided for the detail of NRC staff with state and local emergency preparedness expertise to work with FEMA through June 1980. The staff will participate with FEMA in preparing assessments of the state of emergency preparedness offsite for all operating reactors by June 1980. As a condition for any new operating license, that NRC will concur with state and local emergency plans. The NRC will participate in the preparation of a set of exercise scenarios from which a state may select a particular scenario to be used in an exercise.

b. Schedule: A Memorandum of Understanding with FEMA was effective January 14, 1980. The detail of NRC staff will be effective through June 1980. Assessment of the state of emergency preparedness offsite for all operating reactors will be completed by June 1980.

c. Resources: SP FY80 - 2.5 my, $350,000, FY81 - 0.5 my; NRR FY80 - 2 my (per MOU with FEMA, ongoing NRC contracts in support of FEMA).

2. Longer term actions.

a. Description:

(1) Utilize state and local emergency preparedness expertise developed at FEMA in NRC licensing reviews. Make decisions with regard to the overall state of emergency preparedness based on the integration of emergency preparedness onsite (as determined by the NRC) and offsite (as determined by FEMA and reviewed by NRC), and with regard to the issuance of operating licenses or the shutdown of operating reactors.

(2) Provide FEMA the opportunity to review and comment on emergency preparedness guidance developed by the NRC for the licensee. Review and comment on emergency preparedness guidance developed by FEMA for state and local agencies.

b. Schedule: FEMA to establish schedule for assessment of overall state of emergency preparedness (integration of onsite and offsite preparedness) for nuclear reactors, fuel facilities, and material licensing reviews.

c. Resources:

(1) FEMA review of state and local plans: The Memorandum of Understanding notes that the Regional Advisory Committees will be responsible for development and review of state and local plans. At the present time, NRC

is devoting approximately 4 man-years of effort/year (IE-3, SP-1) to the Regional Advisory Committee (RAC) field effort. It is expected that the increased role of the Regional Advisory Committees will require 3 to 4 additional man-yea s per year of IE effort.

(2) NRC role and coordination with FEMA: 2 man-years per year of NRR effort will be required to coordinate the FEMA reviews as they relate to the licensing process. The Memorandum of Understanding also assigns the NRC continued responsibility for the overall state of emergency preparedness (i.e., the integration of emergency preparedness onsite as determined by NRC and off-site as determined by FEMA and reviewed by NRC). The extent to which NRC must review the FEMA determinations will become clearer as some operational experience is gained. However, it is estimated that four additional professionals (IE - 2, NRR - 2) will be required on a continuing bases for review of state and local plan adequacy.

C. <u>LICENSEE ACTIONS</u>: None.

D. <u>OTHER ACTIONS</u>: FEMA will provide training programs for state and local emergency response personnel and is developing plans for providing financial assistance to state and local governments where needed.

E. REFERENCES

President's Commission Report: Item F.1

Other: NUREG-0632, Letter to Dr. Frank Press

Joint letter from Chairman Hendrie and FEMA Director Macy, dated October 31, 1979

Senate version of NRC Authorization Bill for FY 1980 (S.562)

Memorandum of Understanding between FEMA and NRC, January 14, 1980

TASK III.C PUBLIC INFORMATION

A. OBJECTIVE: Provide information to the news media and the public describing how nuclear plants operate, radiation and its health effects, and protective actions against radiation.

B. NRC ACTIONS

1. Provide information to public.

a. Description:

(1) The Office of Standards Development (SD) will prepare letters for the Chairman's signature to be sent to the appropriate national professional engineering societies (e.g., ANS, HPS, ASME, and to EPRI) urging active support for public education and news media programs on radiation and nuclear power, including radiation safety.

(2) OPA will issue a letter to DOE's Education Programs Division requesting an augmentation and redirection of its education assistance programs to address the objective of this Action Plan. OPA will provide the necessary guidance.

(3) SD will issue a NUREG-series report on nuclear power and radiation effects to meet public information needs.

(4) SD will prepare letters for the Chairman's signature to professional societies, such as ANS and HPS, urging that they sponsor seminars for the news media where reporters can learn how nuclear power plants operate, how nuclear power is regulated, and about radiation effects.

b. Schedule: The above items, which are expected to be ongoing for a number of years, should be in place and functional by December 1980.

c. Resources: OPA - 0.2 my per year beyond current program; SD - 0.25 my; IE FY80 - 0.16 my, $1,400.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items F.4, G.1, G.2, and G.3

TASK III.D.1 RADIATION SOURCE CONTROL

A. OBJECTIVE: Reduce the potential for exposures to offsite populations and workers at nuclear power plants following an accident by reducing the sources of radiation in areas which may be occupied by personnel after an accident and by reducing the radiation which may be released to the environment.

B. NRC ACTIONS

1. Sources outside the containment structure.

a. Description: The likelihood of worker exposure and radiation releases from sources of radiation and airborne radioactivity in the primary coolant outside the containment structure following an accident will be reduced by taking the following actions.

(1) NRR is reviewing program plans submitted by licensees and applicants for operating licenses to satisfy the Lessons Learned Task Force Short-Term Recommendations 2.1.6.a and b pertaining to reducing leakage from operating systems and resultant high radiation fields and effluent releases.

(2) NRR will require plants in the operating license review stage to provide information on equipment arrangement drawings, piping drawings, and fabrication criteria (or specifications) for systems which may contain substantial amounts of radioactivity after an accident (e.g., letdown/makeup, RHR, RCIC, etc. See NUREG-0578, Sec. 2.1.6.a).

(3) An NRR contractor will evaluate information already available, along with information obtained from LER's. This evaluation will summarize experience, determine the feasibility, and make recommendations for installing those systems in an enclosure provided with venting to the containment structure or requiring additional design features to reduce occupational exposures and effluent releases.

(4) Based on this evaluation, NRR will revise, as appropriate, Standard Review Plan Sections 9.3.4, "Chemical and Volume Control System," 11.3, "Gaseous Waste Management Systems," and others, such as 6.4, "Habitability Systems," and 12.3, "Radiation Protection Design Features."

b. Schedule.

(1) NRR will complete review of program plans submitted by operating reactors and applicants for operating license (required by January 1980) by March 1980.

(2) NRR will request system and equipment descriptions by March 1980.

(3) An NRR contractor will complete evaluations by December 1980.

(4) NRR will revise the appropriate Standard Review Plan sections by July 1981.

c. Resources: NRR FY80 - 1.0 my, $80,000; NRR FY81 - 0.1 my, $20,000; SD FY80 - 0.2 my, FY81 - 0.33 my.

2. Vent-gas systems.

a. Description: NRR will evaluate the adequacy of the existing acceptance criteria for the design of vent-gas systems and the need for requiring leak-detection systems and then revise or develop additional criteria, as appropriate. NRR will require applicants and licensees to provide more complete vent-gas system descriptions and leak-detection provisions, as appropriate, which meet revised acceptance design criteria. In the interim, operating reactors and reactors undergoing operating license review will be required to evaluate existing vent-gas systems and make modifications necessary to reduce the potential for releases from an accident such as that which occurred at TMI-2 and from an incident such as that which occurred at North Anna Unit 1. NRR will revise Standard Review Plan Section 11.3, "Gaseous Waste Management Systems," as appropriate.

Little detail presently exists in SRP Section 11.3 regarding criteria specific to vent-gas system design for either normal or accident conditions. Noble gases released to the environment during both the accident of TMI-2 and the incident at North Anna Unit 1 in 1979 were identified as coming from the vent-gas system, at least in part. The evaluation will therefore include such factors as overpressurization design, pressure relief mechanisms, flow restriction, system discharge point, filtration, etc. Such factors can not only reduce airborne radioactive effluent releases during operational occurrences normally anticipated at a plant (such as a blown rupture disk) and accounted for in the Appendix I source term, but they can also provide the benefit of reducing the potential for release from the vent-gas system during accident conditions. Rulemaking (as described in Action Plan II.B.8) may lead to additional requirements. This action supplements Lessons Learned Short Term Recommendation 2.1.6.a, which calls for leak reduction measures of plants and possibly design changes.

b. Schedule: NRR will complete evaluation of the criteria by April 1, 1980 and will issue guidance. A draft revision of Standard Review Plan Section 11.3 will be prepared by July 1980. NRR will review vent-gas system proposed modifications by September 1980. IE will complete inspections of modifications by December 1981.

c. Resources: NRR FY80 - 0.5 my, FY81 - 0.1 my; IE FY81 - 1 my, $9,000.

3. Secondary system radiological sources.

a. Description: NRR will require operating PWR's and PWR's undergoing operating license review to evaluate primary-to-secondary-side leakage and subsequent radioactivity leakage from the secondary system to buildings outside the containment structure and to evaluate radiological hazards to workers and the public which could result from a major accident. NRR will also require licensees to make modifications to reduce these hazards. IE will perform followup inspection of any modifications made. NRR will revise Standard Review Plan sections, as appropriate.

b. Schedule: NRR will issue the requirement in March 1980. NRR will evaluate licensee responses and issue a regulatory position by September 1980. IE will complete inspections by December 1981. NRR will revise Standard Review Plan sections, as required, by July 1982.

c. Resources: NRR FY80 - 0.5 my; IE FY80 - 0.5 my, FY81 - 1.0 my; SD FY80 - 0.2 my, FY81 - 0.33 my.

