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NRC Action Plan Developed as a Result of the TMI-2 Accident

U.S. Nuclear Regulatory Commission

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NRC Action Plan Developed as a Result of the TMI-2 Accident

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INTRODUCTION

Development of the Action Plan

This Action Plan was developed to provide a comprehensive and integrated plan for the actions now judged necessary by the Nuclear Regulatory Commission to correct or improve the regulation and operation of nuclear facilities based on the experience from the accident at TMI-2 and the official studies and investigations of the accident. Activities and programs of the NRC not related to the accident at TMI-2 are not described in this Action Plan. They are contained in a separate resource and scheduling mechanism known as the NRC Operating Plan. Thus, this Action Plan complements the current NRC Operating Plan and the other important safety issues and programs addressed therein. The schedules and resources presented in this Action Plan and the NRC Operating Plan have been adjusted in accordance with the relative priorities of the various elements of each to try to optimize the increase in safety consistent with the resources available to the agency in fiscal years 1980 and 1981. After approval by the Commission, the fiscal year 1980 and 1981 programs of this Action Plan will be integrated into the NRC Operating Plan; the remaining programs of this Action Plan will be considered in the course of the agency's normal budget development and planning process for fiscal year 1982 and beyond.

Those who have investigated the accident include the Congress, the General Accounting Office, the President's Commission on the Accident at Three Mile Island, the NRC Special Inquiry Group, the NRC Advisory Committee on Reactor Safeguards (ACRS), the Lessons-Learned Task Force and the Bulletins and Orders Task Force of the NRC Office of Nuclear Reactor Regulation, the Special Review Group of the NRC Office of Inspection and Enforcement, the NRC staff Siting Task Force and Emergency Preparedness Task Force, and the NRC Offices of Standards Development and Nuclear Regulatory Research. Each of the investigating groups organized their recommendations in a different way. (The recommendations of the major investigations are cross-indexed to the Action Plan in Volume 2.) This Action Plan collects those recommendations into five chapters, each of which covers one broad subject; namely, I. Operational

Safety; II. Siting and Design; III. Emergency Preparedness and Radiation Effects; IV. Practices and Procedures; and V. NRC Policy, Organization, and Management. The chapters are further divided into sections that contain the actions related to a stated objective and reference the relevant recommendations.

In the development of this Action Plan, NRC has transformed the recommendations into discrete, scheduled tasks that specify changes (or studies of possible future changes) in its regulatory requirements or its organization and procedures. The plan also identifies the organizational elements responsible for the various actions and contains estimates of the resources and schedule necessary for both NRC and the industry to accomplish the actions. As is the nature of any plan, the actions, resources and schedules in the near term are more likely to be accurate than are those for the long term. In recognition of this, the overall plan is not intended to be inviolable - changes in the specified actions will be made as necessary to reflect new information.

Actions to improve the safety of nuclear power plants now operating were judged to be necessary immediately after the accident and could not be delayed until an action plan was developed, although they were subsequently included in the Action Plan. Such actions came from the Bulletins and Orders issued immediately after the accident, the first report of the Lessons-Learned Task Force issued in July, the recommendations of the Emergency Preparedness Task Force and the NRC staff and Commission. Before these immediate actions were applied to operating plants, they were approved by the Commission. Many of the required immediate actions have already been taken by licensees and most are scheduled to be complete by the end of 1980.

Development of this Action Plan began after the immediate corrective actions were well under way and at the time when the principal external investigation, that of the President's Commission, was complete. In developing the Action Plan, the various recommendations and possible actions of all the principal investigations were assessed and either rejected, adopted or modified. These assessments and decisions were made under the direction of a TMI Action Plan Steering Group, which served to integrate and coordinate the development of the Action Plan by the various program offices of the agency. The Commission, the ACRS, the Executive Director for Operations, and the directors of the program offices reviewed and commented on the various drafts of the plan, and their guidance, decisions and directions were followed in refining the plan. The decisions on whether to include specific items in the plan were based primarily on whether they were necessary to respond to the recommendations of the principal investigations. However, decisions on the priority and resources to be afforded the various actions in the plan have been based primarily on their relative risk-reduction potential. Throughout the decision-making process, there has been general agreement that the accident demonstrated that improvements in safety are needed. There has also been general agreement among the various investigators as to the causes of the accident and the failures and errors that occurred before and during the event, both in the equipment and in the organizations that built, operated and regulated the plant. Therefore, there has also been general agreement as to the areas where improvements should be made. Where differences of opinion have occurred, they most often relate to the degree of improvement required and the best ways of achieving improvement. Having considered the various recommendations and various ways of responding to them, the Action Plan represents a collective NRC assessment of the types and degree of improvement that are necessary and describes the means and schedule for attaining the improvements.

When determining the schedules for developing and implementing changes in requirements, the primary concern was the perceived immediacy of the need for corrective actions. As discussed above, many actions were taken to improve safety immediately or soon after the accident. These actions were generally considered to be interim improvements until a better, more comprehensive or more desirable solution could be implemented. However, in scheduling the longer term improvements the availability of both NRC and industry resources were also considered, as well as the safety significance of the actions (see Appendix B). Thus, the Action Plan presents a sequence of actions that will result in a gradually increasing improvement in safety as individual actions are completed and the initial immediate actions are replaced or supplemented by longer term, more stable improvements.

)verview of Action Plan Contents

All the investigations agree that, although the accident resulted from many factors, the most significant were in the broad general area which is called operational safety in this action plan. Operational safety includes the number of staff and their organization, qualifications and training, as well as the inspection and licensing of both the operating staff and the management of the plant. The general conclusion is that these areas, which reflect the human element in reactor operation and safety, have been underemphasized heretofore relative to the hardware - that is, the components, equipment, systems and structures.

The actions in the plan directed toward increasing operational safety have two objectives. The first is to improve the operation of the plant so that the number of events that could lead to accidents is reduced. The second is to improve the ability of the operating staff to recognize such events and take appropriate corrective actions. The first objective, preventing the causes of accidents, is addressed through improvements in the selection and training of not only the operators, but all the plant staff, and improvements in utility management techniques and capabilities. Specific improvements are required in the content and level of training courses, in the use of plant simulators, in operating procedures, and in the design of the controls and instrument displays in the control room. These specific improvements both reduce the incidence of accident situations and increase the ability of the operating staff to arrest an accident before any serious consequences result. Improvements in the evaluation of operating experience and the auditing of day-to-day plant operations are also to be instituted to help the plant technical support staff and management in preventing accidents.

Although there is general agreement that operational safety merits primary emphasis, means of improving current plant designs were also identified in studies of the accident and should not be overlooked. The accident reemphasized the importance of high system reliability, even though there were no significant equipment failures, other than the relief valve on the pressurizer. Therefore, the action plan contains requirements for the assessment of the reliability of some of the engineered safety features (e.g., auxiliary feedwater, emergency core cooling, containment isolation, and decay-heat removal, including natural circulation) and an overall assessment of accident probabilities and consequences using simplified reliability analyses for all plants. These analyses are directed toward identifying and correcting specific weaknesses in current designs.

The action plan also contains studies of the desirability of additional requirements and safety systems to reduce the risk from accidents in which there is significant melting or degradation of the core, such as occurred during the accident at TMI. For example, the plan includes continuation of the NRC work of changing its siting requirements to reestablish distance between population centers and reactors as a safety feature. The plan also contains interim improvements and rulemaking on the capability of nuclear power plants to mitigate the consequences of accidents in which the core is severely damaged, and a long-term study of the possibilities for mitigating accidents. The interim improvements include reducing the possible leakage of highly radioactive material, improving shielding to permit access to important areas, providing better means of sampling the reactor coolant and containment atmosphere, adding or increasing the range of instruments so that accident conditions can be monitored, and providing the operating staff with training in the capability and use of the currently installed systems.

Of major concern during the accident at TMI was the quantity of hydrogen released, which was much greater than the amount that is required to be considered under the current NRC rules. The plan includes an interim rulemaking action to consider the need for interim hydrogen control features for small containment structures, where the potential for ignition of hydrogen is the greatest, and other interim consequence mitigation features for accidents involving core damage.

In addition to the weaknesses in operational safety and system design, the investigators of the TMI accident have generally agreed that the state of planning and preparedness for emergencies at nuclear power plants was inadequate. This condition apparently resulted from the low priority assigned to emergency planning by NRC and its licensees, a poor definition of the NRC role in emergencies, and insufficient coordination between licensees, NRC, and the other Federal, State and local agencies involved. A major action in this area that has already been accomplished is the centralization of emergency planning and response in a single federal agency - the Federal Emergency Management Agency (FEMA). Immediate actions in the Action Plan include better facilities for onsite personnel for handling emergencies, improvements in the organization of personnel for handling emergencies, the improvement of emergency plans for offsite action by the utility and by State and local governments, and improvement in the emergency response capability of the NRC. The accident at TMI-2 also increased awareness of the importance of informing the public during and before emergencies, and therefore actions are provided in the plan to increase the news media and public understanding of how nuclear plants operate, what radiation is and what effect it has on health, and what protective actions will be provided during emergencies.

The investigations of the accident have shown the need for improvements in the protection of the public from radiation, including improved monitoring of radioactive effluents from plants, better radioanalytical measurements and more rapid estimation of offsite doses, and control of the release of radioactivity into the hydrosphere. A consistent and mutually supportive set of actions to address these areas is included in the Action Plan. The investigations have also shown the need to improve radiation protection of workers, particularly under accident conditions. Thus, the plan includes improvements in radiation-protection plans, health-physics operations, inplant radiation monitoring, and the habitability of control rooms, all intended to keep the exposures of workers during both normal operations and accidents as low as reasonably achievable.

In addition to the areas discussed above, which primarily address requirements for licensees, the self-examination by NRC that followed the accident identified necessary improvements in the regulation of nuclear power plants. One area of improvement is the formulation, issuance, and enforcement of NRC requirements. In this area, better rulemaking procedures, periodic reevaluation of rules, and more efficient means of issuing requirements are to be sought. Authority for increased civil penalties is being sought, and currently available sanctions are to be more effectively applied as a means of improving enforcement. Training of inspectors is also being improved.

Another area of improvement is in the early identification, assessment, and resolution of safety issues. Research on the quantification of safety goals, a program to resolve generic issues, and a better means of resolving issues relating to plants under construction are closely associated actions included in the plan.

Studies are also included to determine what actions, if any, should be taken regarding the possible effects on safety of economic factors such as Internal Revenue Service and Public Utility Commission rules, the ongoing systematic assessment of the safety of operating reactors, and the extension of the lessons learned from TMI to other areas regulated by NRC.

The plan also contains actions to be taken by the Commission to revise present policies, procedures, and organization to more effectively accomplish the mission of the agency. These include articulation of a safety goal or safety policy objective, evaluation of the licensing process to reduce delays but permit reasonable review and appeal, increased public participation, and examination of the Commission's role in safety regulation. The need for legislation to modify the Commission's authority and procedures during emergency situations will be studied. Also included are studies of the role, functions and organization of the Commission and the offices so as to increase the application of human factors principles and integrated systems engineering, increase the effectiveness of inspection and enforcement, increase the effectiveness of advisory committees, such as the ACRS, increase staff technical capabilities, and more effectively identify and assess safety issues.

The objectives and actions in the plan are further discussed as an introduction to each section of the plan. These introductions provide more detail on the purpose, intent and relationship of the actions to show how the objectives are to be attained by tasks that have been selected to provide for greatest improvement in safety for the lowest cost in the shortest time.

Implementation of Future Requirements

As described above, a number of TMI-related requirements were approved in the late summer of 1979 and issued to operating reactor licensees. These requirements are all included in the Action Plan and are summarized in part 2 of the list of near-term operating license (NTOL) requirements in Appendix A of the Action Plan (Table A.1, referred to as the "NTOL list"). A list of additional requirements was developed in January and February 1980 for use on pending operating license applications. It was tentatively approved by the Commission in early February 1980. The short-term operating reactor requirements and the additional new operating license conditions constitute the complete set of TMI-related requirements that must be met before a new plant can receive an operating license. This complete set of requirements has come to be called the near-term operating license requirements list or NTOL list.

In addition to the NTOL list, there are a number of studies and criteria-development activities described in the Action Plan that will eventually lead to additional TMI-related requirements to be issued by the NRC in the future. An important question for these additional requirements concerns the timing and other characteristics of their implementation.

In the year since the accident, NRC policy on the short-term urgent actions (the bulletins and orders, the short-term lessons learned, and emergency preparedness actions) has been one of prompt implementation at the possible expense of some delay in the startup of new units or special shutdowns for some operating plants. These urgent actions were judged to be necessary for public health and safety. In the development and refinement of the Action Plan over the past five months, the staff, the Commission and the ACRS have had opportunity to review and reconsider, as appropriate, the urgent short-term requirements in the broad context of the recommendations from all the official studies of the accident and the actions proposed by the staff in response to those recommendations. The result has been that, within the set of additional requirements for new operating licenses, there are only a few short-term requirements to be added to the short-term lessons learned list for operating plants. This tends to confirm a judgment that the most important and urgent actions requiring prompt implementation have been identified.

This in turn leads to a judgment that most of the remaining changes need not be implemented as urgently as those already required. That is, the prompt application of the most important lessons learned over the past year has afforded NRC the opportunity to continue to pursue further changes at a more deliberate pace over the next several years. Such changes may be necessary for long-term improvement in safety or for maintenance of improvements already gained in the short term. Some people have suggested an additional reason to be more deliberate in our development of future changes; that is, the need to avoid counterproductive actions because of finite resources or, worse yet, changes that are unsafe because they were inadequately studied. It is acknowledged, however, that there are some items in the Action Plan (control room design being the best example) that need to be implemented as quickly as they can be done correctly. Such items require a substantial time period for careful development of soundly based criteria and cannot be rushed without weakening or compromising their effectiveness. In such cases, short-term or interim improvements in safety have been required pending criteria development.

Having considered the factors discussed above, it is concluded that the implementation policy for future TMI-related changes (i.e., those that are in addition to the NTOL list of requirements and that stem from activities described in the Action Plan) should have four principal goals; namely,

(1) To develop and implement additional TMI-related requirements in a priority order that gives consideration both to risk reduction and to resource requirements (i.e., a priority system that gives greater weight to actions with a high potential for risk reduction and low resource requirements).

(2) To obtain public comment on the substance and scheduling of implementation of the most significant new requirements prior to issuance. In most cases, the opportunity for such review would be the formal public comment period for a Regulatory Guide, Standard Review Plan revision, or regulation.

(3) To apply future requirements developed in accordance with this plan uniformly to operating plants and to plants under construction, with due consideration of design or other differences among plants. To require that implementation be complete by some specified date on all plants in operation or going into operation after that date. To allow case-by-case exceptions to the deadlines for good cause.

(4) In order to minimize the costs of these future requirements to be derived from the Action Plan, and absent new information to the contrary, to set implementation deadlines so as to avoid downtime on operating plants and delay in startup of plants under construction beyond that necessary to accomplish the change in an orderly manner.