4. Large-volume noble gas recovery or delay system.

a. Description: RES will sponsor a study to determine the applicability and desirability of the use of available technology to minimize the release of radioactive noble gases during various postulated accident conditions. The study will include assessment of the various potential pathways for radioactive gaseous releases, as well as considerations of accelerated rates of treatment of large gas volumes, such as those existing in large containment structures.

b. Schedule: Research will be initiated by October 1980. One year of study will be required, and a final report is to be submitted to NRC in June 1982.

c. Resources: NRR FY80 - 0.1 my, FY81 - 0.1 my; RES FY81 - $100,000 for contractor, FY82 - $50,000 for contractor.

5. Auxiliary and radwaste building ventilation.

a. Description: NRR will require licensees to perform studies and make modifications based on these studies to improve the control of airborne radioactive leakage within the auxiliary and radwaste buildings and to provide for the collection of airborne radioactive particulates and radioiodine and for their processing through filters before release. NRR will revise appropriate

Standard Review Plan sections to reflect these requirements. IE will inspect implementation of the requirements.

b. Schedule: NRR will issue requirements for operating reactors by March 1980, and will review responses and issue approvals by September 15, 1980. Requirements will be issued to construction permit holders and applicants and to operating license applicants by March 1980. Operating license applicants must comply before full-power operation, and construction permit holders must be in compliance before obtaining an operating license. Inspections of implementation will be completed by IE by December 31, 1981. The appropriate Standard Review Plan sections will be revised by July 1981.

c. Resources: NRR FY80 - 0.2 my, $160,000, FY81 - 0.5 my; IE FY80 - 1 my, FY81 - 1 my; SD FY80 - 0.2 my, FY81 - 0.33 my.

6. Radioiodine adsorber criteria.

a. Description: Licensees will be required to improve the mitigation of accident consequences by upgrading radioiodine adsorber requirements and performance criteria of ventilation systems by the following actions.

(1) Licensees will be required to upgrade the charcoal adsorbers and to implement surveillance testing of all engineered safety feature (ESF) and non-ESF filtration systems. NRR will require licensees and applicants to implement the surveillance testing criteria of Regulatory Guides 1.52 or 1.140 for non-ESF filtration systems (ESF systems presently require surveillance)

and to use charcoal with a triethylene diamine (TEDA) or equivalent co-impregnant to improve radioiodine holding capacity. NRR will amend plant technical specifications at the time of issue of the radiological effluent technical specifications (RETS) to include the surveillance requirement. IE will inspect for implementation.

(2) RES will sponsor studies to evaluate charcoal adsorber and other radioiodine collection media performance under accident conditions, evaluate the degradation due to normal operating conditions, and evaluate the ability of the adsorber to perform satisfactorily under accident conditions. Factors to be evaluated will include "poisoning" of the collection media during normal and accident conditions, depth of collection bed, types of charcoal impregnants, radiation degradation effects, influence of high noble gas and radioiodine concentrations, "bleeding" of radioiodine after collection, and other factors. Based on the results of this research, SD will revise Regulatory Guides 1.52, "Design, Testing, and Maintenance Criteria for Engineered Safety Features Atmospheric Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants," and 1.140, "Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorber Units of Light-Water-Cooled Nuclear Power Plants."

b. Schedule: NRR will issue the requirement for charcoal adsorber upgrading and surveillance testing by February 1980. IE inspection will be completed by December 1980. Technical specification revisions will be made during 1980 and 1981.

Research now underway on degradation of activated charcoals will be complete by mid-FY80. Radioiodine collection media research on performance under accident conditions will be complete in FY82. Revision to Regulatory Guides 1.52 and 1.140 will be complete in FY83.

c. Resources: NRR FY80 - 0.1 my, FY 81 - 0.1 my, FY82 - 0.1 my, FY83 - 0.3 my; IE FY80 - 0.25 md per plant; RES FY80 - $110,000 for contracts, FY81 - $115,000 for contracts, FY82 - $122,000 for contracts; SD FY83 - 1.0 my.

C. LICENSEE ACTIONS

1. Sources outside the containment structure.

a. Description: Licensees and operating license applicants are required to implement the leak reduction program specified in NUREG-0578 Recommendation 2.1.6.a and report on that implementation to NRC. Operating license applicants must gather and forward to NRC the information requested in item B.1.a.2 above.

b. Implementation: Operating reactors are to complete implementation of the leakage reduction program by January 1980. Plants scheduled for near-term operation are to implement the program before full-power operation. Plants in the operating license review stage must submit the requested information by June 1980.

c. Resources: Operating reactors FY80 - 0.2 my per plant, FY81 - < 0.1 my per plant; operating license applicants FY80 - 0.1 my per plant with no capital cost.

2. Vent-gas systems.

a. Description: Operating reactors and reactors undergoing operating license review will conduct evaluations of vent-gas systems and make modifications. When final criteria are provided by NRC, they will conduct final reviews of vent-gas system design and leak detection provisions and make modifications required by NRC. Applicants and licensees will provide vent-gas system design information to NRC.

b. Implementation: Applicants for operating licenses will conduct evaluations and provide system descriptions prior to full-power operation and will commit to proposed schedule for any modifications. Operating reactors will complete evaluations, provide system descriptions, and submit schedules for any modifications by September 1980. Final modifications required by NRC are to be complete by July 1981 for operating reactors and prior to full-power operation for any near-term operating license applicants.

c. Resources: FY80 - 0.1 my, FY81 - 0.1 my and up to $100,000 per plant.

3. Secondary system radiological sources.

a. Description: Licensees and operating license applicants must evaluate and modify secondary systems to reduce hazards from radiological sources.

b. Implementation: Evaluations must be complete by April 15, 1980 and modifications by July 1, 1981.

c. Resources: 0.25 my per plant.

4. Large-volume noble gas recovery or delay system: No licensee or applicant action is required.

5. Auxiliary and radwaste building ventilation.

a. Description: PWR licensees and applicants will perform the required studies and implement improvements.

b. Implementation: For operating PWR's, licensees must identify improvements by August 1, 1980 and complete modifications by July 1, 1981. Operating license applicants must submit plans for implementation by full-power operation. Construction permit holders must complete before operating license is issued.

c. Resources: FY80 - 0.5 my per plant; FY81 - 0.5 my per plant; $1,000,000 per plant capital expenditure (average estimate) if ventilation cleanup system is required.

6. Radioiodine adsorber criteria.

a. Description: Licensees are required to develop and implement surveillance testing programs for non-ESF filtration systems and to install charcoal with TEDA (or equivalent) as a co-impregnant in all filtration systems. They must submit surveillance requirements for NRC review.

b. Implementation: Operating reactors must implement surveillance testing programs by July 1, 1980, and submit surveillance technical specification amendments according to RETS schedule. Operating license applicants and construction permit holders must complete this work prior to fuel loading. TEDA-impregnated (or equivalent) charcoal must be installed at earliest filter change or prior to operation.

c. Resources: FY80 - 0.1 my with no capital costs. Costs of approximately $5,000 per set of tests per plant and total yearly costs not to exceed $60,000 per plant may be involved. Manpower cost of approximately 0.1 my in FY80.

D. OTHER ACTIONS: None.

E. REFERENCES

1. Sources outside the containment structure.

President's Commission Report: Item D.4.C(ii)

Others: NUREG-0578, Recommendation 2.1.6.a

2. Vent-gas system.

President's Commission Report: Item D.2

Other: NUREG-0578, Recommendation 2.1.6.a

3. Secondary system radiological sources.

NUREG-0578, Recommendation 2.1.6.a

NUREG-0600, HP 35

4. Large-volume noble gas recovery.

CRS letter, October 9, 1979

5. Auxiliary and radwaste building ventilation.

President's Commission Report: Items A.7 and D.2

6. Radioiodine adsorber criteria.

President's Commission Report: Item D.2

Other NUREG-0585, Recommendation 10

TASK III.D.2 PUBLIC RADIATION PROTECTION IMPROVEMENT

A. OBJECTIVE: Improve public radiation protection in the event of a nuclear power plant accident by improving: (1) radioactive effluent monitoring, (2) the dose analysis for accidental releases of radioiodine, tritium, and C-14, (3) the control of radioactivity released into the liquid pathway, (4) the measurement of offsite radiation doses; and (5) the ability to rapidly determine offsite doses from radioactivity release by meteorological and hydrological measurements, so that population protection decisions can be appropriately made.

B. NRC ACTIONS

1. Radiological monitoring of effluents.

a. Description: NRC will provide acceptance criteria for effluent monitors to accurately measure the amounts of radioactivity being discharged during and following an accident. This long-term activity complements and goes beyond revisions that are being made to Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environmental Conditions During and Following an Accident," and the action described in Lessons Learned Short-Term Recommendation 2.1.8.b (NUREG-0578), which requires an increased range on effluent noble gas monitors. The requirements (or guidance) in Regulatory Guide 1.97 and NUREG-0578, Recommendation 2.1.8.b, were judged to be both technically feasible and necessary, based on experience at TMI-2. The actions described here call for studies of potential requirements which are not obviously feasible and whose added degree of protection needs to be evaluated. The overall objective of these actions, however, is to provide assurance that all possible accident effluent release pathways are monitored and that monitors will perform properly under accident conditions.

(1) NRR will evaluate the feasibility and perform a value-impact analysis of modifying effluent monitoring design criteria to require state-of-the-art or near state-of-the-art effluent monitoring systems and other design features based on TMI-2 and other experience. Factors to be evaluated include: (a) establishment of a requirement for a background-compensating monitoring system, (b) establishment of a requirement for direct quantification of individual radioisotopes in the effluent stream, (c) the effectiveness of various radioiodine adsorbers in sampling systems, (d) establishing a requirement for locating monitors in an area which will have a low background area during accident conditions, (e) establishment of a requirement for certain monitors to meet engineered safety feature (ESF) criteria, and (f) quality assurance and control requirements.

(2) NRR will require the development of effective means for monitoring and sampling noble gases and radioiodines released to the atmosphere during a PWR steam dump. Results of the study will be used to develop criteria for backfit and forward fit.

(3) Based on the results of the evaluations described in items (1) and (2), above, NRR and SD will revise Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Standard Review Plan Section 11.5, "Process and Effluent Radiological Monitoring and Sampling Systems," and further revise Regulatory Guide 1.97, as

necessary. NRR will also establish which design features, if any, should be backfit.

(4) RES will conduct a study to evaluate state-of-the-art monitoring instrumentation to determine the feasibility of requiring the development of radioiodine effluent monitors that provide a continuous indication of the rate of release of radioiodine.

b. Schedule:

(1) NRR will evaluate effluent monitor design criteria by September 1980.

(2) The evaluation of PWR steam dump monitoring will be complete by June 1980 and backfit requirements will be issued by August 1980.

(3) Based on the revised criteria, NRR will prepare draft revisions of Regulatory Guides and additional effluent monitoring backfit requirements by January 1981. SD will issue the revised guides for comment by March 1981.

(4) RES will complete a study of real-time radioiodine effluent monitors by March 1981.

c. Resources: NRR FY80 - 0.3 my,$80,000, FY81 - 0.4 my; SD FY80 - 0.3 my; RES - $150,000 for contract.

2. Radioiodine pathway dose analysis.

a. Description: Improved understanding of radioactive iodine partitioning in the primary coolant, in the containment structure, and in the environment following an accident will be developed.

(1) NRR will perform a study of iodine behavior in TMI-2 reactor coolant, containment water, and water atmosphere in the auxiliary building using, to the extent possible, results obtained in item II.H.3. The results will be compared with predictions in Regulatory Guide 1.111 to determine the adequacy of guide predictions or to upgrade guide methodology.

(2) NRR will evaluate the data collected during the controlled field exercises in 1974 and 1977 at the Quad Cities nuclear station and compare the field measurements of radioiodines with the results calculated using the model described in Regulatory Guide 1.111. The results of the comparison will be used to develop improved calculational methodology that will enable accurate prediction of offsite public doses during the course of an accident.

(3) NRR will study the physical and biological transport of chemical forms of radioiodine in the environment and determine the distribution of the chemical species of radioiodine in air-water-steam mixtures. They will determine the influence of wet deposition (rain or dew) from meteorological and iodine-air-grass-milk models and determine the physical mechanism for iodine pathway behavior under accident conditions. They will also determine the environmental pathways for tritium and carbon-14 released from nuclear power stations. The results will be used to improve calculational methodology.

(4) Depending on the results of these studies, appropriate Standard Review Plan sections and Regulatory Guides will be revised.

b. Schedule:

(1) The TMI-2 experience study will be completed by December 1980.

(2) The Quad Cities experience will be evaluated by September 1980.

(3) Environmental iodine species behavior studies will be complete by September 30, 1980.

(4) Revisions of the appropriate Standard Review Plan sections and Regulatory Guides will be completed by December 1981.

c. Resources: NRR FY80 - 1 my, $280,000, FY81 - 1.4 my, $240,000; SD FY80 - 0.6 my, FY81 - 1.0 my.

3. Liquid pathway radiological control.

a. Description: Provisions will be made for control, mitigation, and monitoring methods for radioactivity released into the liquid pathway during a nuclear power plant accident in order to provide decision bases for improving public radiation protection. Liquid pathway dose control methods may include design features, operational features, interdiction of water and (sea) food sources, etc.

(1) NRR will develop a procedure to discriminate between sites and plants which require prompt assessment of liquid pathway interdiction, mitigation, and monitoring. The procedure will consist of a simplified comparison of specific sites to the site used in NUREG-0440, "Liquid Pathway Generic Study" (LPGS), which was analyzed for a class 9 accident. The use of this discrimination procedure will identify the plants with the highest consequences and which thus require attention first.

(2) NRR will develop requests for the information needed to compare each site with the LPGS site using the procedures developed under item B.1, above.

(3) NRR will use the following priorities to review the data provided and to compare the sites: (a) operating reactor sites - inland sites (rivers, lakes, estuaries), and coastal sites; (b) operating license applicant sites; and (c) construction permit applicant sites. The comparison of specific reactor sites with the population doses of the LPGS by NRR will allow discrimination between sites to categorize which sites require prompt interdiction and mitigation programs and those which may implement such plans on an expanded schedule based on the following:

(a) For Category I sites for which population doses are greater than the LPGS, if any (including sites which, because of the simplified analyses, are not clearly better), NRR will notify licensees of the need to identify state-of-the-art control, interdiction, and mitigation procedures. Licensees will be asked to assess the impact of implementing the procedures within

6 months of notification and to implement effective procedures within 1 year of notification.

(b) For Category II sites for which predicted population doses are better than the LPGS, licensees will be asked by NRR to identify, assess, and implement information and procedures within 2 years of notification.

(4) NRR will review and accept licensee's or applicant's liquid pathway control, interdiction, and mitigation plan. IE will inspect for compliance.

(5) NRR will require all licensees and applicants to identify state-of-the-art procedures and facility-specific plans to monitor ground and surface water radionuclide contamination; categorize procedures, locations, etc., with respect to need prior to, during, or following an accidental release; and schedule for installation of "pre-accident" monitors.

(6) NRR will review the proposed monitoring schemes for compliance with procedures, including "National Handbook of Recommended Methods for Water Data Acquisition," U.S. Geological Survey, using a Standard Review Plan modification that is to be developed for this purpose.

b. Schedule:

(1) Screening and discrimination procedures will be developed by March 15, 1980.

(2) Information needs will be developed by March 30, 1980.

(3) Site comparisons will be completed by January 1981.

(4) Applicant's plans will be reviewed for Category I plants by July 1982, and for Category II plants by June 1983.

(5) NRR will issue requirements to licensees and applicants by April 1980.

(6) Licensee/applicant responses will be reviewed for operating reactors by August 1981, for operating license applicants at time license is granted and 1.5 years later, and for construction permit holders at time of operating license application.

c. Resources:

(1) Screening and discrimination: NRR FY80 - 0.1 my and $15,000.

(2) Identify information needs: NRR FY80 - 0.1 my.

(3) Review of sites: NRR FY80 - 2.5 my, FY81 - 0.5 my.

(4) Review of applicant's plans: NRR FY80 - 0.2 my; IE FY80 - 0.5 my per plant.

(5) Issue requirements to licensees/applicants: NRR FY80 - 0.1 my.

(6) Review licensee/applicant responses: NRR FY80 - 1.0 my, FY81 - 3.0 my.

4. Offsite dose measurements.

a. Description: Additional means are required for determining dose rates and doses associated with large accidental releases of radionuclides.

(1) NRR will determine the desirability and necessity for environmental monitors capable of measuring real-time rates of exposures to noble gases and radioiodines. Monitors or samplers capable of measuring respirable concentrations of radionuclides and particulates will be considered. The feasibility of providing the information in the control room will be determined. This activity supports proposed revisions to Regulatory Guide 1.97 and will provide a basis for further changes to the Guide as results become available.

(2) RES will conduct a study to determine the feasibility of transmitting offsite dose and dose rate information directly to the NRC operations center.

(3) IE will place 50 TLDs around each site in coordination with States and utilities. During normal operation, quarterly reports will be provided to NRC, State, and Federal organizations. In the event of an accident,

the dosimeters can be read at a frequency appropriate to the needs of the situation.

b. Schedule: The dose rate measurement feasibility study is to be complete by October 1980. If feasible, NRR will send modified model technical specifications to licensees by March 1981. Final technical specifications must be in place by March 1982. The RES contract will be complete by December 1980. IE will complete TLD installation by April 1980.

c. Resources: NRR FY80 - 0.5 my, $200,000, FY81 - 0.6 my; IE FY80 - 5 my and $295,000 for contract to install TLDs, FY81 - 3 my and $177,000 for contract, FY82 - 3 my and $227,000 for contract; RES FY80 - $300,000 for contract, FY81 - $300,000 for contract.

5. Offsite dose calculation manual.

a. Description: NRR will prepare a manual to be used by NRC and plant personnel to estimate maximum individual doses and population doses during an accident. The manual will include formulations with which to combine source term and meteorological measurements and thus determine offsite dose rates in a manner that will be standard among all parties making decisions on public protection and emergency response.

b. Schedule: NRR will complete the draft manual by December 1980 and will send it to licensees for inclusion into plant procedures by March 1981.

c. Resources: NRR FY80 - 0.7 my, $80,000, FY81 - 0.1 my; IE FY80 - 5.6 my.