Organization of the Action Plan

Each item in the plan contains a description of the action required by both NRC and industry, estimates of the schedule and resources required by both NRC and industry to accomplish the action, and a list of references that identify the sources that led to the item being included in the plan. The description of the action is not intended to be definitive but is intended to provide a general outline of the bases for and the form of the requirement, task, study or other action. The references are an integral part of the plan and had to be considered in the process of developing the requirements, studies and other actions in the plan.

Although the Action Plan specifies the actions required of the licensees, NRC encourages utilities to form groups that would perform the necessary studies and analyses generically. Individual licensees and applicants could then adopt these as necessary.

Table 1 is a useful overview of the entire plan. It identifies the priority group, lead NRC office, and implementation schedule for each item in the plan. (The priorities and their development are described in Appendix B, Table B.1.) Table 1 also identifies the Decision Group within which each action item falls. There are four Decision Groups:

A - Items or criteria already approved by the Commission in the course of business apart from the Action Plan.

B - Items for which the scope and criteria are sufficiently well-defined in the plan that additional study is not required. Commission approval of the plan means, for these items, implementation in the manner described in the plan, consistent with a policy to solicit and consider public comments on these and any other TMI-related requirements developed in accord with the plan. This policy may impact the estimated implementation deadlines presently shown for these Decision Group B items in the plan and in Table 1.

C - Items which require further definition of scope, need, and criteria. Commission approval of the plan means, for these items, approval to commit the necessary staff resources, consistent with other resource priorities, to develop the information needed to bring the item separately to the Commission for a decision on the schedule shown in the plan.

D - Items that are related to, but not directly derived from, the TMI-2 accident and are more properly characterized as part of the agency's normal operating plan. Some Decision Group D items are ongoing. Decision Group D items are included in the plan for completeness but are to be scheduled and assigned resources along with the other normal functions of the agency in its routine operating plan and budgetary process. Licensee implementation details for Decision Group D items are not included in this Action Plan.

TABLE 1 - PRIORITIES AND STATUS OF ITEMS IN TMI-2 ACTION PLAN

Key to Symbols

Decision Group:

A = Items or criteria already approved by the Commission in the course of business apart from the Action Plan.

B = Items for which the scope and criteria are sufficiently well-defined in the plan that additional study is not required. Commission approval of the plan means, for these items, implementation in the manner described in the plan, consistent with a policy to solicit and consider public comments on these and any other TMI-related requirements developed in accord with the plan. This policy may impact the estimated implementation deadlines presently shown for these Decision Group B items in the plan and in Table 1.

C = Items which require further definition of scope, need, and criteria. Commission approval of the plan means, for these items, approval to commit the necessary staff resources, consistent with other resource priorities, to develop the information needed to bring the item separately to the Commission for a decision on the schedule shown in the plan.

D = Items that are related to, but not directly derived from, the TMI-2 accident and are more properly characterized as part of the agency's normal operating plan. Some Decision Group D items are ongoing. Decision Group D items are included in the plan for completeness but are to be scheduled and assigned resources along with the other normal functions of the agency in its routine operating plan and budgetary process. Licensee implementation details for Decision Group D items are not included in this Action Plan.

Priority Group:

1 = Should be initiated in FY80 or FY81 and accomplished as scheduled in the Action Plan; in general, received more than 170 points in the Action Plan priority system (see Appendix B).

2 = Schedule, if possible, but initiation can be deferred for up to one year in view of relative priority or other work already initiated; in general, received between 110 and 190 points (see Appendix B).

3 = Initiation can be deferred for up to two years; in general received less than 110 points (see Appendix B).

(no priorities assigned to Decision Group D items)

The initials "NA" in the "Implementation" columns indicate that the action item does not apply to licensees or the item 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 estimated dates beyond which the requirements are expected to become prerequisites for issuance of an operating license for full-power operation as specified in the Action Plan. The initials "FL" and "FP" in this column mean that implementation is to be completed prior to fuel loading or operation above about five percent of full power, respectively, for any new plant. Implementation dates for Decision Group A items have been established by earlier Commission action. Implementation dates for the more significant Decision Group B items will not be formally established by approval of this Action Plan; rather, they will be established only after public comment on the proposed implementation schedule. Implementation dates for Decision Group C and D items will be established later on an item by item basis.

Implementation plans for construction permit applications are being developed separate from this Action Plan.

TABLE 1 - PRIORITIES AND STATUS OF ITEMS IN TMI-2 ACTION PLAN

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete	
				Operating Reactors	Plants Under Construction
I. OPERATIONAL SAFETY					
I.A Operating Personnel					
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 - Same as OR
2. Shift Supervisor Admin. Duties	A	1	NRR	1/1/80	FL
3. Shift Manning	A	1	NRR	Personnel req. - 7/1/82 Overtime req. - 8/1/80	FL
4. Long-term Upgrading	D	-	SD	NA	NA
I.A.2 Training and Qualifications of Operating Personnel					
1. Immediate Upgrading of Operator and Senior Operator Training and Qualifications	A	1	NRR	Overall Exp. - 5/1/80 Lic. Exp. - 12/1/80 Shift Tra. - 8/1/80 Tra. Prog. - 8/1/80 Certification - 5/1/80	Overall Exp. - Same as OR Lic. Exp. - NA Shift Tra. - NA Tra. Prog. - Same as OR Certification - Same as OR
2. Training and Qualifications of Operations Personnel	B	2	NRR	1/1/82	Same as OR
3. Administration of Training Programs	Audits - B Instructors - A	2	NRR	Audits - NA Instructors - 8/1/80	Same as OR

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete	
				Operating Reactors	Plants Under Construction
4. NRR Participation in Inspector Training	B	3	IE	NA	NA
5. Plant Drills	Short-term - B Long-term - D	1	NRR	Short-term - 7/1/81 Long-term - NA	Same as OR
6. Long-term Upgrading of Training and Qualifications	C	1	SD	NA	NA
7. Accreditation of Training Institutions	C	2	NRR	NA	NA
I.A.3 Licensing and Requalification of Operating Personnel					
1. Revise Scope and Criteria for Licensing Exams	A	2	NRR	Exam Results - 5/1/80 Requal. Pro. Inst. - 5/1/80 Requal. Pro. Exer. - 8/1/80 Renewals - 11/1/80 Acc. Requal. - 3/28/80	Exam Results - Same as OR Requal. Pro. Inst. - Same as OR Requal. Pro. Exer. - Same as OR Renewals - Same as OR Acc. Requal. - Same as OR
2. Operator Licensing Program Changes	C	3	NRR	NA	NA
3. Requirements for Operator Fitness	D	-	SD	NA	NA
4. Licensing of Additional Operations Personnel	C	2	NRR	NA	NA
5. Establish Statement of Understanding with INPO and DOE	D	-	NRR	NA	NA

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction
I.A.4 Simulator Use and Development					
1. Initial Simulator Improvement	B	1	NRR	1/1/82	Same as OR
2. Long-Term Training Simulator Upgrade	B	2	SD	NA	NA
3. Feasibility Study of Procurement of NRC Training Simulator	D	-	RES	NA	NA
4. Feasibility Study of NRC Engineering Computer	D	-	RES	NA	NA
I.B Support Personnel					
I.B.1 Management for Operations					
1. Organization and Management Long-Term Improvements	C	1	NRR	5/1/81	Same as OR
2. Evaluation of Organization and Management Improvements of NTOL Applicants	A	1	IE	NA	FL
3. Loss of Safety Function	C	2	SD	NA	NA
I.B.2 Inspection of Operating Reactors					
1. Revise IE Inspection Program	D	-	IE	NA	NA
2. Resident Inspector at Operating Reactors	A	1	IE	10/80	FL

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction
3. Regional Evaluations	D	-	IE	NA	NA
4. Overview of Licensee Performance	D	-	IE	NA	NA
I.C Operating Procedures					
1. Short-Term Accident Analysis and Procedures Revision	A	1	NRR	Small Break - 1/1/80 Core Cooling - 1/1/80 Transients/Accidents - NA	Small Break - FL Core Cooling - FL Transients/Accidents - NA
2. Shift and Relief Turnover Procedures	A	1	NRR	1/1/80	FL
3. Shift Supervisor Responsibilities	A	1	NRR	1/1/80	FL
4. Control Room Access	A	1	NRR	1/1/80	FL
5. Procedures for Feedback of Operating Experience	A	1	NRR	1/1/81	FL
6. Procedures for Verification of Correct Performance of Operating Activities	B	2	NRR	Phase 1 - 1/1/81 Phase 2 - NA	Same as OR
7. NSSS Vendor Review of Procedures	A	1	NRR	NA	Low Power Test - FL Emergency & Power Ascension - FP
8. Pilot Monitoring of Selected Emergency Procedures for NTOL Applicants	A	2	NRR	NA	FP
9. Long-Term Program Plan for Upgrading of Procedures	C	1	NRR	NA	NA

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction
I.D Control Room Design					
1. Control Room Design Reviews	NTOL - A Remainder - B	1	NRR	Short-term - 1/1/82 Long-term - 1/1/83	Interim - FL Short-term - Same as OR Long-term - Same as OR
2. Plant Safety Parameter Display Console	B	1	NRR	1/1/82	Same as OR
3. Safety System Status Monitoring	C	2	NRR	NA	NA
4. Control Room Design Standard	B	1	SD	NA	NA
5. Improved Control Room Instrumentation Research	A	2	RES	NA	NA
6. Technology Transfer Conference	A	3	RES	NA	NA
I.E Analysis and Dissemination of Operating Experience					
1. Office for Analysis and Evaluation of Operational Data	A	1	AEOD	NA	NA
2. Program Office Operational Data Activities	A	1	EDO	NA	NA
3. Operational Safety Data Analysis	A	1	RES	NA	NA
4. Coordination of Licensee, Industry, and Regulatory Programs	B	1	AEOD	NA	NA

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction
5. Nuclear Plant Reliability Data System	D	-	SD	NA	NA
6. Reporting Requirements	C	1	AEOD	NA	NA
7. Foreign Sources	B	2	IP	NA	NA
8. Human Error Rate Analysis	A	2	RES	NA	NA
I.F Quality Assurance					
1. Expand QA list	B	2	SD	NA	NA
2. Develop More Detailed QA Criteria	D	-	SD	NA	NA
I.G Preoperational and Low-Power Testing					
1. Training Requirements	A	2	NRR	NA	Plan - FL Training - FP
2. Scope of Test Program	B	2	NRR	NA	NA
II. SITING AND DESIGN					
II.A Siting					
1. Siting Policy Reformulation	C	2	NRR	NA	NA
2. Site Evaluation of Existing Facilities	C	2	NRR	NA	NA
II.B Consideration of Degraded or Melted Cores in Safety Review					
1. Reactor Coolant System Vents	A	2	NRR	Design 1/1/80 Installation 1/1/81	Design FP Installation 1/1/81

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete Operating Reactors	 Plants Under Construction
2. Plant Shielding to Provide Access to Vital Areas and Protect Safety Equipment for Post-accident Operation	A	2	NRR	Design 1/1/80 Modifications 1/1/81	Design FP Modifications 1/1/81
3. Post-accident Sampling	A	2	NRR	Design & Procedures 1/1/80 Modifications 1/1/81	Design & Procedures - FP Modifications 1/1/81
4. Training for Mitigating Core Damage	A	1	NRR	Program - 1/1/81 Implement - 4/1/81	Initial Program - FL Implement - FP
5. Research on Phenomena Associated with Core Degradation and Fuel Melting	A	2	RES	NA	NA
6. Risk Reduction for Operating Reactors at Sites with High Population Densities	A	1	NRR	Selected Sites - 10/1/80	NA
7. Analysis of Hydrogen Control	C	1	NRR	NA	NRC decide on interim hydrogen control measures - FP
8. Rulemaking Proceeding on Degraded-Core Accidents	C	2	SD	NA	NA (NRC issue Advance Notice of Rulemaking - FP)
II.C Reliability Engineering and Risk Assessment					
1. Interim Reliability Evaluation Program (IREP)	A	1	RES	Crystal River - 7/80 6 plants - 3/81	NA
2. Continuation of IREP	C	2	RES	All - 1983	Undecided

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete	
				Operating Reactors	Plants Under Construction
3. Systems Interaction	A	1	NRR	Indian Point 3 - 1981	Diablo Canyon - FP
4. Reliability Engineering	B	2	NRR	Beyond 1982	NA
II.D Reactor Coolant System Relief and Safety Valves					
1. Testing Requirements	A	1	NRR	Program - 1/1/80 Testing - 7/1/81	Program - FL Testing - 7/1/81
2. Research on Relief and Safety Valve Test Requirements	A	3	RES	NA	NA
3. Relief and Safety Valve Position Indication	A	1	NRR	1/1/80	FL
II.E System Design					
II.E.1 Auxiliary Feedwater System					
1. Auxiliary Feedwater System Evaluation	A	1	NRR	Short-term - W & CE - 6/1/80 B&W - 9/1/80 Long-term - 1/1/82	FP
2. Auxiliary Feedwater System Automatic Initiation and Flow Indication	A	1	NRR	Control Grade - 6/1/80 Safety Grade - 1/1/81	Control Grade - FL Safety Grade - 1/1/81
3. Update Standard Review Plan and Develop Regulatory Guide	D	-	NRR	NA	NA
II.E.2 Emergency Core Cooling System					
1. Reliance on ECCS	B	2	NRR	Beyond 1982	NA

TABLE 1 (continued)

Action Item		Decision Group	Priority Group	Lead Office	Implementation Complete	
					Operating Reactors	Plants Under Construction
2.	Research on Small Break LOCAs and Anomalous Transients	A	1	RES	NA	NA
3.	Uncertainties in Performance Predictions	C	2	NRR	Beyond 1982	Same as OR
II.E.3	Decay Heat Removal					
1.	Reliability of Power Supplies for Natural Circulation	A	1	NRR	1/1/80	FP
2.	Systems Reliability	B	1	NRR	NA	NA
3.	Coordinated Study of Shutdown Heat Removal Requirements	C	2	NRR	NA	NA
4.	Alternate Concepts Research	D	-	RES	NA	NA
5.	Regulatory Guide	D	-	SD	NA	NA
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
2.	Isolation Dependability	A	1	NRR	Signals - 1/1/80 Plan - 6/1/80 Mod - 11/1/80	Signals - FP Plan - FP Mod - FP
3.	Integrity Check	B	2	NRR	NA	NA
4.	Purging	A	1	NRR	1/1/80 - Staged	FP - Staged