6. Independent radiological measurements.

a. Description: Implementation of the findings of a task force review of an NRC plan to independently perform radiological measurements routinely and in response to emergencies will be planned, including manpower and equipment requirements for FY81 and FY82.

b. Schedule: The task force review is to be completed in January 1980 and the implementation plan is to be completed by IE by March 1980.

c. Resources: IE FY80 - 1.25 my.

C. LICENSEE ACTIONS

1. Radiological monitoring of effluents.

a. Description: Systems for radiological monitoring of effluents will be designed to meet revised criteria and backfit selected features, as required by NRC. These systems will be in addition to currently required improved systems for radiological monitoring of effluents.

b. Implementation: For operating reactors and operating license applicants, the systems must be complete by December 1981; for construction permit holders, the systems must be complete prior to licensing for operation. If vendors cannot supply upgraded monitors in time for installation by December 1981, they must be installed as soon thereafter as practical.

c. Resources: The development cost of a steam dump monitor (by an industry organization or DOE) could approach $500,000. The effluent monitor cost could be a few hundreds of thousands of dollars per plant for a plant in the construction permit stage. Estimated backfit costs for operating reactors and operating license applicants will be developed as backfit requirements are established. The manpower requirements in FY81 would be 0.1 my per reactor, and in FY82, 0.2 my per reactor.

2. Radioiodine pathway dose analysis: Plants will review Standard Review Plan and Regulatory Guide revisions. Actions and schedules will depend on content of revised guidance.

3. Liquid pathway radiological control.

a. Description: Plants will provide the information required and, as specified by NRC, develop, assess, and implement state-of-the-art procedures for the control, interdiction, and mitigation of consequences in the liquid pathway leading to release of radioactive liquids. All licensees and applicants will identify state-of-the-art procedures and equipment, specific to each facility and site, necessary to monitor ground and surface water contamination following an accidental release, including melt-through type events; identify those components which, in some cases, must be installed prior to an accident; develop a program to install all required pre-release monitoring; develop a plan to install all other necessary monitoring as required; identify those sites and types of releases where little or no potential exists for rapid contamination of the liquid pathway and need for monitoring system is minimal; and identify existing licensee, State, and Federal monitoring programs which could be relied upon to provide necessary monitoring, including types and locations of sampling stations.

b. Implementation: Operating reactors and operating license applicants must supply the required information by December 1980. Construction permit holders must comply prior to licensing for operation. Category I operating reactors and operating license applicants must implement state-of-the-art monitoring procedures by January 1982; and construction permit holders, prior to operation. Category II operating reactors and operating license applicants, January 1983, and construction permit holders, prior to operation. Pre-release monitoring equipment must be in place at operating reactors by December 1980; operating license applicants must comply within 1 year of issuance of the license; and construction permit holders must comply before operation.

c. Resources: Because of the presently unknown characteristics of mitigation requirements, no firm estimates of capital costs can be made. Development of the requested information will require about 4 mm per plant. Evaluations of needs and alternatives are expected to require 3 to 6 mm per reactor. Capital costs could range up to $1,000,000 per reactor. Monitoring requirements will vary with reactor and site, but capital costs are not expected to exceed $100,000 for any site. The manpower requirement may be 3 my per plant.

4. Offsite dose measurements.

a. Description: Plants must design, order, and install a system of detectors capable of meeting the requirements outlined in model technical specifications, complete technical specification revisions, and rewrite emergency plans and procedures.

b. Implementation: For operating reactors and operating license applicants, the task must be complete by June 1981. For construction permit holders, this work applies to operating license stage submission of technical specifications.

c. Resources: 2 my per reactor; capital cost of $500,000 per reactor (if required).

5. Offsite dose calculation manual.

a. Description: Plants must rewrite procedures to implement the new calculational manual.

b. Implementation: For operating reactors, procedures must be complete by June 1981; for operating license applicants, prior to startup or June 1981, whichever is later; for construction permits, include in operating license stage submission of technical specifications.

6. Independent radiological measurements: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

1. Radiological monitoring of effluents.

President's Commission Report: Items A.7, D.2, and D.3

Other: NUREG-0578, Recommendation 2.1.8.b
Regulatory Guide 1.97, Proposed Revision 2

2. Radioiodine pathway dose analysis.

President's Commission Report: Item D.5

3. Liquid pathway radiological control.

President's Commission Report: Items E.4.a, D.4.b, and D.4.c

Other: NUREG-0440
NUREG-0625
Memorandum, Hulman to Denise, July 5, 1979, TMI Unit 2 Lessons Learned in Meteorology and Hydrology

4. Offsite dose measurements.

President's Commission Report: Items E.4.c, E.4.d, and F.6

Other: NUREG-0600, HP13

Regulatory Guide 1.97, Revision 2

NUREG-0578, Recommendations 2.2.2 and 3.6.3

5. Offsite dose calculations manual.

President's Commission Report: Items E.4.c, E.4.d, and E.5

6. Independent radiological measurements.

President's Commission Report: Item A.11.d

Other: NUREG-0578, Recommendations 2.2.1.1, 2.2.2, 3.6.3, 3.9.3, and 3.14.3

TASK III.D.3 WORKER RADIATION PROTECTION IMPROVEMENTS

A. OBJECTIVE: Improve nuclear power plant worker radiation protection to allow workers to take effective action to control the course and consequences of an accident, as well as to keep exposures as low as reasonably achievable (ALARA) during normal operation and accidents, by improving radiation protection plans, health physics, inplant radiation monitoring, control room habitability, and radiation worker exposure data base.

B. NRC ACTIONS

1. Radiation protection plans.

a. Description: NRC will require all licensees to prepare and implement radiation protection plans (RPP) which will incorporate commitments to criteria in existing Regulatory Guides, including Regulatory Guide 8.8, and Standard Review Plan Chapter 12, as well as criteria to be developed from analysis of the IE appraisal of health physics programs at all operating sites. The RPP will be integrated into the emergency plan to assure worker protection without unduly restricting accident mitigation and recovery.

(1) NRR will, in cooperation with IE and SD, prepare a draft Guide for the preparation of an RPP that will include an existing draft Guide on "Implementation of ALARA at Operating Plants."

(2) NRR will develop acceptance criteria using existing regulatory guides, the Standard Review Plan, and information to be developed on the basis of feedback from ongoing IE comprehensive appraisals at all operating reactors to assess the adequacy of existing radiation protection programs.

(3) NRR will publish for review and action by licensees the draft RPP Guide (see item 1 above), which will specify format, content, and acceptance criteria, including guidance on implementing ALARA at operating plants.

(4) NRR will hold regional meetings to discuss implementation of RPPs and to receive comments on improvements in the draft Guide.

(5) NRR will revise the draft Guide based on the feedback obtained at the regional meetings and from IE.

(6) NRR will require licensees to provide RPPs and request amendment of technical specifications, including a commitment to implement the RPP.

(7) NRR will review the RPPs and, for reference, the amended technical specifications.

(8) NRR will revise Standard Review Plan Section 12.5, "Health Physics Program," to include the RPP Guide in the acceptance criteria.

(9) SD will revise Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."

b. Schedule: The draft RPP Guide is to be complete by April 1980, and the acceptance criteria are to be available by June 1980. Licensees will be requested in July 1980 to prepare RPPs and plan to implement ALARA requirements. Regional meetings to discuss the RPPs will be held in September 1980. NRR will then revise the RPP Guide and transmit the requirements to licensees by January 1981. Licensees will be required to provide RPPs by September 1981 for NRR review. NRR will make the appropriate Standard Review Plan revisions by August 1981, and SD will revise Regulatory Guide 1.70, also by August 1981.

c. Resources: NRR FY80 - 1.8 my, $10,000, FY81 - 2.25 my, FY82 -3.1 my; SD FY80 - 0.6 my; IE FY80 - 6 my, $1,254,000, FY81 - 2 my, $418,000.

2. Health physics improvements.

a. Description: The accuracy of health physics measurements for both routine and emergency conditions is to be improved. Accurate high dose rate warning devices and radioiodine respiratory protection are needed.

(1) SD will amend 10 CFR 20 to require that personnel dosimetry processing be done only by nationally certified processors who meet specific performance criteria.

(2) SD will issue a regulatory guide containing specifications for audible alarm dosimeters and criteria for their use.

(3) SD, in cooperation with the American National Standards Institute (ANSI), will develop standard performance criteria for radiation survey and monitoring instruments. SD will contract for performance testing of on-the-shelf instruments to determine feasibility of the standards. NRC will adopt a final standard and require that only instruments meeting the standard be used at licensed facilities.

(4) Under contract with RES, LASL will develop a method for testing and certifying air-purifying respirators for use against radioiodines. The method and equipment will be transferred to NIOSH and NIOSH will be requested to amend 30 CFR 11 to incorporate the method into respirator test and certification schedules.

b. Schedule: The proposed amendment to 10 CFR 20 is to be available for comment by July 1980 and is to be effective in July 1981. A Regulatory Guide on audible alarm dosimeters was distributed for comment in August 1979 and is to be effective in August 1980. A draft standard for radiation survey instruments is to be completed by September 1980; testing is to be completed by September 1981; a rule change is to be available for comment by January 1982 and the rule change is to be effective January 1983. The radioiodine respirator technology will be transferred to NIOSH in September 1981.

c. Resources: SD FY80 - 0.73 my and $588,000 for contracts, FY81 - 0.53 my and $500,000 for contract; RES FY80 - $110,000 for contract, FY81 - $120,000 for contract.