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction
II.E.5 Design Sensitivity of B&W Reactors					
1. Design Evaluation	A	2	NRR	4/1/81	4/1/81
2. B&W Reactor Transient Response Task Force	A	2	NRR	NA	NA
II.E.6 In Situ Testing of Valves					
1. Test Adequacy Study	D	-	NRR	NA	NA
II.F Instrumentation and Controls					
1. Additional Accident Monitoring Instrumentation	A	1	NRR	Procedures - 7/1/80 Instrumentation - 1/1/80	Procedures - FL Instrumentation - 1/1/81
2. Identification of and Recovery from Conditions Leading to Inadequate Core Cooling	A	1	NRR	Subcool - 1/1/80 Level Design - 1/1/80 Level Install - 1/1/81	Subcool - FL Level Design - FL Level Install - 1/1/81
3. Instrumentation for Monitoring Accident Conditions (Reg. Guide 1.97)	B	2	SD	6/1/82	6/1/82
4. Study of Control and Protection Action Design Requirements	D	3	NRR	NA	NA
5. Classification of Instrumentation, Control and Electrical Equipment	B	2	SD	NA	NA
II.G Electrical Power					
1. Power Supplies for Pressurizer Relief Valves, Block Valves, and Level Indications	A	1	NRR	1/1/80	FL

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete	
				Operating Reactors	Plants Under Construction
II.H TMI-2 Cleanup and Examination					
1. Maintain Safety of TMI-2 and Minimize Environmental Impact	A	1	NRR	NA	NA
2. Obtain Technical Data on the Conditions Inside the TMI-2 Containment Structure	A	2	RES	NA	NA
3. Evaluate and Feedback Information Obtained from TMI	A	2	NRR	NA	NA
4. Determine Impact of TMI on Socioeconomic and Real Property Values	A	3	RES	NA	NA
II.J General Implications of TMI for Design and Construction Activities					
II.J.1 Vendor Inspection Program					
1. Establish a Priority System for Conducting Vendor Inspections	D	-	IE	NA	NA
2. Modify Existing Vendor Inspection Program	D	-	IE	NA	NA
3. Increase Regulatory Control Over Present Nonlicensees	D	-	IE	NA	NA
4. Assign Resident Inspectors to Reactor Vendors and Architect-Engineers	D	-	IE	NA	NA

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction
II.J.2 Construction Inspection Program					
1. Reorient Construction Inspection Program	A	3	IE	NA	NA
2. Increase Emphasis on Independent Measurement in the Construction Inspection Program	A	3	IE	NA	NA
3. Assign Resident Inspectors to all Construction Sites	D	-	IE	NA	NA
II.J.3 Management for Design and Construction					
1. Organization and Staffing to Oversee Design and Construction	C	1	NRR	NA	NA
2. Issue Regulatory Guide	C	3	SD	NA	NA
II.J.4 Revise Deficiency Reporting Requirements					
1. Revise Deficiency Reporting Requirements	C	1	IE	NA	NA
II.K Measures to Mitigate Small-Break LOCAs and Loss of Feedwater Accidents					
1. IE Bulletins	A	1	NRR	3/31/80	Table C.1, Appendix C
2. Commission Orders on B&W Plants	A	1	NRR	1/1/81	Table C.2, Appendix C
3. Final Recommendations of B&O Task Force	B	1	NRR	Table C.3, Appendix C	Table C.3, Appendix C

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction
III. EMERGENCY PREPARATIONS AND RADIATION EFFECTS					
III.A NRC and Licensee Preparedness					
III.A.1 Improve Licensee Emergency Preparedness - Short-term					
1. Upgrade Emergency Preparedness	A	1	NRR	Phased: 1/1/80 - 1/1/85	Initial - FL NUREG-0654 - FP
2. Upgrade Licensee Emergency Support Facilities	A	1	NRR	Initial - 1/1/80 Upgrade - 1/1/81	Initial - FL Upgrade - Same as OR
3. Maintain Supplies of Thyroid Blocking Agent (Potassium Iodide)	C	3	NRR	Workers - 3/1/81 Public - NA	Workers - Same as OR Public - NA
III.A.2 Improving Licensee Emergency Preparedness - Long-term					
1. Amend 10 CFR 50 and 10 CFR 50, Appendix E	C	3	SD	NA	NA
2. Development of Guidance and Criteria	C	3	NRR	NA	NA
III.A.3 Improving NRC Emergency Preparedness					
1. NRC Role in Responding to Nuclear Emergencies	A	1	EDO	NA	NRC define its role - FP
2. Improve Operations Centers	B	2	IE	NA	NA

TABLE 1 (continued)

Action Item		Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction
3.	Communications	Telephones-A Backup-C	2	IE IE	Telephones - 3/1/80 NA	Telephones - FL NA
4.	Nuclear Data Link	C	3	IE	NA	NA
5.	Training, Drills, and Tests	D	-	IE	NA	NA
6.	Interaction of NRC with Other Agencies	C	2	EDO	NA	NA
III.B	Emergency Preparedness of State and Local Governments					
1.	Transfer of Responsibilities to FEMA	A	1	EDO	NA	NA
2.	Implementation of NRC's and FEMA's Responsibilities	A	1	EDO	NA	NA
III.C	Public Information					
1.	Have Information Available for the News Media and the Public	C	3	OPA	NA	NA
2.	The Office of Public Affairs will Develop Agency Policy and Provide Training for Interfacing with the News Media and Other Interested Parties	C	3	OPA	NA	NA
III.D	Radiation Protection					
III.D.1	Radiation Source Control					
1.	Primary Coolant Sources Outside the Containment Structure	NTOL - A Criteria - C	2	NRR NRR	1/1/80 NA	FP NA

TABLE 1 (continued)

Action Item		Decision Group	Priority Group	Lead Office	Implementation Complete: Operating Reactors	Implementation Complete: Plants Under Construction
2.	Radioactive Gas Management	B	3	NRR	NA	NA
3.	Ventilation System and Radioiodine Adsorber Criteria	B	2	NRR	NA	NA
4.	Radwaste System Design Features to Aid in Accident Recovery and Decontamination	C	3	NRR	NA	NA
III.D.2	Public Radiation Protection Improvement					
1.	Radiological Monitoring of Effluents	B	2	NRR	NA	NA
2.	Radioiodine, Carbon-14, and Tritium Pathway Dose Analysis	B	3	NRR	NA	NA
3.	Liquid Pathway Radiological Control	C	3	NRR	NA	NA
4.	Offsite Dose Measurements	NTOL - A Remainder - C	3	IE RES	NA NA	NRC install TLDs - FP NA
5.	Offsite Dose Calculation Manual	B	3	NRR	9/1/82	Same as OR
6.	Independent Radiological Measurements	D	-	IE	NA	NA
III.D.3	Worker Radiation Protection Improvement					
1.	Radiation Protection Plans	B	2	NRR	9/1/81	Same as OR
2.	Health Physics Improvements	D	-	SD	NA	NA

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete	
				Operating Reactors	Plants Under Construction
3. Inplant Radiation Monitoring	Short-term - A Long-term - B, D	3	NRR	Radioiodine Det. - 1/1/80 Radioiodine Mea. - 1/1/81 Addl. Monitors - 6/1/82	Radioiodine Det. - FL Radioiodine Mea. - Same as OR Addl. Monitors - Same as OR
4. Control Room Habitability	NTOL - A	2	NRR	Review - 1/1/81 Mod - 1/1/83	Review - FP Mod - Same as OR
	Long-term - C	-	NRR	NA	NA
5. Radiation Worker Exposure Data Base	D	-	SD	NA	NA
IV. PRACTICES AND PROCEDURES					
IV.A Strengthen Enforcement Process					
1. Seek Legislative Authority	A	2	OGC	NA	NA
2. Revise Enforcement Policy	D	-	IE	NA	NA
IV.B Issuance of Instructions and Information to Licensees					
IV.B.1 Revise Practices for Issuance of Instructions and Information to Licensees	D	-	NRR	NA	NA
IV.C Extend Lessons Learned to Licensed Activities Other Than Power Reactors					
IV.C.1 Extend Lessons Learned from TMI to Other NRC Programs	C	3	NMSS	NA	NA

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete	
				Operating Reactors	Plants Under Construction
IV.D NRC Staff Training					
IV.D.1 NRC Staff Training	C	2	ADM	NA	NA
IV.E Safety Decision-Making					
1. Expand Research on Quantification of Safety Decision-Making	D	-	RES	NA	NA
2. Plan for Early Resolution of Safety Issues	C	2	NRR	NA	NA
3. Plan for Resolving Issues at Construction Permit Stage	C	3	NRR	NA	NA
4. Resolve Generic Issues by Rulemaking	C	2	SD	NA	NA
5. Assess Currently Operating Reactors	C	2	NRR	NA	NA
IV.F Financial Disincentives to Safety					
1. Increased IE Scrutiny of Power Ascension Test Program	A	3	IE	NA	FL-Until Prog. Comp.
2. Evaluate the Impacts of Financial Disincentives to the Safety of Nuclear Power Plants	C	3	NRR	NA	NA
IV.G Improve Safety Rulemaking Procedures					
1. Develop a Public Agenda for Rulemaking	D	3	ADM	NA	NA

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete	
				Operating Reactors	Plants Under Construction
2. Periodic and Systematic Reevaluation of Existing Rules	D	3	ELD	NA	NA
3. Improve Rulemaking Procedures	D	3	ELD	NA	NA
4. Study Alternatives for Improved Rulemaking Process	D	3	ELD	NA	NA
IV.H NRC Participation in the Radiation Policy Council	A	3	SD	NA	NA
V. NRC Policy, Organization, and Management					
1. Develop NRC Policy Statement on Safety	NA	NA	Comm	NA	NA
2. Study Elimination of Nonsafety Responsibilities	NA	NA	Comm.	NA	NA
3. Strengthen Role of ACRS	NA	NA	Comm.	NA	NA
4. Study Need for Additional Advisory Committees	NA	NA	Comm.	NA	NA
5. Improve Public and Intervenor Participation in Hearing Process	NA	NA	Comm.	NA	NA
6. Study Construction-During-Adjudication Rules	NA	NA	Comm.	NA	NA
7. Study Need for TMI-Related Legislation	NA	NA	Comm.	NA	NA
8. Study the Need to Establish an Independent Nuclear Safety Board	NA	NA	Comm.	NA	NA

TABLE 1 (continued)

Action Item	Decision Group	Priority Group	Lead Office	Implementation Complete	
				Operating Reactors	Plants Under Construction
9. Study the Reform of the Licensing Process	NA	NA	Comm.	NA	NA
10. Study NRC Top Management Structure and Process	NA	NA	Comm.	NA	NA
11. Reexamine Organization and Functions of NRC Offices	NA	NA	Comm.	NA	NA
12. Revise Delegations of Authority to Staff	NA	NA	Comm.	NA	NA
13. Clarify and Strengthen the Respective Roles of Chairman, Commission, and EDO	NA	NA	Comm.	NA	NA
14. Authority to Delegate Emergency Response Functions to a Single Commissioner	NA	NA	Comm.	NA	NA
15. Achieve Single Location - Long-term	NA	NA	Comm.	NA	NA
16. Achieve Single Location - Interim	NA	NA	Comm.	NA	NA
17. Reexamine Commission Role in Adjudication	NA	NA	Comm.	NA	NA

CHAPTER I

OPERATIONAL SAFETY

INTRODUCTION

A common conclusion of every investigation of the accident at TMI-2 has been that many factors contributed to the accident, but the major contributing factor was the manner in which the plant was operated both before and during the accident.

The intent of the actions described in this chapter is to substantially improve and emphasize operational safety, an area that has not previously been given the same regulatory emphasis as nuclear power plant design. The actions have two complementary objectives: (1) reduce challenges to the safety of the plant, and (2) assure proper reactions to challenges that do occur. The reduction of challenges requires a competent staff that devotes unflagging attention to the proper operation of the plant, continuous monitoring to verify that plant operations are correctly performed, and correcting and improving operations by the feedback of operating experience. The proper reaction to challenges requires a thorough understanding of plant design and plant response to upset conditions, as well as training in the diagnosis and reaction to unusual or unexpected events.

An important part of operational safety is the level of qualifications of operations personnel, including their education, training, experience, and fitness. A general technical education provides the basis for understanding the principles and operation of nuclear power plants. One objective of the actions in this chapter is to increase the level of the education of senior operators and other operations personnel to assure that they have appropriate technical backgrounds. In order to provide people with this additional technical capability on shift until the time that staffing and qualifications of shift personnel and the control room man-machine interface requirements are upgraded, operating staffs are being required to have on shift a technical advisor with engineering expertise, training in details of design, function, arrangement and operation of plant systems, and special training in plant dynamic response.

Besides educational background, training and experience of the operators and senior operators of nuclear power plants are being increased to improve their knowledge of plant design, plant response, and procedures. Actions in this area include requirements for on-shift training for operators and senior operators, additional nuclear power plant experience requirements, requirements for experience as a licensed operator before licensing as a senior operator, increased use of and variety in simulator training, increased plant training during the initial test program, inplant drills for shift operating personnel, and enhanced requalification programs.

The Action Plan also addresses the improvement in the quality of training to be provided, including accreditation of training institutions. Training center and facility instructors who teach reactor systems, transient response of reactors, and simulator courses will be required to demonstrate their competence to the NRC by successful completion of a senior operator examination. These instructors will also 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. Emphasis will be placed on the instructors' abilities to teach as well as their technical knowledge. The NRC will develop criteria and procedures to be used in auditing training programs and increase the amount of auditing. The audits to be conducted 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 need for mandatory simulator training is discussed in the plan as well as the quality of the simulators to be used. Improvements in simulators will be required in order to improve the level of realism in the training and retraining of operators. Requirements and procedures for licensing and requalification of operating personnel are also addressed, both for initial issuance of licenses and for license renewals. The licensing of additional operations personnel is also covered.

Several other actions recognize the need to have proper shift staffing and administration to deal with unusual situations. Such actions include requirements on the number and qualifications of people on shift, assurance of operator fitness, restrictions on the use of overtime, control of shift turnover, control of access to the control room, delineation of authority in the control room, and specification of shift supervisor responsibilities.

Human beings make errors no matter how qualified they are. Better systems of verifying correct performance of operating activities are needed to provide a means of detecting human errors and thus improving the quality of normal operations by reducing the frequency of occurrence of situations that could result in or contribute to accidents. Steps for more effective verification by licensees of correct performance of operating activities are addressed in the plan. Consideration is also given to actions to be taken by the NRC and the licensee in the event of personnel errors that cause losses of safety function. The Action Plan provides for more direct inspection, accelerating the implementation of the resident inspection program, and performing evaluations of licensee performance both by the regional offices and by an NRC interoffice review group.

Specific actions are also being initiated to improve licensees' site organizations and management. The improvements in organization and management of a plant include greater emphasis on the health physics organization and provisions for a dedicated safety engineering function for each facility to provide improved technical support and to provide continuous evaluation and feedback of lessons learned from operating experience.

In addition to the problems associated with site organization and management, the accident at TMI demonstrated that there were serious deficiencies in operating procedures for plant emergency situations. The emergency operating procedures in use by plant operators during the accident at Three Mile Island were found to be ambiguous and unclear in their instructions for combatting the conditions following what should have been routine turbine and reactor trips. Both short-term changes for existing procedures and the longer term development of new approaches to casulty procedures are included in the Action Plan.

The short-term changes in emergency operating procedures include revisions of small-break LOCA procedures, development of general inadequate core cooling procedures and general revision of existing transient and accident procedures to improve their realism and symptoms indicators. The plan ties these short-term changes to a number of short-term changes in administrative procedures for operating plants and for new plants. In addition, the staff will review selected emergency operating procedures for new plants in some detail and require the NSSS vendors to review all emergency operating procedures in detail. Long-term actions will be taken to identify the improved approaches for providing the test tools to the operator for analyzing plant response to emergency conditions, to identify what has happened, what is wrong, and the immediate and followup actions needed to correct or overcome the emergency. The actions will achieve the immediate effect of upgrading the specifically identified procedural deficiencies of TMI while initiating a broader and more inclusive examination of better ways of writing procedures needed by operators to successfully train for and function in emergency conditions.

Each of the major studies of the Three Mile Island accident indicated that insufficient attention had been given to ensuring compatibility between the reactor operators and the systems they are required to operate. The Action Plan includes actions planned or initiated by the Commission in response to these findings. These actions include steps to improve existing and future control room designs, to develop standards and regulatory guides related to control room design and human factors engineering, and to conduct research to develop improved instrumentation and diagnostic aids.

The plan includes a requirement that both licensees and applicants review their control room designs to identify and correct human factors and instrumentation deficiencies. NRC is presently developing guidelines to be used during these reviews. The licensees will be required to correct deficiencies on a schedule consistent with the complexity of the remedial action required. It is expected that many simple but effective corrective measures will be implemented promptly.

The variety and quantity of information displayed in control rooms can be overwhelming in some circumstances. A concise display of the parameters critical to assessing the status of a plant would aid operators to quickly establish the plant status and diagnose faults. The development and installation of such a safety parameter display console will be required for all plants.

Research is also under way to develop improved instrumentation to aid the operator in monitoring critical plant parameters and to assess the need for improvements in postaccident monitoring instrumentation. In addition, improvements in control room displays are being evaluated, as are computer-based aids that could be used by operators to diagnose the cause of plant upset conditions.

These actions, when completed, will result in a significant improvement in the capability of the operator to contribute effectively to safe plant operation. They respond to the human engineering deficiencies identified following the TMI-2 accident and are judged sufficient to resolve those deficiencies.

The collection, assessment, and feedback of operating experience has always been recognized as an integral part of assuring the safety of nuclear facilities. However, the programs for accomplishing these tasks have been fragmented and ad hoc in nature. A more systematic and expanded program of operational data assessment by NRC, industry organizations, and NRC licensees is being undertaken and is reflected in the plan.

In July 1979, the Commission established the Office for Analysis and Evaluation of Operational Data (AEOD) and directed that the major program offices also establish the capability to perform special analyses of operational data. The AEOD will analyze and evaluate operational safety data for all NRC-licensed activities (reactor and nonreactor) and will develop formal guidance for the agency on the collection, evaluation, and feedback of operational data. These NRC activities will be coordinated with operational data assessment programs now being established at the reactor sites and at industry organizations such as the Nuclear Safety Advisory Committee (NSAC) and Institute for Nuclear Power Operations (INPO) to help assure an integrated national program.

Other tasks include licensee and industry efforts directed to improving the assessment and feedback of operating experience. For example, each reactor licensee will have the capability to assess the operating history of his own plant and plants of similar design. Further, each reactor licensee is to have procedures in place to assure that the results of such assessments are continuously provided to operators and other operations personnel.

Additional emphasis is being placed on obtaining, assessing, and including foreign operational experience into U.S. operations and regulatory activities. Planned improvements include letters to other countries reemphasizing the importance of rapid exchange of significant data, additional formal agreements, improved interaction with other regulatory groups, and a more timely and comprehensive review of foreign experience by NRC.

Several systems important to the safety of TMI-2 were not designed, fabricated, and maintained at a level equivalent to their safety importance. They were not on the Quality Assurance (QA) List for the plant. This condition exists at other plants and results primarily from the lack of clarity in NRC guidance for graded levels of quality assurance. The plan will provide a basis for developing guidance by NRC for the expansion of the listing of equipment important to safety.

The actions of Chapter 1 recognize that the improvement and maintenance of operational safety is a fundamental responsibility of licensees. That is, the licensees must assure day-to-day awareness of, and attention to, not only the letter but also the spirit of operational safety principles.

TASK I.A OPERATING PERSONNEL

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 (Item I.A.2.6) and improved control rooms (Task I.D.1) 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 - 0.4 my and $25,000, FY81 - 0.5 my and $15,000; IE FY80 - 0.4 my, FY81 - 0.1 my.

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 that all operating plant licensees review the administrative duties of the shift supervisor. The review should be performed by the senior officer at each utility who is 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.

3. Shift manning.

a. Description: NRR will review 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 guidance in IE Circular 80-02 will be referenced in the instructions.

The requirements on the number and qualifications of operators to be present in the control room will be changed so that in each control room, including common control rooms for multiple units, there shall be a licensed reactor operator at all times for each reactor loaded with fuel and a senior reactor operator licensed for each reactor that is operating. There shall also be onsite at all times, an additional relief operator licensed for each reactor, a licensed senior reactor operator who is designated as the shift supervisor, and any other licensed senior reactor operators required so that their total number is at least one more than the number of control rooms from which a reactor is being operated. (See also Table C.1, Item 4.c and Table C.3, Item 53.)

b. Schedule:

(1) NRR will have criteria ready to issue by May 15, 1980.
(2) IE will review implementation by July 1, 1982.

c. Resources: NRR FY80 - 0.2 my; IE FY80 - 0.4 my. Resources for the administration of examinations are included in Item I.A.3.1.

4. 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, control room presence, and working hours. 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. Personnel requirements determined by emergency preparedness considerations will also be considered (refer to Item III.A.2.2).

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTIONS

1. Shift technical advisor.

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

b. Implementation: Operating reactors were 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 one person per shift 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.

b. Implementation: Operating reactors completed this task 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 submit a plan for implementation of personnel requirements and review and revise as necessary the administrative procedures concerning overtime by August 1, 1980. Operating reactors will meet the personnel requirements as soon as practicable but no later than July 1, 1982. Operating license applicants will complete procedures and personnel requirements before fuel loading.

c. Resources: Approximately $400,000 per year on the average (based on estimate of at least one extra person per shift plus relief and cost of additional training).

4. Long-term upgrading: This is a Decision Group D item.

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

E. <u>REFERENCES</u>

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

Other: NUREG-0578, Recommendations 2.2.1.a and 2.2.1.b
NUREG-0585, Recommendations 2 and 3
NUREG-0616, Recommendations 2.4.2.6 and 3.13.12
Letter from Chairman, ACRS, to Chairman, NRC, dated December 13, 1979, Subject: "Report on TMI-2 Lessons Learned Task Force Final Report"
Letter from Chairman, ACRS, to Chairman, NRC, dated August 13, 1979, Subject: "Short Term Recommendations of TMI-2 Lessons Learned Task Force"
NUREG/CR-1250, Vol. I, p. 106; Vol. II, Part 2, p. 612, Part 3, p. 854
Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations C.1.b, C.1.e, C.2.a, C.3.c

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

A. <u>OBJECTIVE</u>: 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. Increase the education, experience, and training requirements for operators, senior operators, supervisors, and other personnel in the operations organization to substantially improve their capability to perform their duties.

B. <u>NRC ACTIONS</u>

1. Immediate upgrading of operator and senior operator 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 senior operators and control room operators. NRR will also require that a level of corporate operations management 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. Long-term upgrading of training and qualifications of operating personnel is discussed in Item I.A.2.6.

(1) Qualifications - Experience.

(a) Senior operators* - Effective May 1, 1980, applicants for senior operator licenses will be required to meet the experience requirements of Recommendation 1 of SECY 79-330E. Effective December 1, 1980, an applicant for a senior operator license will be required to have been a licensed operator for one year (Recommendation 2 of SECY 79-330E as modified by the Commission).

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

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

(2) Training.

(a) Senior operators*: Effective August 1, 1980, applicants will be required to have three months of continuous on-the-job training as an extra person on shift (Recommendation 3 of SECY 79-330E).

(b) Control room operators*: Effective August 1, 1980, applicants will be required to have three months' training on shift as an extra person in the control room (Recommendation 3 of SECY 79-330E).

(c) Training programs will be modified, as necessary, to provide: (1) training in heat transfer, fluid flow, and thermodynamics; (2) training in the use of installed plant systems to control or mitigate an accident in which the core is severely damaged (see also Item II.B.4); and (3) increased emphasis on reactor and plant transients.

(3) Facility certification of competence and fitness of applicants for operator and senior operator licenses.

Effective May 1, 1980, certifications completed pursuant to Sections 55.10(a)(6) and 55.33a(4) and (5) of 10 CFR Part 55 will be signed by the highest level of corporate management for plant operation (for example, Vice President for Operations).

b. Schedule: The requirements were issued by NRR on March 28, 1980.

c. Resources: NRR FY80 - 0.6 my; ADM FY80 - 0.1 my and $8,000, FY81 - 0.1 my and $3,000; IE FY80 - 1.0 my.

2. Training and qualifications of operations personnel.

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

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

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. This task is amenable to a generic approach. INPO could perform a task analysis for those positions generally used throughout industry. Each utility could then evaluate in a similar manner any unique position in its organization not covered in the INPO study. (See also Table C.1, Items 1, 2, 11 and Table C.2, Item 11.)

Licensees will also be required to upgrade training and qualifications of personnel found to be necessary as a result of the review. The team aspect of the shift operating organization will be emphasized in training, particularly during simulator training and requalification and plant drills.

IE will check to assure that the training evaluation has been performed and personnel are properly qualified. In addition, they will perform evaluation of personnel changes in key plant management positions and changes in organizational structures (see also Item I.B.1.1).

b. Schedule: NRR will issue requirement by October 1, 1980.

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

3. Administration of training programs.

a. Description: NRR will develop criteria and procedures to be used in auditing training programs, including those provided by reactor vendors, and increase the amount of auditing. The audit criteria will place emphasis on the instructors' abilities to teach as well as their technical knowledge (NUREG-0585, Recommendation 1.4(6), Recommendation 6 of SECY 79-330E). The audits 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 (see Item I.A.2.7). NRR will also conduct all cold certification examinations at simulator training centers (Recommendation 5 of SECY 79-330E as modified by the Commission).

Pending accreditation of training institutions, NRR will require that training center and facility instructors who teach systems, integrated responses, transient, and simulator courses demonstrate their competence to NRC by successful completion of a senior operator examination. These instructors will also 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.

b. Schedule: NRR will initiate procedure development in FY81 and will begin augmented auditing in FY82. NRR issued requirements on March 28, 1980, for certain instructors to demonstrate senior reactor operator (SRO) qualifications and to be enrolled in requalification programs. NRR will conduct certification examinations for some trainees from each simulator training class to audit the training program effectiveness starting October 1, 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 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 program will be initiated in FY82.

c. Resources: Annual recurring requirements, NRR - 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). See also Table C.2, Item 11.

Over the long term, the staff will give consideration to the need for a standard dealing with in-plant drills to be 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: Short-term requirements will be issued by January 1981. A long-term standard will be developed as a Decision Group D item.

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

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. More explicit guidance regarding exercises to be included in simulator requalification programs will be included in the regulatory guide (Recommendation 8 of SECY 79-330E) as will qualifications of shift supervisors and senior reactor operators [NUREG-0585, Recommendations 1.6(1) and (2)].

(2) Based on staff 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 the applicable short-term changes described above plus requirements based on Commission action on SECY 79-330E for mandatory simulator training for applicants for licenses (Recommendation 4), mandatory simulator training in requalification programs (Recommendation 7), NRC administration of requalification examinations (Recommendation 9 as modified by the Commission), and mandatory operating tests at simulators (Recommendation 11). See also Table C.2, Item 5 and Table C.3, Item 56.

(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.

(6) NRR will establish definitive instructional requirements for the basic course in nuclear power fundamentals in licensee training programs [NUREG-0585, Recommendation 1.6(3)].

b. Schedule:

(1) SD will issue revised Regulatory Guide 1.8 for public comment in August 1980.

(2) The staff will complete its review of study NRR-80-117 (planned for completion in September 1980). SD will submit a paper to the Commission by December 1, 1980; revise and reissue for comment Regulatory Guide 1.8 resulting from Commission action on study NRR-80-117 and action on Item I.B.1.1; issue guide for public comment by May 1, 1981; and complete effective guide by February 1, 1982.

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.

(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 - 0.5 my, FY81 - 0.3 my; NRR FY80 - 0.1 my; ADM FY80 - 0.4 my and $28,000, FY81 - 0.3 my and $31,000.

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

(3) SD FY80 - 0.2 my, FY81 - 0.5 my; NRR FY80 - 0.5 my, FY81 - 0.5 my. (NRR manpower figures are associated with publication of rule change. Implementation manpower figures will be considered in FY82 budget.)

(4) NRR FY81 - 0.3 my.

(5) IE FY81 - 1.33 my.

(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 examining various NRC approaches to accreditation of training institutions. This will be coordinated with INPO to include thorough discussion and assessment of INPO programs.

b. Schedule: NRR will complete study by June 1980. NRR will complete information paper by August 1980. SD will complete a Commission action paper by January 1982.

c. Resources: NRR FY80 - 0.1 my and $80,000; SD FY80 - 0.1 my, FY81 - 1.0 my; ADM FY80 - 0.1 my and $7,000, FY81 - 0.2 my and $7,000.

C. LICENSEE ACTIONS

1. Immediate upgrading of operator and senior operator 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 as defined in NRC Item I.A.2.1. Operating reactor licensees will modify and submit revised training programs for review by August 1, 1980. Operating license applicants will be required to include specified items in their training programs prior to fuel load or by August 1, 1980, whichever is later.

c. Resources: $30,000 per year per plant.

2. Training and qualifications of operations personnel.

a. Description: Licensees will review training programs for all operations personnel and upgrade training and qualifications as found to be necessary.

b. Implementation: Operating reactors and applicants for operating licenses must complete analysis and initiate retraining by January 1982 or before operating license is issued, whichever is later.

c. Resources: $50,000 per year per plant.

3. Administration of training programs.

a. Description: Pending accreditation of training institutions, licensees and applicants for operating licenses will assure that training center and facility instructors who teach systems, integrated responses, transient, and simulator courses demonstrate SRO qualifications and be enrolled in appropriate requalification programs.

b. Implementation: Applications for SRO examinations should be submitted no later than August 1, 1980, for instructors who do not already hold an SRO license. Appropriate requalification programs for instructors should be initiated by May 1, 1980, and programs submitted for NRR for review by August 1, 1980.

c. Resources: $30,000 per year per plant.

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 short-term requirements. The long-term program is a Decision Group D item.

b. Implementation: Drills will begin at operating reactors by July 1, 1981. Operating license applicants will begin drills by July 1, 1981, or before operating license issuance, whichever is later. The long-term program is a Decision Group D item.

c. Resources: 1 my per reactor to establish program. $25,000 and 1/2 my per plant to implement short-term program. The long-term program is a Decision Group D item.