3. Inplant radiation monitoring.

a. Description: Licensees are to improve systems for monitoring inplant radiation and airborne radioactivity with instruments appropriate for a broad range of routine and emergency conditions and to provide calibration methods for such instruments.

(1) NRR has issued a letter requiring improved radioiodine sampling instrumentation (NUREG-0578, 2.1.8.c) and identification of vital areas requiring access after an accident (NUREG-0578, 2.1.6.a). NRR will evaluate this information and set criteria requiring licensees to evaluate in their plants the need for additional radiation monitors in vital areas and requiring, as necessary, installation of area monitors with remote readout. Operating reactors will be reviewed for conformance with Standard Review Plan Section 12.3.4, "Area Radiation and Airborne Radioactivity Monitoring Instrumentation." NRR will revise Standard Review Plan Sections 12.5 and 12.3.4 to incorporate additional monitor requirement criteria. IE will inspect implementation.

(2) SD will issue a rule change providing acceptable methods for calibration of radiation-monitoring instruments.

(3) SD will issue a Regulatory Guide providing acceptable methods for calibration of air-sampling instruments.

b. Schedule: NRR issued requirements regarding radioiodine monitoring to licensees on October 30, 1979; requirements regarding area monitors will be issued by September 1980. The rule change on calibration of radiation monitoring instruments will be issued for comment in September 1980 and will be effective in September 1981. The Regulatory Guide on calibration of air-sampling instruments was issued for comment in October 1979 and will be effective in October 1980.

c. Resources: NRR FY80 - 0.3 my, $60,000, FY81 - $120,000; SD FY80 - 0.4 my, FY81 - 0.2 my.

4. Control room habitability.

a. Description: To assure that workers are adequately protected from radiation and other hazards and that the control room can be used in the event of an emergency, NRR will require all facilities that have not been reviewed for conformance to Regulatory Guides 1.78 and 1.95 and Standard Review Plan Sections 2.2.1, 2.2.2, 2.2.3, and 6.4 to make the evaluations and implement appropriate modifications. In conjunction with the rulemaking proposed in Task II.B.8, other sources of radiation may cause changes to these requirements.

b. Schedule: NRR will issue the requirements for operating reactors by March 1980. NRR will complete evaluation of responses and notify licensees of acceptance by November 1980. IE will complete inspections for conformance by May 1982.

c. Resources: NRR FY80 - 0.2 my, $180,000, FY81 - 0.5 my; IE FY81 - 1 my, $9,000, FY82 - 0.5 my, $4,500.

5. Radiation worker exposure data base.

a. Description: NRC will expand the requirements for nuclear facility radiation worker records to permit later epidemiologic studies of worker health.

(1) SD will develop a format for data to be collected by utilities regarding total radiation exposures to workers, as well as other data pertinent to eventual epidemiological studies. These data will include both external and internal doses, medical radiation exposures, health data, and exposure to nonradioactive carcinogens (such as those found in tobacco smoke). This data collection will require worker collaboration and acquiescence, since action that may come from Congress may not have been completed.

(2) SD will, following appropriate legislative action to permit such regulatory requirement, revise 10 CFR 20 to require licensees to collect worker data.

b. Schedule: SD will complete format for radiation exposure data base for epidemiological studies by August 1980. The requirement for implementation of data collecting will be issued as a proposed rule for comment in July 1981 to be effective in October 1982, provided other necessary actions have been implemented.

c. Resources: SD FY80 - 0.5 my; NRR FY80 - 0.3 my, FY81 - 0.1 my; IE FY80 - 0.5 my, $4,500, FY81 - 0.6 my, $5,400.

C. LICENSEE ACTIONS

1. Radiation protection plans.

a. Description: Operating reactor licensees and operating license applicants will develop an RPP based on NRC guidance and propose a technical specification change. Following NRC review, the licensees will take corrective actions, as necessary, based on inspection findings.

b. Implementation: Operating reactors will complete by September 1981; operating license applicants will complete before fuel loading or September 1981, whichever is later.

c. Resources: 0.5 my per reactor.

2. Health physics improvements.

a. Description: Once the rule change is issued, licensees will have dosimeter processing done only by a certified processor. Licensees will use audible alarm dosimeters as specified when the Regulatory Guide becomes effective. Upon issuance of revised 10 CFR 20, licensees will use only approved radiation survey instruments.

b. Implementation: Licensees must be using only certified dosimeter processors within one year after date of the rule change. Audible alarms must be available in operating reactors and near-term operating license plants within six months of the effective date of the Regulatory Guide; other operating license applicants must provide audible alarms prior to operation; and construction permit holders must provide them prior to applying for an operating license. Approved radiation survey instruments must be available on the same schedule as the audible alarms. Approved respirators must be used after issuance of NIOSH test schedule.

c. Resources: Development of RPPs and implementation of corrective action will require 0.5 my per reactor. Dosimeter processing by certified processors will add nominal cost to most facilities since they now process on site. They will have to add TLD processing by a certified vendor or become certified themselves. This may amount to $10,000. The use of audible alarms may cost $2000 per reactor. The cost for approved survey instruments is unknown because it depends on how many existing instruments will be qualified. The cost for approved respirators should be no more than committed now for unapproved respirators.

3. Inplant radiation monitoring.

a. Description: Licensees must evaluate locations and ranges of radioiodine monitors, provide results to NRC, and install new monitors as required. They must also comply with the rule on radiation monitoring instruments and the Regulatory Guide on air-sampling instruments.

b. Implementation: Operating reactors and near-term operating license applicants must have radioiodine detection capability by January 1, 1980 and must add area monitors and a low-background area for iodine analysis by June 1982; other operating license applicants and construction permit holders must comply by June 1982 or prior to licensing for operation, whichever is later. Schedules for compliance with the rule on radiation-monitoring instruments and the Regulatory Guide on air-sampling instruments will be provided.

c. Resources: Evaluation of radioiodine detection capability will require 0.1 my per reactor, and the addition of monitors will require 0.1 my and $50,000 per monitor. Calibration of radiation monitoring and air-sampling instruments will require 0.1 my for revising procedures.

4. Control room habitability.

a. Description: Licensees must review control room habitability against specified guidance and make necessary modifications.

b. Implementation: For operating reactors, reviews must be complete by May 1980 and modifications must be complete by March 1981; operating license applicants must confirm compliance with existing requirements or establish schedule for necessary modifications before full-power operation; construction permit holders must comply before an operating license is issued.

c. Resources: 0.3 my per reactor and capital cost of $35,000 per reactor.

5. Radiation worker exposure data base.

a. Description: Licensees must implement data collecting requirements and develop procedures to collect and transmit the required data.

IV. NRC ORGANIZATION, MANAGEMENT, PRACTICES AND PROCEDURES

TASK IV.A OVERALL POLICY AND ORGANIZATION

A. OBJECTIVE: To clarify and to strengthen the overall NRC policy and organization.

B. NRC ACTIONS*

1. Develop NRC policy statement on safety.

a. Description: The Commission will issue an explicit statement of safety policy that includes considerations of safety-cost tradeoffs.

b. Resources: To be determined.

2. Clarify and strengthen the respective roles of Chairman, Commission, and Executive Director for Operations.

a. Description: The Commission will clarify and strengthen the respective roles and authority of the Chairman, as chief executive officer, the Commission, as head of the agency, the Executive Director for Operations (EDO), as chief staff officer.

b. Resources: OGC FY80 - 0.3 my.

*Note: All of the action items in Task IV.A are considered to be Commission-level actions. Therefore, no schedule has been indicated.

3. Authority to delegate emergency response functions to a single Commissioner.

a. Description: Seek authority for the Commission to delegate specific management responsibilities to an individual Commissioner in the event of defined emergencies.

b. Resources: OGC/OELD FY80 - 0.3 my each.

4. Achieve single location - long-term.

a. Description: Break present impasse hindering location of NRC and its major headquarters staff components in a single location (a single building or an adjacent group of buildings). Accomplishment of this objective is essential to, among other purposes, minimize adverse disruption of NRC headquarters upon installation of NRC terminal of nuclear data link, and headquarters computer and simulator equipment. (See Task III.A.1, item 5, and Item 5 of this task.)

b. Resources: Gross physical space needs are discussed in the GSA "Space Requirements Report." This action impacts on and is impacted by the requirement for an NRC headquarters nuclear data link and computer terminals by 1982. Unless the building at the final location can be completed before the data link and computer terminals are operable, the cost of the final NRC location will be significantly affected by the cost of relocating the data link, computer terminals, and NRC simulators. (See also Task III.A.1, item 5.) ADM FY80 - 4.1 my; FY81 - 4.1 my; FY82 - 4.1 my.

5. Achieve single location - interim.

a. Description: The distance between NRC headquarters offices must be promptly reduced.

b. Resources: ADM FY80 - 2.2 my; FY81 - 2.2my.

6. Reexamine Commission role in adjudication.

a. Description: Review the Commission's role in adjudications to examine the extent of Commission involvement in licensing proceedings and to eliminate any undesirable and unnecessary insulation of the Commission from decision-making activities of the staff.

b. Resources: OGE/OELD/OPE FY80 - 1.8 my.

7. Study elimination of nonsafety responsibilities.

a. Description: Review the Commission's nonsafety and nonsafeguards regulatory review responsibilities, including antitrust, NEPA, and exports. Examine whether removal of these responsibilities would leave gaps in Federal regulation, and whether they may be transferred to other agencies.

b. Resources: Dependent upon Commission decision.