6. Long-term upgrading of training and qualifications.

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 as specified by NRC at a later date; 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 $6,000,000 in capital expenses for simulator purchase, if required.

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. <u>REFERENCES</u>

President's Commission Report: Items A.4.a., A.5, A.8.b, B.1.a, B.4, C.1, C.2, and C.3

President's Response dated December 7, 1979: Proposals C.1.a and D.1.a

Other: NUREG-0585, Recommendations 1.1, 1.2, 1.3, 1.4(1), 1.4(5), 1.4(6), 1.6(1), 1.6(2), and 1.6(3)

NUREG-0616, Recommendations 2.4.2, 3.7.1.4, and 3.13.7.1

SECY-79-330E/F Qualifications of Reactor Operators-Recommendations 1, 2, 3, 4, 5, 6, 7, 8, 9, 11

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "NRC Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2"

Letter from Chairman, ACRS, to Chairman, NRC, dated February 13, 1980, Subject: "Qualification of Radioactive Waste System Operating Personnel"

NUREG/CR-1250, Vol. I, pp. 105, 106, and 146; Vol. II, Part 1, p. 130, Part 2, pp. 419, 423, 458, 612, Part 3, pp. 854, 874, 920

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations B.2.d, C.2.a, C.2.b, C.3.c

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 operator license holders 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, 11, 12, 13). The notification will include a new category on operator and senior operator examinations 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.2.1). NRR will include simulator examinations as a portion of the license examination. The increased examination requirements will have a substantial resources impact on NRC and a moderate impact on licensees. Applicants for examinations will also be required to grant permission to NRC to inform their facility management regarding the results of the examinations for purposes of enrollment in requalification programs (SECY 79-330E, Recommendation 14). See also Table C.1, Items 1, 2, 4d, 11, 26; Table C.2, Items 4, 11; and Table C.3, Item 56.

b. Schedule: NRR issued requirements on March 28, 1980, and will begin examining to the new criteria by May 1, 1980 for operating reactors. Applicants for operating licenses must prepare employees for new examinations prior to fuel load. Simulator examinations as a part of the license examination will start by June 1, 1980 at facilities where there is a simulator. Starting FY81, simulator examinations will be conducted for facilities where simulators are not available at the facility, depending on availability and suitability of simulators.

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

2. Operator licensing program changes.

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 being made under contract 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).

b. Schedule: Initiate work in FY82 or later except for regional relocation of examiners, which will proceed in the interim on a personnel availability basis.

c. Resources: NRR first year - 1.2 my, second year - 1.5 my, third year - 0.5 my.

3. Requirements for operator fitness.

a. Description: A regulatory approach will be developed for Commission consideration to provide assurance that applicants for operator and senior operator 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: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

4. 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 contract NRR-80-117, which is planned for completion in September 1980. The pending petition for rulemaking (PRM 20-13) concerning radiation protection personnel will be held in abeyance until the comprehensive study is completed.

b. Schedule: Work will be initiated in FY82 or later.

c. Resources: NRR first year - 1.0 my; ADM first year - 0.2 my and $15,000.

5. 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 mutual intent of NRC and INPO concerning 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.

Consideration will also be given in the development of a statement of understanding that will provide alternative mechanisms for industry to inform NRC of its general progress on needed safety reforms. This will be necessary for NRC to evaluate and accredit those efforts as appropriate.

The staff will report periodically to the Commission on its interactions with INPO.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTIONS

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. Specific requirements related to new examinations include:

(1) All reactor operator license applicants shall take a written examination with a new category dealing with the principles of heat transfer and fluid mechanics, a time limit of nine hours, and a passing grade of 80 percent overall and 70 percent in each category.

(2) All senior reactor operator license applicants shall take the reactor operator examination, an operating test, and a senior reactor operator written examination with a new category dealing with the theory of fluids and thermodynamics, a time limit of seven hours, and a passing grade of 80 percent overall and 70 percent in each category.

(3) Applicants for operator licenses will be required to grant permission to the NRC to inform their facility management regarding the results of examinations.

(4) Simulator examinations will be included as part of the licensee examination.

Specific requirements related to requalification programs include:

(1) Contents of the licensed operator requalification program shall be modified to include instruction in heat transfer, fluid flow, thermodynamics, and mitigation of accidents involving a degraded core.

(2) The criteria for requiring a licensed individual to participate in accelerated requalification shall be modified to be consistent with the new passing grade for issuance of a license.

(3) Requalification programs shall be modified to require specific reactivity control manipulations. Normal control manipulations, such as plant or reactor startups, must be performed. Control manipulations during abnormal or emergency operations shall be walked through and evaluated by a member of the training staff. An appropriate simulator may be used to satisfy the requirements for control manipulations.

b. Implementation: New examination requirements for operating reactors will be effective May 1, 1980, and for applicants for operating licenses requirements must be satisfied before fuel loading. By May 1, 1980 requalification programs must include instruction in heat transfer, fluid flow, thermodynamics, and mitigation of accidents involving a degraded core. The grading criteria for accelerated requalification shall apply to all annual requalification exams conducted after March 28, 1980. Requalification programs must be modified by August 1, 1980 to require specific reactivity control manipulations. Renewal applications received after November 1, 1980, must reflect compliance with the new requalification program. After May 1, 1980 applicants for operator licenses will be required to grant permission to NRC to inform their facility management regarding results of examinations. The requirement to include simulator examinations as a part of the licensee examination will apply by June 1, 1980 to applicants where a simulator is located at the facility. Starting in FY81, simulator examinations will be conducted as part of the licensee examination for applicants where simulators are not available at the facility, depending on availability and suitability of simulators.

c. Resources: $100,000 per plant for initial implementation and $100,000 per plant per year for recurring costs.

2. Operator licensing program changes: No licensee action is required other than reporting operating performance after requirements are developed.

3. Requirements for operator fitness: This is a Decision Group D item.

4. Licensing of additional operations personnel: Licensee action is to be determined.

5. Establish statement of understanding with INPO and DOE: This is a Decision Group D item.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.4.a, A.5, A.8.b, B.1.a, C.1, C.2, C.3.a and C.3.d

President's Response dated December 7, 1979: Proposal B.1.c, B.1.f, C.1.a and C.1.b

Other: NUREG-0585, Recommendations 1.4(2), 1.4(7), and 1.8
NUREG-0616, Recommendation 2.4.2
NUREG/CR-1250, Vol. I, pp. 105, 110 and 146; Vol. II, Part 2, pp. 423, 424, 458, 612, Part 3, pp. 854
SECY-79-330E, Qualifications of Reactor Operators, Recommendations 8, 10, 11, 12, 13, 14, 16
Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations C.2.b, C.2.c, C.3.c, D.3

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for "Long-Term" TMI Improvements and/or For Other Power Reactor Sites" Recommendations 22, 23

TASK I.A.4 SIMULATOR USE AND DEVELOPMENT

A. OBJECTIVE: 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 operators' 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, study NRR-80-117, "Requirements for Operator Licensing" (Item I.A.2.6), and the proposed regulatory guide on simulators (Item I.A.4.2), NRR will require that specific weaknesses be corrected in the simulators used to train licensed operators. See also Table C.3, Item 54.

In April 1979, managers of simulator training centers were requested to develop the following capabilities for simulators: modelling saturation conditions, providing multiple failure accident training, including incorrect instrument responses, providing training for both active and passive failure of engineered safety feature components, and providing training on natural circulation operation under solid water conditions.

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 appropriate requirements by December 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. Explicit consideration will be given to operator actuation of controls versus automatic actuation. 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. Consideration of loss-of-power supply during a critical transient or accident-mitigation sequence will be included.

(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 Item I.A.4.1, public comment, research (item (1) above), and the revised ANS-3.5, SD will revise and issue the regulatory guide for acceptability of nuclear power plant simulators for use in training programs (Recommendation 15, SECY 79-330E/F). SD will include procedures and criteria for testing simulators against the regulatory guide and consideration will be given to the need for full-plant-specific simulators.

(4) Review simulators for conformance to criteria: Simulator owners will be required to submit a report describing their plan for complying with the 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 August 1980, and will issue the effective guide by September 1981.

(4) Review simulators for conformance to criteria: Verification of simulator conformance will be initiated in FY82 or later.

c. Resources:

(1) RES FY80 - 0.2 my and $195,000, FY81 - 0.5 my and $600,000, FY82 - $900,000.

(2) SD FY80 - 0.1 my.

(3) SD FY80 - 0.2 my, FY81 - 0.5 my; ADM FY80 -0.2 my and $12,000, FY81 - 0.2 my and $12,000.

(4) NRR first year - 5.0 my.

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 the lease or procurement of one or more simulators to be located in the NRC headquarters area will be performed. These simulators would 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 specifications, development of procurement and commissioning schedules, estimation of costs, and comparison with other methods of providing such training for NRC personnel.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

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 (interim 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: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

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 training licensed operators shall be upgraded by January 1, 1982.

c. Resources: $250,000 per existing simulator and $50,000 for new simulators.

2. Long-term training simulator upgrade.

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: It is not possible to estimate implementation schedules for all simulators. Implementation schedules will be established during course of long-term upgrade study.

c. Resources: It is not possible to estimate accumulated cost at this time, but changes could range from very minimal to a high of about $6,000,000 per simulator if old simulators had to be replaced.

3. Feasibility study of procurement of NRC training simulator: This is a Decision Group D item.

4. Feasibility study of NRC engineering computer: This is a Decision Group D item.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.4.a, C.3.d, and C.4

President's Response dated December 7, 1979

Other: NUREG-0585, Recommendation 7.4
NUREG/CR-1250, Vol. II, Part 1, p. 130 and Part 2, pp. 463 and 612
SECY 79-330E, Recommendation 15
Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendation C.2.c

TASK I.B SUPPORT PERSONNEL

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 of long-term improvements.

a. Description: NRC will develop criteria for onsite and offsite organizations, both management and technical, including the radiological protection organization, 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 (RS-NRR-80-105, 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. Industry efforts to upgrade ANSI N18.7 (ANS-3.2) will also interact with this work.

Specific items being considered in the development of the acceptance criteria include (a) the qualifications and experience of management, technical staff and safety review groups, both onsite and offsite, including the interactions of these groups to assure effectiveness and to avoid duplication of effort;

(b) the duties and responsibilities of key personnel; (c) the size of offsite staff, types of expertise needed, and the degree of their involvement in plant operations; (d) pooling of resources among utilities to provide the operations staff with the means to acquire prompt expert advice from offsite sources; (e) organizational arrangements for both normal and accident situations; (f) the training and a program of requalification 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 and qualifications of control room personnel (Items I.A.1.3 and I.A.1.4); (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) procedures for normal operations, accident conditions, surveillance, and maintenance (Item I.C); (k) special requirements for accident situations, including control room access, onsite technical support center, and onsite operational support center; (l) implementation of preestablished plans for using available resources in the event of unusual situations; (m) provision of necessary independent technical review onsite; (n) reporting of unusual events; (o) policy for the consideration by management of unresolved safety issues identified at all levels; (p) provisions for review of plant organization changes and personnel changes in key management technical and operation positions; and (q) provisions for selection of shift supervision and key technical personnel. See also Table C.3, Item 52.

NRR will issue draft criteria for public comment and will coordinate development of the acceptance criteria with similar efforts of the Atomic Industrial Forum (AIF), Institute of Nuclear Power Operations (INPO), and other industry organizations, as appropriate. The criteria will also be provided to ACRS for review and comment.

The proposed NRC activities are identified as follows:

(1) NRR will prepare draft criteria in coordination with other NRC offices. The experience from interoffice review of NTOL applicants will be factored into the draft criteria.

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

(3) NRR will issue requirements to licensees 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.

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

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

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

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

b. Schedule:

(1) NRR selected a contractor in October/November 1979.

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

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

(4) NRR will review responses by July 1981.

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

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

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

c. Resources: NRR FY80 - 3.4 my and $150,000, FY81 - 1.9 my; SD FY80 - 0.2 my, FY81 - 0.3 my; ADM FY80 - 0.3 my and $12,000, FY81 - 0.4 my and $17,000.

2. Evaluation of organization and management improvements of near-term operating license applicants.

a. Description: NRC will evaluate organization and management capabilities of near-term operating license applicants preceding license issuance. The scope of the evaluations will include onsite and offsite organizations, both management and technical, including the radiological protection organization. Emphasis will be placed on recently added organizational elements and functions, including the onsite safety engineering group, the operating experience evaluation capability, and the shift technical advisor. Interactions of these groups with other committees or groups already established, such as those specified in technical specifications, will be considered to assure effectiveness of the groups and to avoid duplication of review efforts. The shift technical advisor may be incorporated in the safety engineering group. The duties and responsibilities of the safety engineering group should include (1) close coordination with the engineering groups of the NSSS and A-E, (2) careful review of reported operating experiences of the plant and plants of similar design, and (3) review of design changes.

The proposed NRC activities are identified as follows:

(1) NRR will provide draft criteria to be used by an interoffice review team at each near-term operating license site.

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

(3) The findings of the interoffice team will be an input into the Safety Evaluation Report for each near-term operating license facility.

b. Schedule:

(1) NRR provided draft criteria for use by NRC inspection team.

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

c. Resources: NRR FY80 - 0.9 my, FY81 - 0.9 my; IE FY80 - 1.7 my, FY81 - 2.0 my.

3. Loss of safety function.

a. Description: SD has prepared a staff paper presenting the following options related to regulatory actions to be taken in the event of human error leading to a complete loss of safety function.

(1) Require licensees to immediately place plant in the safest shutdown cooling condition following a total loss of safety function due to personnel error 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 would be required for this option.

b. Schedule: The proposed paper was forwarded to the Commission for information as an attachment to an EDO memo of March 18, 1980.

c. Resources: SD FY80 - 0.6 my, FY81 - 0.5 my; ADM FY80 - 0.1 my and $7,000, FY81 - 0.1 my and $7,000.

C. LICENSEE ACTIONS

1. Organization and management of long-term improvements.

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 decisionmaking 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: Operating reactors will submit a plan for implementation by May 1981. For operating license applicants, this item will be incorporated in the normal review process after May 1981.

c. Resources: 4 my per utility (submittals and reviews), 6 my per facility (added staffing, training, etc.).

2. Evaluation of organization and management improvements of near-term operating license applicants.

a. Description: The licensee organization will comply with the findings and requirements generated in an interoffice NRC review of licensee organization and management. The review will be based on an NRC document entitled Draft Criteria for Utility Management and Technical Competence. The first draft of this document was dated February 25, 1980, but the document is changing with use and experience in ongoing reviews. These draft criteria relate to the organization, resources, training, and qualifications of plant staff, and management (both onsite and offsite) for routine operations and the resources and activities (both onsite and offsite) for accident conditions.

The licensee organization will establish a group that is independent of the plant staff but is assigned onsite to perform independent reviews of plant operational activities and a capability for evaluation of operating experiences at nuclear power plants.

b. Schedule: Organizational changes will be implemented on a schedule to be determined prior to fuel loading.

c. Resources: 6 my per plant.

3. Loss of safety function.

a. Description: Licensee action depends on Commission decision.

b. Implementation: Action depends on Commission decision.

c. Resources: Action depends on Commission decision.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.5, A.8.b, A.11.b, A.11.f, B.1.a, B.2, B.3, B.4, B.5.d, and D.7

President's Response dated December 7, 1979, Proposal B.1.a and B.1.b

Other: NUREG-0572
NUREG-0578, Recommendation 2.2.3
NUREG-0585, Recommendations 1.1 and 1.7
NUREG-0616, Recommendation 2.5.4.1

NUREG/CR-1250, Vol. I, pp. 106, 146, 155; Vol. II, Part 1, 135 and 137, Part 2, pp. 342, 419, 423, 430, 432, 438, 468, 612, Part 3, pp. 854, 874, 892, 920

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations B.2.d, C.2.a

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for "Long-Term" TMI Improvements and/or For Other Power Reactor Sites" Recommendations 21-24, 42

Letter from Chairman, ACRS, to Chairman, NRC, dated March 11, 1980, Subject: "ACRS Report on NTOL Items from Draft 3 of NUREG-0660, NRC Action Plans Developed as a Result of the TMI-2 Accident"

Letter from Chairman, ACRS, to Chairman, NRC, dated August 13,1979, Subject: "Short-Term Recommendations of TMI-2 Lessons Learned Task Force"

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

TASK I.B.2 INSPECTION OF OPERATING REACTORS

A. <u>OBJECTIVE</u>: 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 inspection 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. The program will provide for increased NRC presence at plants that are in startup testing in order to observe each major test.

In addition, the inspection program will emphasize reactive efforts in response to operating events, allegations or followup to previous findings.

Performance Appraisal Team inspections will be performed periodically at operating facilities to supplement the resident inspector by an in-depth inspection of the overall plant operation. Other support inspections in technical specialty areas will continue to be performed in support of the resident inspector.

The inspection program at facilities in startup testing will be intensified to prevent compromising safety in view of proposed expansion of startup test programs and the economic incentives to achieve commercial operation.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

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.

b. Schedule: IE will place a senior resident inspector at near-term operating plants by June 1980 and before fuel loading. The selection of inspectors to man the approved program will be completed by October 1980.

c. Resources: IE FY80 - 134 inspectors, FY81 - 149 inspectors, ADM FY80 - 0.5 my and $43,000, 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 the enforcement actions, licensee event reports, technical and management performance, significant personnel and organizational changes, 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: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

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: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTIONS

1. Revise IE inspection programs: This is a Decision Group D item.

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

3. Regional evaluations: This is a Decision Group D item.

4. Overview of licensee performance: This is a Decision Group D item.

D. OTHER ACTIONS: None.

E. REFERENCES

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

President' Response dated December 7, 1979; Proposals A.6.c and A.6.e

Other: NUREG-0572

NUREG-0616, Recommendations 2.2.1, 2.2.2, 2.2.3.2, 2.2.4, 2.3.1.3, 2.3.3, 2.4.2.4, 2.5.1, 2.5.2, 2.5.3.5, 2.5.4.2, 2.5.5.3, 2.6.2.2, 3.16.2

NUREG/CR-1250, Vol. I, pp. 97, 100; Vol. II, Part 1, pp. 135, 137; Part 3, p. 920

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations B.2.a, B.2.b, C.3.d, D.1

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for "Long-Term" TMI Improvements and/or For Other Power Reactor Sites" Recommendations 20, 33, 37, 38, 39, 40, 42, 44, 45, 54

TASK I.C OPERATING PROCEDURES

A. OBJECTIVE: 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 principal part of this work 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 operators and, once identified, to assure consistency with operator training.

B. NRC ACTIONS: NRC has taken action, and will take further action, to assure immediate improvement of selected emergency operating and some other operating procedures for operating reactors and near-term operating license applicants. Specific actions are being taken for near-term operations, and actions that will lead to new and better procedures will then be considered for the longer term. In the long term, symptoms-oriented approaches 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. The need for coordination and training of plant personnel is recognized.

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 for handling such transients and accidents (see NUREG-0578, Sec. 2.1.9).

(1) Small-break loss-of-coolant accidents (LOCAs). NRR sent letters on September 13 and 27, October 10 and 30, and November 9, 1979 referencing Section 2.1.9 of NUREG-0578 to licensees of operating plants, pending operating

license applicants, licensees of plants under construction, and applicants for construction permits. The staff required that analyses be performed and guidelines prepared to develop emergency operating instructions for handling small-break loss-of-coolant accidents. Appropriate retraining of operators was also required (see also Item I.A.2.1). Guidelines were prepared for each class of operating plants and were reviewed and approved by the NRR staff.

Detailed emergency operating procedures have been or are being prepared for each operating and near-term operating plant to implement the approved guidelines for handling small-break LOCAs. An NRC audit team (with NRR leading and IE participating) performed reviews of procedures for lead plants designed by each reactor manufacturer. Procedures for the remaining operating plants will 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, October 10 and 30, and November 9, 1979, NRR required operating licensees, pending operating license applicants, licensees of plants under construction, and applicants for construction permits to perform analyses, including preparation of emergency procedure guidelines, and to develop procedures and conduct training 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 (see also Item I.A.2.1). 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, October 10 and 30, and November 9, 1979, NRR required licensees of operating plants, operating license applicants, licensees of plants under construction, and pending construction permit applicants to perform analyses of transients and accidents, prepare emergency procedure guidelines, upgrade emergency procedures, including procedures for operating with natural circulation conditions, and to conduct operator retraining (see also Item I.A.2.1). Emergency procedures are required to be consistent with the actions necessary to cope

with the transients and accidents analyzed. Analyses of transients and accidents were to be completed in early 1980 and implementation of procedures and retraining were to be completed three months after emergency procedure guidelines were established; however, some difficulty in completing these requirements has been experienced. Clarification of the scope of the task and appropriate schedule revisions are being developed. In the course of review of these matters on B&W designed plants, the staff will followup on the Bulletin and Orders matters relating to analysis methods and results, as listed in Appendix C. See Table C.1, Items 3, 4, 16, 18, 24, 25, 26, 27; Table C.2, Items 4, 12, 17, 18, 19, 20; and Table C.3, Items 6, 35, 37, 38, 39, 41, 42, 47, 55, 57.

(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.) These analyses in the case of the B&W design will also be used to establish whether core-barrel check valves have been adequately modeled in the analysis by the vendor since the Three Mile Island accident.

b. Schedule.

(1) Guidelines for handling small-break LOCAs at operating reactors were reviewed and approved by NRR Bulletins and Orders Task Force in late 1979. Reviews of lead operating plants were performed as indicated in NUREG-0645. IE will conduct reviews of remaining operating plants by June 1, 1980. Reviews of operating license applicants will be consistent with operating license review schedules.

(2) Audits of lead operating plants will be completed in FY80. Reviews for the remaining operating plants will be conducted by IE by April 1, 1981. Reviews of operating licensee applicants will be consistent with operating license review schedules.

(3) NRR will clarify the scope of the task and issue a revised schedule for task completion by July 1980. It is expected that this requirement will be coupled with Task I.C.9.

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

c. Resources: NRR FY80 - 3.5 my and $50,000, FY81 - 6.0 my; IE FY80 - 5.0 my, FY81 - 4.0 my; 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. To assure that these functions are adequately prescribed, NRR issued requirements in letters dated September 13 and 27, October 10 and 30, and November 9, 1979, to licensees and applicants to review and revise as necessary shift and relief turnover procedures. See also Table C.1, Item 5, and Table C.3, Items 52.

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

c. Resources: IE FY80 - 0.1 my; NRR FY80 - 0.1 my.

3. Shift supervisor responsibilities.

a. Description: In letters of September 13 and 27, October 10 and 30, and November 9, 1979, NRC required licensees and applicants to review and revise as necessary plant procedures and directives to assure that the duties, responsibilties, and authority were properly defined to establish a definite line of command and clear delineation of the command decision authority of the supervisor in the control room relative to other plant management personnel. These letters also emphasized the primary management responsibility of the shift supervisor for safe operation of the plant. Training programs for shift supervisors were required to emphasize and reinforce the responsibility for safe operation and management function of the shift supervisor to assure safe operation of the plant.

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

c. Resources: IE FY80 - 0.1 my; NRR FY80 - 0.1 my.

4. Control room access.

a. Description: Letters dated September 13 and 27, October 10 and 30, and November 9, 1979, were sent to all licensees and applicants 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.

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

c. Resources: IE FY80 - 0.1 my; NRR FY80 - 0.1 my.

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

a. Description: NRR will require that licensee procedures be reviewed and revised as necessary to assure that important 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. These procedures will assure that high-priority matters are dealt with promptly while keeping operating personnel from being deluged with paper or instructions on less important matters to the detriment of their overall proficiency. See also Table C.3, Item 52.

b. Schedule: The requirement will be issued by May 15, 1980. IE will audit implementation in normal course of routine inspections.

c. Resources: NRR FY80 - 0.3 my, FY81 - 0.1 my; IE FY80 - 0.2 my.

6. Procedures for verification of correct performance of operating activities.

a. Description: NRR will require that licensees procedures be reviewed and revised, as necessary, to assure that an effective system of verifying the correct performance of operating activities is provided as a means of reducing human errors and improving the quality of normal operations. This will reduce the frequency of occurrence of situations that could result in or contribute to accidents. Such a verification system may include automatic system status monitoring, human verification of operations, and verification maintenance activities independent of the people performing the activity (see NUREG-0585, Recommendation 5).

Implementation of automatic status monitoring if required will reduce the extent of human verification of operations and maintenance activities but will not eliminate the need for such verification in all instances. The procedures adopted by the licensees may consist of two phases - one before and one after installation of automatic status monitoring equipment, if required, in accordance with Item I.D.3. See also Table C.1, Item 5.

b. Schedule: The requirement will be issued by July 1, 1980. IE will audit implementation in normal course of routine inspections.

c. Resources: NRR FY80 - 0.2 my; IE FY81 - 0.3 my.

7. NSSS vendor review of procedures.

a. Description: Applicants for near-term operating licenses will be required to obtain NSSS vendor review of low-power and power-ascension test and emergency procedures (see Regulatory Guide 1.33, Appendix A, Section 6) as a further verification of the adequacy of the procedures. After trial use of this requirement on a few pending operating license applications, the staff will decide whether its further use or expansion to include procedure review by the A-E is desirable. This decision will be made in light of the long-term program described in Item I.C.9. See also Table C.1, Item 4a and Table C.3, Item 50.

b. Schedule: The requirement will be issued by May 15, 1980. IE will audit implementation in the normal course of routine inspections.

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

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

a. Description: An interdisciplinary and interoffice NRC task force will audit emergency procedures received from 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, the task force will also review the training related to the symptoms of the postulated transients.

The task force will 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 (e.g., small-break LOCA, loss of feedwater, loss of alternating current and restart of engineered safety features that were reset prior to power loss, steam-line break, or steam-generator tube rupture); (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. See also Table C.1, Item 4a and Table C.3, Item 49.

b. Schedule: This work will be completed on each pending operating license application prior to issuing a full-power license for that applicant. Consideration will be given in FY81 to the extension of this program to a few operating plants of different design to increase the experience base prior to initiation of significant work on item I.C.9.

c: Resources: NRR FY80 - 3 my, FY81 - 2 my; IE FY80 - 1.3 my, FY81 - 5 my; ADM FY80 - 0.2 my and $7,000.

9. Long-term program plan for upgrading of procedures.

a. Description: NRC will develop a long-term program plan that will integrate and expand on current efforts in the writing, reviewing, and monitoring of plant procedures. NRR will lead this effort and will receive significant support from IE, SD and RES. Studies to be considered in the plan will include how best to write plant procedures to assure that the wording of procedures is clear and concise; that the content of procedures reflects both engineering thinking and operating practicalities; and that the format of procedures is clear including clear diagnostic instructions for identifying the particular abnormal conditions confronting the operator. Studies will also address the proper interrelationships among administrative, operating, maintenance, test and surveillance procedures; and the depth and content of regulatory and licensee review and monitoring of procedures.

The scope of the plan will include the transient analyses that form the basis of many of the emergency procedures, reliability analysis, human factors engineering, crisis management, and operator training. Plant conditions in addition to those pertinent to the design basis will be considered, as well as administrative prohibitions to prevent improper operator actions during accident conditions that could cause serious threat to reactor safety. The plan will be coordinated with applicable industry groups. See also Table C.3, Item 49, 50, and 51.

b. Schedule: The plan will be developed by July 1981.

c. Resources: NRR FY80 - 0.5 my, FY81 - 2 my; IE FY80 - 0.5 my, FY81 - 1 my; SD FY81 - 0.5 my; RES FY80 - 0.1 my, FY81 - 0.3 my.

C. LICENSEE ACTIONS

1. Short-term accident analysis and procedures revision.

a. Description: The effort under way to improve design-basis and off-normal transient accident response and procedures has been coordinated through owners' groups and with individual licensee representatives. The three-phase effort is as follows:

(1) Small-break loss-of-coolant accidents (LOCAs). Licensees and applicants are required to perform small-break loss-of-coolant accident analyses, prepare emergency procedure guidelines, implement appropriate emergency procedures, and retrain operators.

(2) Inadequate core cooling. Licensees and applicants are required to perform analysis of inadequate core cooling, prepare emergency procedure guidelines, implement appropriate emergency procedures, and conduct retraining.

(3) Transients and accidents. Licensees and applicants are required to perform analysis of accidents and transients, prepare emergency procedure guidelines, implement appropriate procedures, and retrain operators.

b. Implementation.

(1) Small-break loss-of-coolant accident analysis, guidelines preparation, procedures revision, and retraining of operators were to be completed at operating reactors by January 1, 1980. Operating license applicants must complete the work prior to fuel loading.

(2) Operating reactors were required to complete analyses, guideline preparation, procedure revision, and retraining by January 1, 1980. Operating license applicants must complete the work prior to fuel loading.

(3) The schedule for completion of the task is to be issued by NRR by July 1980.

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 reactor licensees were required to complete procedures revisions by January 1, 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 reactor licensees were required to complete procedures revisions by January 1, 1980. Operating license applicants are to complete this work 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 reactor licensees were required to complete procedures 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 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 provided to operators and other operations personnel and is incorporated in training programs in accordance with NRC instructions.

b. Implementation: Operating reactor licensees will complete by January 1, 1981. Operating license applicants will complete prior to fuel loading.

c. Resources: 0.5 my per plant.