8. Study NRC top management structure and process.

a. Description: Have an outside management consulting firm examine the current internal management approaches and procedures used by the Commissioners to execute their responsibilities and to examine possible improvements in the Commission's efficiency and effectiveness (related to items 9 and 10 of this task).

b. Resources: ADM $200,000 to $500,000.

9. Reexamine organization and functions of the NRC offices.

a. Description: Examine the current organization and functions of the NRC offices to identify possible improvements in the overall efficiency and effectiveness of NRC (related to items 8 and 10 of this task).

b. Resources: ADM FY80 - $200,000 to $500,000 contractor.

10. Revise delegations of authority to staff.

a. Description: Improve NRC's organizational and management capabilities for effective pursuit of safety goals by clarifying and, as necessary, revising delegations of authority to the staff (related to items 8 and 9 of this task).

b. Resources: Dependent on decisions to be taken in February 1980.

11. Strengthen role of Advisory Committee on Reactor Safeguards.

a. Description: Strengthen the role of the Advisory Committee on Reactor Safeguards (ACRS) by legislating to eliminate its compulsory jurisdiction, and by considering ACRS views on the President's Commission recommendations respecting its role.

b. Resources: ACRS FY80 - 10 my.

12. Study need for additional advisory committees.

a. Description: Determine whether NRC should establish additional advisory committees, such as a citizen's advisory committee or a general advisory committee similar to that of the Atomic Energy Committee.

b. Resources: OPE - 2 mm.

13. Improve public and intervenor participation in hearing process.

a. Description: Assess alternative methods to enhance public and intervenor participation in the hearing process by undertaking a pilot program for intervenor funding in accordance with the FY81 budget request and by studying the concept of an Office of Hearing Counsel, as described by the President's Commission recommendation, and other concepts of Public Counsel (such as those used by some Public Service Commissions). If desirable, propose needed legislation.

b. Resources: OGE/OELD FY80 - less than 1 my each.

14. Study construction-during-adjudication rules.

a. Description: Complete rulemaking on whether construction should be permitted while challenges to a construction permit authorized by a licensing board are under adjudication.

b. Resources: OGC FY80 - less than 1 my.

15. Study need for TMI-related legislation.

a. Description: Study the need for legislation as follows:

(1) Clarify NRC authority to issue a license amendment prior to a hearing when necessary to ensure the health and safety of the public.

(2) Determine whether NRC should seek an amendment to the Sunshine Act to reduce the Act's requirements for Commission meetings during an emergency.

(3) Study and make determinations with respect to NRC's current legal authority to take over and conduct cleanup actions at a nuclear facility and with respect to the Federal government's (a) liability for damages occurring during a cleanup conducted by NRC, and (b) entitlement to reimbursement for cleanup costs.

(4) Study the continuing desirability of Price-Anderson Act in two areas: (a) extraordinary nuclear occurrence, and (b) limitation on liability.

(5) Study and determine desirability of creating a new category of license to be issued in place of an operating license for a facility during an extended recovery period following a major accident.

b. Resources: OGC - 1 to 2 my.

16. Improve overall agency attitude.

a. Description: Undertake continuing program of guidance to enhance, as needed, the overall NRC and industry attitudes and attention toward safety.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.1, 2, 3, 4 and 10; Principal Findings and Conclusions

Other: Letter, M. Plesset, ACRS, to Chairman Ahearne, January 15, 1980

Letter, Chairman Ahearne to Honorable J. T. McIntyre, Jr., January 7, 1980, NRC Reorganization Plan

NUREG-0616, 2.3.1-1, 2, 3; 2.3.2; 2.6.1-4, "Review of Delegations of Authority Within NRC"

Commission's draft licensing reform bill and staff memorandam; Commission comments on pending administrative reform bills, sections on intervenor funding

Baerberg, Hewer, Klores and Koss, Report to the [NRC]: Policy Issues Raised by Intervenor Requests for Financial Assistance in NRC Proceedings, NUREG-75/071 (1975)

"Request for Study of the Generic Issues of Construction During Adjudication," memo to Lee V. Gossick, EDO, from Samuel J. Chilk, Secretary, April 5, 1978

"Interim Report to the Nuclear Regulatory Commission of the Advisory Committee on Construction During Adjudication," submitted to the Commission by Gary Milhollin, Chairman of the Advisory Committee, April 10, 1979

"Report of the Advisory Committee on Construction During Adjudication," submitted to the Commission by Gary Mihollin, Chairman of the Advisory Committee, December 12, 1979

"Supplemental Views of Members Nash, Frye, Cho, Lovelace, and Quay" to Report of the Advisory Committee on Adjudication, December 18, 1979

TASK IV.B.1 INCREASE EMPHASIS ON HUMAN FACTORS

A. <u>OBJECTIVE</u>: Provide organizational structure which gives prominence to efforts related to human factors.

B. <u>NRC ACTIONS</u>

1. Reorganization of NRR.

a. Description: The NRC reactor licensing staff will be reorganized so that functions such as operating procedures, operator training and qualifications, operational quality assurance, and operator-process communications are given prominence in safety criteria development and system evaluation equivalent to that afforded the equipment aspects of nuclear power plant safety.

b. Schedule: The reorganization effort will be completed by April 15, 1980.

c. Resources: Basically complete.

2. Acquisition of expert human factors advice.

a. Description: The NRC staff will collaborate with the Human Factors Society (HSF), selected personal services consultants, and the nuclear industry (ANS and INPO) to establish a long-term plan for regulatory and industry changes to achieve equivalence of human factors in reactor safety with equipment factors.

Preliminary efforts are under way. Consideration is to be given to the formulation of two concurrent but interrelated groups. The first group, including representatives from NRC, the HFS, and the industry, will serve largely in an advisory capacity on a wide range of subjects that relate human factors and the nuclear industry. The second group will initially focus its attention on a study of the human factors needs of the nuclear industry and on the development of an integrated human factors program plan for NRC.

b. Schedule: The long-term plan will be completed by September 1980.

c. Resources: NRR FY80 - 0.4 my, $150,000, FY81 - 0.6 $150,000.

3. Appoint a manager/coordinator for human factors research in RES.

a. Description: RES will establish a position to manage and coordinate all human factors research. The individual in that position will serve as principal technical specialist, senior project manager, and team leader for planning, organizing, directing, and coordinating major research efforts dealing with human factors in nuclear safety. The individual will also serve to provide advice to other offices in human factors.

b. Schedule: Personnel action has been requested by RES to post this new position.

c. Resources: RES FY80 - 1 my, FY80 - 1 my.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.4.a, A.4.b, A.4.c, B.3, B.5, C.1, C.2, C.3, C.4, D.1

Other: NUREG-0585, Recommendation 7.0

NUREG-0600, C.1.d, C.1.e (5)

TASK IV.B.2 INCREASE INSPECTION AND ENFORCEMENT EFFECTIVENESS

A. OBJECTIVE: Reorganize the Office of Inspection and Enforcement to more effectively carry out assigned responsibilities.

B. NRC ACTIONS

1. Increase inspection and enforcement effectiveness.

a. Description: The NRC will reorganize the Office of Inspection and Enforcement to enhance its effectiveness. The reorganization will give greater strength to the enforcement function and direct special attention to the following functions: (1) resident inspection program; (2) emergency planning and response to accidents, including administrative support; (3) enforcement; (4) increased technical support for the inspection program; (5) independent testing and measurements; (6) investigations; (7) quality assurance.

b. Schedule: The reorganization will be completed by April 1980.

c. Resources: IE FY80 - 3.1 my, $280,800, FY81 5 my, $45,000; ELD FY80 - 2 my, FY81 - 3my.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: A.11a-f, B.5, F.1.q, F.1.b

Other: NUREG-0600, 57, 58, 59, 61, 62, 64, 66

NUREG-0600, D.2

NUREG-0616, 2.2.3-1, 2, 3, 4, 6; 2.3.3-3; 2.5.1-3; 2.4.1, 1-6; 2.8.1-1, 2; 3.16-1, 2, 3; 3.10.1, .2, .3, .6, .7, .8; 3.8.2; 3.12.2

TASK IV.B.3 STRENGTHEN ENFORCEMENT PROCESS

A. OBJECTIVE: Substantially improve licensee awareness and attitude toward safety by vigorous enforcement of NRC rules. The two major aspects of this objective are as follows: (1) assess substantial penalties for licensee failure to report safety-related information or for violations of rules defining safety practices or conditions; (2) adopt criteria for revocation of licenses, sanctions short of revocation, such as probation, and safety violations that would require immediate plant shutdown or other operational safeguards.

B. NRC ACTIONS

1. Legislative authority.

a. Description: NRC has requested Congressional approval to increase the civil penalty limit on an individual violation to $100,000 with no upper limit. The NRC is presently considering whether it is desirable to seek legislative modifications to (1) enable civil penalties for a category of actions (such as unreasonable or nonprudent actions) relating to safety, (2) provide order authority against nonlicensees and authority for enforcement sanction (including assessment of civil penalties) against an individual not employed by a licensee, and (3) extend criminal penalties to willful violation of a license condition.

b. Schedule: The increased civil penalty limit will be implemented by February 1980. Other items being considered will be resolved by October 1980.

c. Resources: OGC - 1 my; ELD 0.5 my.

2. Revise enforcement policy.

a. Description: NRC is revising its enforcement policy and guidance including the imposition of civil penalties, orders, and other sanctions. Consideration will be given to using probation as an enforcement action. The revised policy will include methods of informing the public (e.g., public meetings near the site). The public and licensees will be informed of the new policy through information releases and regional meetings.

b. Schedule: April 1980.

c. Resources: FY80 - 2.5my, $18,600, FY81 - 0.25 my, $1,130.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.11.c and A.11.f

Other: NUREG-0616, Section 2.8.1-1, 2

TASK IV.B.4 STREAMLINE NRC PRACTICES CONCERNING INSTRUCTIONS AND INFORMATION FOR LICENSEES

A. OBJECTIVE: Develop a more efficient and effective management method for issuing information and requirements to licensees to eliminate the duplication of staff effort for NRC and licensees. Provide an NRC-wide system for tracking safety issues and recommendations, including differing professional opinions.

B. NRC ACTIONS

1. Develop a management method.

a. Description: NRC requests actions from licensees in various forms, such as generic letters and bulletins. NRC also provides information to licensees in various forms, such as circulars, notices, and letters. Nuclear steam supply system vendors also issue instructions that are periodically referenced in NRC Bulletins. Coordination between NRC offices is not always effective and results in inefficiency or duplication. Necessary information is not promptly received by cognizant supervisors and inspectors. This adversely affects licensee actions and the understanding of safety issues and dilutes NRC and licensee technical resources.

An NRC staff-level task force (with NRR as the lead office) will be established to review overall NRC practices concerning issuance of information to licensees, request for information from licensees, and issuance of various requirements for licensees (including staff issuance of Technical Specifications without request by licensee). This review will identify, for further study, other practices which detract from the application of resources that should be applied to improvement of safety. It will also review related matters such as systems to track resolution of safety issues.

b. Schedule: The NRC staff review will begin in March 1980, and is scheduled for completion in January 1981.

c. Resources: NRR FY80 - 0.5 my; IE FY80 - 0.3 my, $2,700.

C. <u>LICENSEE ACTIONS</u>: Licensees will be queried for suggestions.

D. <u>OTHER ACTIONS</u>: None.

E. <u>REFERENCES</u>

President's Commission Report: Section A.9

TASK IV.B.5 EXTEND LESSONS LEARNED TO LICENSED ACTIVITIES OTHER THAN POWER REACTORS

A. OBJECTIVE: Assure that the lessons learned from TMI are applied to other key NRC programs.

B. NRC ACTIONS

1. Extend lessons learned from TMI to other NRC programs.

a. Description: The lessons learned from TMI should be extended to other key NRC programs where a potential exists for nuclear accidents, including but not restricted to the transportation of nuclear materials, waste management, research reactors, fuel facilities, and Category I materials licensees. The NRC should perform a study to identify the lessons learned from TMI and the resulting agency actions to determine if agency policies and practices related to key programs, other than light water power reactor safety, should be revised and upgraded.

b. Schedule: Studies conducted by both NMSS and NRR will be completed by July 1, 1980.

c. Resources: NMSS FY80 - 2 my; NRR FY80 - 0.5 my.

C. LICENSEE ACTIONS: Increases in staff and upgrading of nonpower reactor facilities may be required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.11

Other: NUREG-0616, 3.13.11

TASK IV.B.6 NRC STAFF TRAINING

A. <u>OBJECTIVE</u>: Improve and expand the NRC training program for its technical staff, including supervisors, project engineers, engineers, inspectors, scientists, investigators, and safeguards personnel.

B. NRC ACTIONS

1. Assess training needs.

a. Description: The NRC will determine training needs for its professional employees. A comparison of identified needs with currently available courses would be required to determine the necessary new courses, associated staff, or contractor assistance. The NRC would then develop and conduct the needed courses.

The following areas will be examined in particular:

(1) Engineering Systems Management

(2) Simulator Training and Drills

(3) Construction Engineering

(4) Emergency Response Function and Terms

(5) Radiological Protection

(6) Radioactive Waste Systems and Handling

(7) Security and Safeguards

(8) Quality Assurance

(9) Investigation

(10) Organizational Relationships

(11) Professional Staff Responsibilities

b. Schedule: The scheduled contract work will begin in July 1980 and be completed by March 1981. The courses developed will begin in October 1980, and be completed by June 1981. Additional training will begin in January 1981.

c. Resources: FY80 - $250,000; IE FY81 - 36 my, $885,000, FY82 - 38 my, $761,000, FY83 - 40 my, $781,000, FY84 - 42 my, $804,000; NRR FY81 - 5 my, FY82 - 5 my, FY83 - 2.5 my, FY84 - 1 my; ADM FY80 - 4.0 my, $250,000, FY81 - 2.0 my, $40,000, FY82 - 2.0 my, $60,000.

C. <u>LICENSEE ACTIONS</u>: None.

D. <u>OTHER ACTIONS:</u> Courses will be expanded to include participants from relevant State and Federal agencies.

E. <u>REFERENCES</u>

President's Commission Report: F.1.b, F.6, A.11.d, 2.4.2, 3.10.4

TASK IV.B.7 ORGANIZATION FOR ANALYSIS OF SAFETY IMPROVEMENTS

A. OBJECTIVE: Establish an integrated program for the modification of regulatory requirements based on the systematic identification and assessments of safety issues related to nuclear power plants.

B. NRC ACTIONS

1. NRR safety improvement.

a. Description: NRR will establish a group that will identify, assess, and resolve safety issues relevant to nuclear power plants. The identification of safety issues will come from the results of safety-related research, the evaluation of operating experience, reviews by the NRC staff and the ACRS, and review and exploratory analysis by the group itself. The assessment of these issues would require further analysis of the course and consequence of possible events and their probabilities. Emphasis should be placed on the realistic evaluation of expected plant response to combinations and permutations of events or potential failure sequences. Resolution would generally be in the form of recommended changes to the Commission's regulations, the Standard Review Plan, Regulatory Guides, review methods, and inspection procedures. The group will communicate and coordinate within NRR and with other offices (RES, AEOD, IE, SD) and industry to obtain the results of licensing reviews, inspections, research or operating experience; to request further analysis, experimentation, or tests in support of safety assessments; and to recommend additional analysis, research, and modifications to review methods, inspection procedures, rules, guides, and review plans.

b. Schedule: The NRC staff will define and document its function by April 1, 1980, and will complete its staffing by December 1, 1980.

c. Resources: NRR FY80 - 0.1 my, FY81 - 8.0 my (continuing).

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.1.d, A.4.c, A.10.a.

Others: ACRS letter August 14, 1979, Item 1, 2, 3, 4, 10, 11 and 12.
ACRS letter April 7, 1979.

TASK IV.C IMPROVE FOLLOWUP ON ACRS ADVICE

A. OBJECTIVE: Improve mechanisms for prompt and substantive followup on ACRS recommendations with respect to cases, standards, and rules.

B. NRC ACTIONS

1. Followup on ACRS advice.

a. Description: The NRC (with NRR as the lead office) will apply more vigorously the current procedures, and will reinforce the procedures as needed. The NRC will give active attention to generic implications of ACRS advice letters and will provide timely compliance and advice to the Commission on needed changes in regulations or procedures. The NRC will conduct stock-taking meetings with ACRS and staff, and will submit progress reports to the Commission. New procedures have been developed to more carefully identify requests for staff action and to control followup. (These actions may be affected by the ACRS report and comments to the Commission on the President's Commission Recommendations.)

b. Schedule: Continuous (new schedule may be developed after submission of ACRS views on President's Commission Report).

c. Resources: 1 my per year.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: ACRS formal correspondence will be used to identify formal requests for staff action.

E. REFERENCES

President's Commission Report: Section A.3

Other: Letter of Chairman Plesset, ACRS, to Chairman Ahearne, dated January 15, 1980

TASK IV.D.1 EXPAND RESEARCH ON SAFETY DECISION-MAKING

A. OBJECTIVE: Develop an expanded program of regulatory research covering new methodologies for making safety-cost tradeoffs, with specific alternative applications to specific licensing and inspection decisions.

B. NRC ACTIONS

1. Formulate alternative safety criteria.

a. Description:

(1) RES will assemble a research task force from a wide variety of professional disciplines. The task force will formulate several possible sets of numerical criteria using different technical approaches. The formation of the research task force and the conduct of its meetings are being coordinated through the Institute of Electrical and Electronic Engineers (IEEE) and the American Nuclear Society (ANS).

(2) Under contract to NRC, Brookhaven National Laboratory will independently formulate criteria and subcontract organizations.

(3) Decision theory and survey methods as means of obtaining criteria are being pursued as extensions of previous approaches to acceptable risk. These methods provide another approach to the establishment of acceptable risk criteria. Negotiations are under way to initiate efforts in this area.

(4) Negotiations are under way with various governmental and private agencies for information on proposed criteria. In addition, letters are beng sent to several hundred individuals announcing the project and requesting their contributions.