6. Procedures for verification of correct performance of operating activities.

a. Description: Each licensee will review and revise procedures as necessary to assure that an effective system of verifying the correct performance of operating activities is in place. This action may be accomplished in two phases - one before and one after installation of automatic status monitoring equipment, if required.

b. Implementation: Operating reactor licensees are to complete the first phase by January 1, 1981 and the second phase six months after completion of installation of automatic status monitoring equipment, if required (see Item I.D.3). Operating license applicants are to complete these tasks on the same schedule as operating reactors or prior to fuel loading, whichever is later.

c. Resources: Phase 1 - 0.5 my per reactor for procedure review and 3.0 my per reactor for implementation. Phase 2 - to be determined in conjunction with Task I.D.3.

7. NSSS vendor review of procedures.

a. Description: Operating license 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 vendor review of emergency and power-ascension test procedures prior to full-power operation and low-power test procedures before fuel loading.

c. Resources: $200,000 per plant (cost includes 2 my per plant engineering effort).

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

a. Description: Licensees will be required to correct any deficiencies identified before full-power operation.

b. Implementation: See "Description" above.

c. Resources: $50,000 per near-term operating license applicant.

9. Long-term plan for upgrading of procedures.

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 training and training improvements will also be required. In addition, NRC will require industry cooperation in developing a pilot program to implement the upgraded procedures on lead plants.

b. Implementation: This effort will parallel the NRC actions in this area and will be addressed in the NRC plan to be developed by July 1981.

c. Resources (industry total): Costs will be discussed in NRC plan.

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

E. REFERENCES

President's Commission Report: Items A.4.c(i), A.5, B.1.b, B.3.b, B.3.c, B.5, C.3.b, C.3.c, D.4, D.4a, D.7

Other: NUREG-0578, Recommendations 2.1.3b, 2.1.9, 2.2.1a, 2.2.1c, and 2.2.2a

NUREG-0585, Recommendations 4, 5, and 6.2

NUREG-0616, Recommendation 2.2.4

NUREG/CR-1250, Vol. I, pp. 105, 146; Vol. II, Part 1, p. 130, Part 2, pp. 463, 465, 468, 612; Part 3, pp. 854, 874

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on the Three Mile Island Nuclear Station, Unit 2"

Letter from Chairman, ACRS, to Chairman, NRC, dated August 14, 1979, Subject: "Studies to Improve Reactor Safety"

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

Letter from Chairman, ACRS, to Chairman, NRC, dated March 11, 1980, Subject: "ACRS Report on NTOL Items from Draft 3 of NUREG-0660, NRC Action Plans Developed as a Result of the TMI-2 Accident"

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations B.2.c, C.2.a, C.7.a

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 operating licenses perform a detailed control room design review to identify and correct design deficiencies. This review will include an assessment of control room layout, the adequacy of the information provided, the arrangement and identification of important controls and instrumentation displays, the usefulness of the audio and visual alarm systems, the information recording and recall capability, lighting, and other considerations of human factors that have an impact on operator effectiveness. This review will be performed on a schedule consistent with the implementation of other requirements for enhancing operator effectiveness including necessary retraining. This will ensure that the measures for correcting control room design deficiencies will be considered in conjunction with the other actions affecting the operator. These other actions include installation of a safety parameter display console (Item I.D.2), verification of the correct performance of operating activities (Items I.C.6 and I.D.3), and upgrading of licensee emergency support facilities (Item III.A.1.2).

This detailed control room design review is expected to take more than a year. Therefore, NRR will require that those applicants for operating licenses who are unable to complete this detailed review prior to fuel loading make a preliminary assessment of their control rooms to identify significant human factors and instrumentation problems and establish a schedule approved by NRC for correcting deficiencies. NRR will conduct a review of the applicants' assessments and the corrective actions implemented to ensure that these actions are sufficient. These applicants will also be required to complete the more detailed control room reviews on the same schedule as licensees with operating plants.

Prior to the initiation of the detailed reviews, 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, their relationship to proposed industry standards, and the impact of their implementation.

NRR and IE will audit the licensee and applicant review process and the final reports prepared 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. In conjunction with this development effort, Essex will visit several operating plant control rooms to ensure that the guidelines are sufficiently comprehensive. Essex will also prepare the evaluation criteria and a plan to be used by the staff in performing the onsite audits of the licensee and applicant review process.

b. Schedule:

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

(2) NRR and IE will complete onsite audits by May 1981.

(3) NRR will issue a Commission information paper by December 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 February 1981.

(4) On a schedule consistent with licensing needs, NRR and IE will review the results of those preliminary control room design assessments performed by applicants granted operating licenses prior to January 1982.

(5) NRR and IE will complete audits of control room design review reports submitted by licensees and applicants for operating licenses by April 1982 or prior to issuance of the operating license, whichever is later.

c. Resources: NRR FY80 - 2.5 my and $160,000, FY81 - 4.0 my and $270,000; IE FY80 - 0.1 my, FY81 - 0.1 my; ADM FY80 - $10,000.

2. Plant safety parameter display console.

a. Description: In conjunction with the control room design upgrade described in Item I.D.1, NRR will require all licensees and applicants to install a safety parameter display system that will display to operating personnel a minimum set of parameters (safety state vector) which define the safety status of the plant. The system should have the capability of displaying a full range of important plant parameters and data trends on demand. In addition, the system should provide indication of when process limits are being approached or exceeded.

NRR will review the proposed designs in conjunction with plans for other control room design modifications developed pursuant to Item I.D.1 to ensure that the needs of the operator are met. See also Table C.3, Items 23 and 55.

b. Schedule: NRR requirements will be issued by August 1980.

c. Resources: NRR FY80 - 2.0 my, FY81 - 1.0 my and $250,000; IE FY81 - 0.5 my.

3. Safety system status monitoring.

a. Description: NRR will study the need for all licensees and applicants not presently committed to the requirements of Regulatory Guide 1.47, "Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems," to monitor and verify operations, test, and maintenance activities by means of an automatic status monitoring system, such as that described in Regulatory Guide 1.47. This study is to be performed following a review of procedures and other nonautomatic actions to verify these activities, as required in Item I.C.6 and installation of the safety monitor console (Item I.D.2). In addition, consideration should be given to the impact of other control room modifications on the need for automatic status monitoring (Item I.D.1). See also Table C.3, Item 55.

b. Schedule: NRR work is not planned to be initiated in FY82 or later; however, some approaches by some vendors for Item I.D.1 and I.D.2 above may include safety system status monitoring in which case this part of the plan may need modification.

c. Resources: NRR first year - 0.5 my.

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 these standards to plants under construction. SD will urge prompt revision of IEEE 566 and 567. NRR will require compliance with the regulatory guide as necessary.

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

c. Resources: SD FY80 - 0.1 my, FY81 - 0.5 my; ADM FY81 - 0.1 my and $5,000.

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 and postaccident 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) Online 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, extended range sensors, 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 and postaccident monitoring. Status monitoring requirements are to be confirmed by December 1980.

(3) Online 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 - 0.2 my and $190,000, FY81 - 0.2 my and $400,000.

(2) Plant status monitoring: RES FY80 - 0.2 my and $200,000, FY81 - 0.2 my and $400,000.

(3) Online reactor surveillance system: RES FY80 - 0.2 my and $200,000, FY81 - 0.3 my and $150,000; ADM FY80 - 0.3 my and $15,000, FY81 - 0.4 my and $12,000.

(4) Process monitoring: RES FY80 - 0.2 my and $230,000, FY81 - 0.3 my and $500,000.

(5) Disturbance analysis systems: RES FY80 - 0.3 my and $1,000,000, FY81 - 0.3 my and $1,000,000.

6. Technology transfer conference.

a. Description: 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 a discussion of methods of improving the quality of the man-machine interface, including personnel training and qualification.

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

RES is also developing research plans in response to some of the recommendations made at the meeting.

b. Schedule: Conference held January 15-17, 1980.

c. Resources: RES FY80 - 0.1 my and $30,000; ADM FY80 - 0.1 my and $15,000.

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 and applicants will complete review and implement short lead-time revisions by January 1982 or prior to issuance of operating license, whichever is later. Long lead-time revisions will be completed by January 1983 or prior to issuance of operating license, whichever is later. Applicants to be granted operating licenses prior to January 1982 must perform a preliminary assessment of their control rooms to identify significant human factors and instrumentation deficiencies and establish a schedule approved by the NRC for correcting deficiencies prior to fuel loading.

c. Resources (per reactor): Range from $1,000,000 to $2,000,000 per plant.

2. Plant safety parameter display console.

a. Description: Design and install safety parameter display console.

b. Implementation: Licensees and applicants will submit the system design for NRR review by January 1981 or in time for review prior to issuance of an operating license, whichever is later. Licensees and applicants for operating licenses will complete implementation by January 1982 or prior to issuance of operating license, whichever is later.

c. Resources (per reactor): $1,000,000 to $2,000,000 per plant.

3. Safety system status monitoring: No licensee action is required at this time.

4. Control room design standard.

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

b. Implementation: Licensees and applicants will comply with regulatory guide provisions where required.

c. Resources (per reactor): To be determined during course of regulatory guide development.

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

6. Technology transfer conference: Requires no licensee action.

D. <u>OTHER ACTIONS</u>

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: The total program cost is estimated to be several million dollars per year; exact resources are not yet available. NRC does not contribute to this program but does monitor its progress.

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), C.4, D.1 and D.3

President's Response dated December 7, 1979: Proposals C.1.d, D.1.a, D.1.b, D.1.e, and D.1.f.

Other: NUREG-0585, Recommendations 5, 7.1, 7.2, 7.3, and 7.5

NUREG-0616, Recommendations 3.9.1, 3.10.5.2 and 3.12.1

NUREG/CR-1250, Vol. 1, pp. 127, 128, 146; Vol. II, Part 2, pp. 468, 485, 487, 612

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 2 on Three Mile Island Nuclear Station Unit 2"

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

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations C.1.a, C.1.b, C.1.d, C.3.b, C.5.a

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for "Long-Term" TMI Improvements and/or For Other Power Reactor Sites" Recommendation 55

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, inspection, standards and research 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 specific recommendations for action by other NRC offices. AEOD also 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 in June 1980. Interim procedures are to be issued for trial use in June 1980. Final procedures are to be forwarded for Commission action in February 1981.

c. Resources: AEOD FY80 - 10 my and $120,000, FY 81 - 22 my and $500,000; ADM FY80 - 0.2 my and $110,000, FY81 - 0.1 my and $100,000.

2. Program office operational data evaluation.

a. Description: Major program offices will conduct special operational safety analyses. These analyses will be coordinated with and the results distributed as part of the integrated program on operating experience assessments.

The work of the program offices will complement the AEOD activities in accordance with the agency program guidance developed under Item I.E.1. In addition to in-house efforts, some technical assistance is being obtained through contracts; for example, current Lawrence Livermore Laboratory efforts include evaluation of the significance of foreign reactor experience and providing recommendations on actions relative to U.S. operating reactors.

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

c. Resources: NRR FY80 - 3.0 my, FY81 - 8 my; IE FY80/81 - 5.0 my (headquarters); MPA FY80 - 4 my, FY81 - 6 my (LER review and associated support only); RES FY80/81 - 4 my; and NMSS FY80/81 - 3-5 my;* ADM FY80 - $100,000, FY81 - $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 LERs; 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.

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*Estimated licensing resources for operational data activities based on using existing organizational staffing and structure.

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 Items I.A.1.1, I.B.1.1 and I.B.1.2). Additionally, licensees will be required to review their administrative procedures to assure that operating experience is properly evaluated and effectively fed back to operators and other operations personnel and is incorporated in training programs (see Item I.C.5). Industry evaluation programs will be conducted at NSAC and INPO and at vendor organizations (see Section D of this task).

Licensee evaluations of operating experience will be supported by NRC and industry evaluations. The NRC program, for example, will evaluate operating events; identify the most significant; summarize the implications and needed corrective actions; and provide a clear and concise summary description to all potentially affected licensees. It is anticipated that industry evaluation programs will provide similar support. Thus, licensee evaluation programs will use the prioritized and analyzed event descriptions as feedback to operations personnel and as input to training programs.

This action item is necessary to assure that NRC programs are coordinated with industry and licensee evaluation programs. The activity includes the use of a common data base and formal lines of communication, and it assures that corrective action recommendations of the licensees, industry, and NRC are properly coordinated. AEOD is the lead organization for the coordination of operational data collection, analysis, and evaluation within the NRC, and for NRC coordination with industry and other operational data evaluation programs.

b. Schedule: June 1980 for formal communication channels to be discussed with industry groups.

c. Resources: (Included with other tasks.)

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. An advance notice of proposed rulemaking to make participation in the NPRDS mandatory has been issued for public comment. SD has the lead on the NPDRS rulemaking proceeding.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

6. Reporting requirements.

a. Description: Improved reporting requirements are necessary to (1) upgrade reporting to include all events having public health significance; (2) eliminate reporting of insignificant events and failures; (3) achieve consistency in reporting among licensees; and (4) include reporting on systems and components that may have safety implications and not just "safety-related." This revised reporting activity must reflect resolution of the NPRDS rulemaking proceeding and efforts to minimize the number of data storage and retrieval systems. Further, since it is intended that NRC offices, licensees, and industry all use a common data base, this task will require extensive in-house, licensee, and industry coordination.

Since the changes in the reporting requirements are likely to be fundamental, it is anticipated that Commission review and approval will be requested. Thus, a Commission paper is scheduled in January 1981, to be followed by revision of Regulatory Guides 1.16 and 10.1 by SD and modification of license conditions by NRR and NMSS or appropriate rulemaking action initiated. An interim action on revised reporting requirements has been completed with the issuance of a rule covering immediate reporting of significant events. AEOD has the overall lead for coordination of this task (see also Item II.J.4). See also Table C.1, Item 12.

b. Schedule: NRC issued rule for immediate reporting of significant events in February 1980. Commission paper to be prepared in January 1981. Revision of regulatory guides or publication of proposed rulemaking will be completed in 1981.

c. Resources: IE FY80 - 0.4 my; SD FY81 - 0.5 my; AEOD FY80 - 0.5 my, FY81 - included in Item I.E.1; MPA FY80 - 0.5 my; NMSS FY80/81 - included in Item I.E.2; 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. Currently, this information is obtained through formal regulatory arrangements with governmental agencies of 16 countries. In order to gain additional foreign operating experience in a more systematic manner, IP is (1) participating with the nuclear regulatory agencies of other nations in a centralized exchange of incident information within the Nuclear Energy Agency (NEA); (2) supplementing the effort in (1) by upgrading the exchange of information on significant event incidents through direct contact and correspondence with our bilateral partners; and (3) concluding additional formal bilateral agreements authorizing information exchanges with Canada, Finland, and others.

Foreign reactor incident and operating experience reports are now being routinely received and disseminated to NRC technical staff. The actions identified above will upgrade and expand the reporting of reactor incidents to NRC. These incident reports are being assessed technically for significance and relevance to U.S. operating reactors (see Items I.E.1 and I.E.2) and will be entered into the reactor data base.

b. Schedule: In spring 1980, IP finished contacting all agreement countries with LWRs, regarding upgrading of exchange programs and is striving to conclude one or more additional bilateral agreements by December 30, 1980. Initiation of NEA exchange will be accomplished by June 30, 1980.

c. Resources: IP FY80 - 0.5 my, FY81 - 1.0 my; ADM FY80 - 0.1 my and $65,000, FY81 - 0.1 my and $25,000.