(5) To assure tht the criteria receive regorous peer review, negotiations are under way with the National Science Foundation, the National Academy of Sciences, and the American Statistical Association.

b. Schedule: The project is scheduled to be completed by December 31, 1980.

c. Resources: RES FY80 - 0.2 my, $250,000, FY81 - 0.2 my, $250,000; ELD FY81 - 0.5 my.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.4

TASK IV.D.2 EARLY RESOLUTION OF SAFETY ISSUES

A. OBJECTIVES: To foster early resolution of safety issues before major construction commitments occur, eliminate repetitive consideration of issues at several stages of the licensing process, and use rulemaking to resolve generic issues.

B. NRC ACTIONS

1. Plan for resolving issues at the construction permit stage.

a. Description: SD, in consultation with the appropriate program offices, will prepare an information paper outlining a plan for a study and implementation of methods to resolve as many issues as possible at the construction permit stage before major financial commitments in construction occur. Such a study is to (1) take into account previous work done in conjunction with proposed licensing legislation; (2) consider the elimination of 10 CFR 50.35 and the revision of licensing regulations within the current statutory framework to call for complete designs for the construction permit stage and for review by steps of design implementation during the course of construction; (3) consider the issuance of the equivalent of Technical Specifications for construction; (4) include an assessment of hearing rights under the present statute; (5) assess needed revisions to the construction permit format; and (6) identify any needed rulemaking or legislative changes. The plan will include consideration of whether the study should be conducted by an outside "blue ribbon" committee, an inside task force, or other arrangements, and shall discuss methods for industry and public input.

b. Schedule: The information paper will be completed for presentation to the Commission by October 1980. Subsequent information will depend on Commission action on the plan.

c. Resources: SD - 1 my to develop plan.

2. Resolve generic issues by rulemaking.

a. Description: While the Commission attempts to resolve generic issues by rulemaking, means to enhance the Commission's rulemaking efforts are addressed in the OGC/OPE "Study of Delegations Within NRC" which was transmitted to the Commission on October 4, 1979. Further action in this regard will be forthcoming from the Commission's consideration of this document.

b. Schedule: Commission response was due in December 1979.

c. Resources: Not applicable.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.10.

TASK IV.D.3 IMPROVE SYSTEMATIC ASSESSMENTS OF CURRENTLY OPERATING REACTORS

A. OBJECTIVE: To improve programs for the systematic safety evaluation of currently operating plants, in order to assess compliance with current requirements, to assess the need to make new requirements retroactive to older plants, and to identify new safety issues.

B. NRC ACTIONS

1. Assess currently operating reactors.

a. Description: NRR, in consultation with other appropriate offices, will develop a Commission paper setting forth a plan for approval by the Commission to accomplish this objective. (Development of such a plan will take into account the SEP program, the ACRS comments on the program, and the IREP plan.)

b. Schedule: Commission paper will be completed and presented to the Commission for approval by July 1, 1980.

c. Resources: NRR - 0.5 my.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item 11.a

Other: ACRS letter of October 11, 1979

TASK IV.E IMPROVE SAFETY RULEMAKING PROCEDURES

A. OBJECTIVE: Improve NRC's rulemaking procedures to provide a meaningful opportunity for public participation, to assure a periodic and systematic reevaluation of NRC's rules, and to include appropriate provision for backfitting in all new regulations. (Item IV.A.10 discusses related action assessing the delegation of rulemaking authority to members of the staff.)

B. NRC ACTIONS

1. Develop a public agenda for rulemaking.

a. Description: SD, in consultation with other program offices, will publish a semi-annual agenda for significant rulemaking action as called for in Executive Order 12044. At present, the NRC issues an agenda of petitions for rulemaking, a status summary report listing those regulations under development by SD, and publishes advance notice of proposed rulemaking on major actions.

b. Schedule: Initial agenda will be issued by December 1980.

c. Resources: SD FY80 - 0.6 my, FY81 - 0.5 my, FY82 - 0.5 my; OGC FY80 - 0.5 my, FY81 - 0.5 my.

2. Periodic and systematic reevaluation of existing rules.

a. Description: NRC will comply with the intent of Executive Order 12044, which requires a periodic and systematic reevaluation of existing rules. It will first review its rules for content and, at a later date, will review the regulations as a body for proper structure. The initial review will concentrate on areas where rules are broadly affected by the TMI accident. These include rules involving operator training, emergency planning, environmental monitoring, radiation protection, and consistent treatment of fission product release from fuel clad failure.

b. Schedule: The TMI-affected rules will be reviewed by June 1980. Rule changes will be completed by December 1982. A systematic review of all regulations will be completed by December 1984. A complete repetition of the cycle will be performed every 5-7 years.

c. Resources: SD FY80 - 2.4 my, FY81 - 4.4 my, FY82 - 4.0 my; NRR FY80 - 2 my, 5 my per year beginning in 1981; NMSS - 5 my per year beginning in 1981; IE - 2 my per year beginning in 1981; ELD - 5 my per year beginning in 1980; RES - 1 my per year beginning in 1981; Rules and Records - 2 my per year beginning in 1980.

3. Improve rulemaking procedures.

a. Description: The NRC will publish an agenda for significant rulemaking. It will then reevaluate the rulemaking process to ensure that it is properly focused on resolving important safety issues and that the procedures are clear, understandable, efficient, and well-publicized. The NRC will then consider a proposal to codify in NRC regulations the practice that all new rules include considerations of backfitting to existing plants.

b. Schedule: The NRC will issue an agenda for significant rulemaking in mid-1980, and will complete a reevaluation of the rulemaking process and propose revised procedures in late 1980. A complete rule change requiring consideration of backfitting will be issued in 1982.

c. Resources: To issue the agenda, less than 1 my will be required in FY80 for NRR, IE, NMSS, RES, and ELD. To reevaluate the rulemaking process in FY80, SD will require 1 my, ELD will require less than 1 my, and OGC will require less than 1 my. To consider the backfitting proposal in FY80 through FY82, SD will require 3 my per year, NRR will require 1 my per year, IE will require 1 my per year, NMSS will require 1 my per year, and ELD will require less than 1 my per year. SD FY80 - 0.6 my, FY81 - 1.0 my.

4. Study alternative for improved rulemaking process.

a. Description: The NRC will study alternatives to the present rulemaking system.

b. Schedule: OGC/ELD - 6 months due September 1980.

c. Resources: OGC/ELD FY80 - 0.5 my each.

C. <u>LICENSEE ACTIONS</u>: None.

IMAGE EVALUATION
TEST TARGET (MT-3)

1.0 1.1 1.25 1.4 1.6 1.8 2.0 2.2 2.5 2.8 3.2 3.6 4.0

150mm

6″

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.9.a, A.9.c, and A.9.d

TASK IV.F.1 EXPEDITE STAFFING

A. OBJECTIVE: Increase efforts to expedite obtaining adequate, competent NRC staff at the earliest possible date.

B. NRC ACTIONS

1. Expedite staffing.

a. Description: The Division of Personnel will develop a plan for modifying staffing practices to emphasize expedited hiring practices. This plan, which will be presented for Commission review and approval, will include plans for immediate decisions by the line organizations on interview/no interview upon review of employment applications. It will include the establishment of an Expedited Hiring Unit in O&P dedicated to staffing responsibilities and expedited final decisions on hire/no hire by selecting officials. Exceptions to the pre-employment security clearance requirements will also be considered.

b. Schedule: A plan will be submitted for Commission approval by February 15, 1980.

c. Resources: ADM - FY80 3 my; ELD FY81 - 1.0 my.

C. LICENSEE ACTIONS: None.

D. <u>OTHER ACTIONS</u>: None.

E. <u>REFERENCES</u>: None.

TASK IV.F.2 STUDY TECHNICAL MANPOWER RESOURCE LIMITATIONS

A. OBJECTIVE: Determine the technical manpower resources available in the nation over the next 5 years and compare this with the needs in the nuclear industry and the NRC to accomplish the overall NRC safety improvement action plans (including this plan), while at the same time maintaining an adequate level of safety at operating reactors.

B. NRC ACTIONS

1. Study technical manpower resource limitations.

a. Description: The NRC will promptly undertake a survey to determine the availability of technically trained manpower, including current trends in engineering school student population and other technical training sources. The findings of the survey will be assessed to determine the implications on the manpower needs of licensees and the NRC staff to accomplish overall NRC safety improvement action plans that include, but are not limited to, the TMI action plans.

b. Schedule: The contract effort will be completed in 6 months.

c. Resources: ADM $250,000.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES: None.

TASK IV.F.3 INCREASE STAFF CAPABILITY THROUGH TECHNICAL CONSULTANTS

A. OBJECTIVE: Increase staff capability through the use of technical consultants.

B. NRC ACTIONS

a. Description: Increase the use of technical consultants to expand staff capabilities in the following areas: (1) behavior of PWR and BWR coolants and other materials under radiation conditions; (2) generation, handling, and disposal of radiolytic or other hydrogen at nuclear facilities; (3) performance of various chemical additives in containment sprays; (4) processing and disposal techniques for low and high level radioactive wastes; (5) chemical operations in other parts of the nuclear fuel cycle; and (6) chemical treatment operations involved in recovery, decontamination, or decommissioning of nuclear facilities.

b. Schedule: Beginning in October 1980, technical consultants will be used on a continuing basis.

c. Resources: ADM $100,000 per year for technical consultants on a continuing basis.

C. LICENSEE ACTIONS: None.

D. <u>OTHER ACTIONS</u>: None.

E. <u>REFERENCES</u>

President's Commission Report: None

Other: ACRS letter of May 16, 1979, Interim Report No. 3