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 actions and operational aids. (see also item I.A.4.2) RES has lead responsibility on this activity.

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 - 0.5 my and $500,000, FY81 - 0.5 my and $500,000.

C. LICENSEE ACTIONS

1. Office for Analysis and Evaluation of Operational Data (AEOD): 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 licensee, industry, and regulatory programs.

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

b. Implementation: Discussions will be held in June 1980 with INPO and NSAC regarding communication channels. Additional discussions with licensees and industry groups will be held in FY81.

c. Resources: $5,000 per plant.

5. Nuclear Plant Reliability Data System (NPRDS). This is a Decision Group D item.

6. Reporting requirements.

a. Description: To be determined.

b. Implementation: To be determined.

c. Resources: To be determined.

7. Foreign sources: Requires no licensee action.

8. Human error rate analysis: No specific licensee actions are required, but some licensees will be asked to cooperate with the RES studies.

D. <u>OTHER ACTIONS</u>

1. Nuclear Safety Analysis Center (NSAC).

a. Description: Industry has established a program at NSAC to systematically review available event reports and operating data. Efforts are being 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 in progress. Staffing and contractual support will be completed by spring 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. Vendor's program.

a. Description: Each principal vendor (NSSS and A-E) should have 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: The resources will vary with the vendor.

E. REFERENCES

President's Commission Report: Items A.5, A.11.a, A.11.b, B.1.b, B.5.d, D.4.a, and D.7

President's Response dated December 7, 1979: Proposals A.6.c, D.1.d and D.1.e.

Other: NUREG-0572

NUREG-0585, Recommendation 6.1

NUREG-0616, Recommendations 2.3.1, 2.5.3.2, 2.7.2, 2.7.3

NUREG/CR-1250, Vol. I, pp. 97, 99, Vol. II, Part 1, pp. 105, 135, and 137

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2"

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations B.2.c, D.3

TASK I.F QUALITY ASSURANCE

A. <u>OBJECTIVE</u>: 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

Several systems important to the safety of TMI Unit 2 were not designed, fabricated, and maintained at a level equivalent to their safety importance. They were not on the Quality Assurance List (the QA list) for the plant. This condition exists at other plants and results primarily from the lack of clarity in NRC guidance for graded protection. This situation and other quality assurance problems relating to the quality assurance organization, authority, reporting and inspection have been identified by the various TMI accident investigations and inquiries. One of the difficulties in establishing a QA list based on safety importance is the absence of relative risk assignments to equipment. NRC will develop guidance for the expansion of the listing of equipment important to safety and later for what constitutes activities acceptable for effective quality assurance programs for design, construction, and operation.

Other tasks will resolve the importance to safety of equipment (associated risk). These include Items II.C.1.1, Interim Reliability Evaluation Program, II.C.1.2, Continuation of IREP, and II.C.1.3, Systems Interactions. These planned actions will upgrade the safety quality associated with a significant amount of equipment. The net effect will be to improve the reliability of systems and equipment needed for integrity of the reactor coolant system pressure boundary, accident prevention and mitigation, safe shutdown and cooldown, and information display and annunciation for plant operational safety.

1. Expand QA list.

a. Description: NRC will develop guidance for licensees to expand their QA lists to cover equipment important to safety and rank the equipment in order of its importance to safety. The results of the interim reliability evaluation program (IREP) and the systems interaction tasks will be used to establish the importance of equipment as it relates to safety. Experience in use of the revised NRR review procedure for developing QA lists for individual operating license applicants will also be factored into the generic guidance to be developed and when determining backfit requirements. (There is a task presently under way to define the applicability of 10 CFR 50 Appendix B to 10 CFR 50 Appendix A required equipment.)

b. Schedule: SD will issue a regulatory guide by September 1983. The expanded QA list will be issued to licensees and applicants for implementation by December 1983. This schedule is compatible with the IREP schedule.

c. Resources: NRR first year - 0.3 my, second year - 0.3 my; SD first year - 1.0 my, second year - 0.3 my; IE first year - 0.3 my, second year - 0.3 my.

2. Develop more detailed QA criteria.

a. Description: NRC will develop more detailed criteria for various aspects of quality assurance for design, construction, and operations. The existing criteria are general and allow broad interpretation. Detailed guidance is needed to clarify NRC requirements for the QA function in design, construction and operations. In development of the detailed criteria consideration will be given to the following:

(1) 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 quality assurance/quality control (QA/QC) function at construction sites. Consider using the third-party concept for accompanying the NRC review and audit

and making the QA/QC personnel agents of the NRC. Consider using INPO to enhance QA/QC independence.

(2) 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.

(3) Include the QA personnel in all activities involved in design, construction, installation, preoperational and startup testing, and operation.

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

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

(6) Increase the size of the licensees' QA staff.

(7) 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.

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

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

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

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

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTIONS

1. Expand QA list.

a. Description: Develop improved QA list.

b. Schedule: Licensee action is yet to be determined.

c. Resources: No resources required until implementation in FY83. Estimate for FY83 is not provided.

2. Develop more detailed QA criteria: This is a Decision Group D item.

D. OTHER ACTIONS: None.

E. REFERENCES:

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

Other: NUREG-0616, Recommendations 2.5.2.1, 2.5.3.3, 2.6.1.1, 2.6.1.2, 2.6.1.5
NUREG/CR-1250, Vol. II, Part 2, p. 487
Letter from Chairman, ACRS, to Chairman, NRC, dated August 14, 1979, Subject: "Studies to Improve Reactor Safety"
Letter from Chairman, ACRS, to Chairman, NRC, dated December 17, 1979, Subject: "A Review of NRC Regulatory Processes and Functions"
Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for "Long-Term" TMI Improvements and/or For Other Power Reactor Sites" Recommendation 24
Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations C.1.a, D.1

TASK I.G 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 changes and off-normal events is conducted. 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). Review comprehensiveness of test programs.

B. NRC ACTIONS

1. Training requirements.

a. Description: NRR will require new operating licensees to conduct a set of low-power tests to accomplish the objective. The set of tests will be determined on a case-by-case basis for the first few plants. Then 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. It is not expected that all tests will be required to be conducted by each operating shift. Observation by one shift of training of another shift may be acceptable. See also Table C.1, Items 4, 18, 26; and Table C.2, Item 11.

b. Schedule: NRR will develop criteria in conjunction with initial near-term operating license reviews. This work will be completed by December 1980.

c. Resources: NRR FY80 - 1.5 my, FY81 - 0.5 my.

2. Scope of test program.

a. Description: NRR will lead an interoffice reassessment of SRP Chapter 14, Regulatory Guide 1.68, and related test program guidance to determine whether requirements for full comprehensive programs exist.

b. Schedule: Initiate work by FY82 or later.

c. Resources: First year NRR - 0.2 my; IE - 0.1 my; SD - 0.1 my.

C. LICENSEE ACTIONS

1. Training requirements.

a. Description: Licensees will (1) define training plan prior to loading fuel, and (2) conduct training prior to full-power operation.

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, 2 my plus costs associated with delay due to extended startup period (delay estimated to be one week).

2. Scope of test program: This is a Decision Group D item.

D. OTHER ACTIONS: None

E. REFERENCES

President's Commission Report: Items A.8.b and C.3.c

Other: NUREG/CR-1250, Vol. I, p. 146; Vol. II, Part 1, p. 199
Letter from Chairman, ACRS, to Chairman, NRC, dated December 11, 1979, Subject: "Interim Low Power Operation of Sequoyah Nuclear Power Plant, Unit 1"
Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation" Recommendations B.2.c, C.2.c, C.7.a, C.7.c

CHAPTER II

SITING AND DESIGN

INTRODUCTION

The actions to improve operational safety described in Chapter I are the more important responses to the accident at Three Mile Island. However, possible weaknesses in siting and plant design revealed by the accident should be evaluated and corrected, where necessary.

The NRC had been critically examining siting policy prior to the accident at Three Mile Island. This examination was concluded in August 1979 (NUREG-0625). Recommended changes in siting policy from that study and other changes are soon to be issued in an Advanced Noticed of Rulemaking, as recently directed by the Commission. The new rule will be applicable to the siting of newly proposed nuclear plants; however, the treatment of existing nuclear plants, either operating or under construction, also will be considered.

The accident at TMI demonstrated the reality of the risk, previously only theoretically assessed, of accidents that result in substantial degradation and melting of the core. This risk arises from the fact that core-degradation accidents can lead to containment failure and the eventual release of large amounts of radioactivity to the environment. The Action Plan calls for the development and implementation of a number of phased actions dealing with explicit consideration of accidents involving severely damaged or molten cores in the design and operation of nuclear power plants.

The program phases include (1) short-term actions for early implementation on operating reactors; (2) added requirements for operating reactors at sites with high population density; (3) research programs and design studies to develop additional needed information; and (4) rulemaking proceedings to establish long-term policy, goals, and requirements related to accidents involving core damage greater than the present design basis.

The short-term actions include requirements to (1) install reactor coolant system vents to relieve the coolant system of noncondensible gases that could interfere with coolant flow and distribution, (2) provide more shielding to allow access to vital areas and to protect safety equipment for postaccident operation,

(3) improve the existing reactor coolant and containment atmosphere sampling systems, (4) develop and implement training in the control and mitigation of an accident in which the core is severely damaged, and (5) add or increase the range of some important instruments so that accident conditions can be monitored.

One of the long-term actions is completion and implementation of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," which will supplement the short-term requirement for improved instruments. The long-term actions also include rulemaking to provide a comprehensive assessment of the issues and specific facts relating to the consideration of core-melt accidents, design features to mitigate the consequences of degraded-core conditions and core-melt accidents, effectiveness and performance of systems for controlled, filtered venting of the containment structure, and molten-core retention and hydrogen control systems for all nuclear power plants. The rulemaking is intended to establish policy on the whole issue of possible accidents that are beyond the currently established design basis.

There are activities that fall somehwere between the short- and long-term activities. They involve the consideration of plants presently under construction and operating reactors located in areas of high population density. For these situations, additional measures or design changes that can and should be implemented are to be studied to see if it is prudent to reduce the consequences of possible severe accidents involving core damage. Such studies are presently under way for the Indian Point 2 and 3 and Zion 1 and 2 nuclear power plants, which are located at sites with high population density. This program is to proceed in parallel with the rulemaking proceedings and the research work described in the plan.

The management of large quantities of hydrogen generated in the containment structure during a severe accident, with its potential to burn or explode and cause containment overpressurization, involves both short- and long-term actions. The short-term actions include consideration of the possible need for inerting of BWR Mark I and Mark II containment structures and the initiation of studies to identify possible means to prevent overpressurization for other types of containment structures. The long-term actions include research and evaluation dealing with all aspects of hydrogen control problems, ranging from studying the behavior of hydrogen in an accident environment and the burning or detonation effects on containment structures to the development and implementation of hydrogen control systems for various types of containment structures.

The lessons learned from TMI emphasize the importance of high reliability of systems, even though there were no significant failures of equipment during the accident, other than the relief valve. Recently developed system analysis techniques can be used to supplement traditional NRC safety evaluations. These newer techniques can be used for both quantitative and qualitative analysis of reactor systems. The Action Plan includes three uses of these techniques for improved reactor safety evaluation, the Interim Reliability Evaluation Program (IREP), the Systems Interaction (SI) program, and the Reliability Engineering program.

IREP is a systematic comparison of overall plant reliability for operating nuclear power plants. IREP uses a simplified version of WASH-1400 event trees and fault trees to assess the plant's reliability. Plant systems and procedures are analyzed. No accident consequences analysis or siting factors are specifically evaluated. IREP is intended to identify significant contributors to risk, train personnel in quantitative risk assessment, and develop bases for further reliability analyses.

The SI program, which has been under way for some time in connection with the Unresolved Safety Issues Program, is a qualitative analysis of the way reactor systems interact in transients and accidents. The Reliability Engineering program, which has not yet begun, is one that will bring quantitative reliability analysis to bear in monitoring plant component and system performance experience.

These systems analysis techniques will provide an overall, integrated assessment of the effectiveness of plant systems. However, the investigations of the accident identified weaknesses in specific systems. These systems include the relief and safety valves and some of the engineered safety features.

The proximate cause of the accident was the failure of a power-operated relief valve to close, and this has prompted some concern over the reliability of the relief and safety valve function in general. At TMI and during other incidents, relief and safety valves have been subjected to the flow of water and steam-water mixtures, conditions for which they are not qualified. Performance of these valves under such conditions has not been tested. The plan included requirements for licensees to demonstrate by testing and analysis that the reactor coolant overpressure protection systems (relief, safety and block valves and associated piping) are qualified for the full range of operating and accident conditions. Furthermore, the electrical power for relief and block valves is to come from emergency power sources and the motive and control components are to be designed to safety-grade criteria to increase their reliability.

Since TMI, actions have been recommended for improving the reliability and performance of the auxiliary feedwater system (AFWS). Based on such recommendations, actions are included in the plan to assess the reliability and performance of the AFWS by using fault-tree, event-tree and deterministic methods to identify design weaknesses, correct them where necessary, make certain specific design changes affecting AFWS initiation and flow indication, and upgrade the quality of the AFWS. Building on success in measuring and improving AFWS reliability since TMI, the plan also includes specific actions to determine and if necessary decrease the frequency of ECCS challenges, evaluate the capability and reliability of the ECCS for various break sizes and degraded plant conditions to identify design weaknesses, augment research efforts related to small breaks and transients, and evaluate the uncertainties in ECCS performance predictions for small-break LOCAs.

The accident emphasized the importance of the decay-heat removal function. Since accomplishing this function in the absence of offsite power requires that the reactor be cooled by natural circulation, the reliability of this mode of cooling is critical. Although natural circulation does not require pressure control by the pressurizer, the normal functioning of the pressurizer is an important aid. Therefore actions to improve the pressurizer pressure control function are included in the plan. These actions include requiring the capability to supply some of the pressurizer heaters from the emergency power source and the pressurizer level indicators from vital buses. Possible need for general improvements in the residual heat removal (RHR) systems are also to be investigated.

The importance of the containment structure and the necessity of reliably isolating it were reemphasized by the accident. Specific actions in the plan include provisions of dedicated penetrations for external hydrogen recombiner systems; improvements in containment isolation dependability, including short-term requirements for two diverse initiating signals and ultimately three; consideration of tests to provide a containment integrity check following each cold shutdown and prior to power operation, and reassessment of requirements and restrictions on containment purging.

A specific design feature of B&W plants that was highlighted by the accident is the once-through type steam generator that has a small, residual secondary-side water volume that increases the sensitivity of the plant response to feedwater transients. Because of this and other B&W design idiosyncracies, there is increased potential for operator action, which in turn increases the potential for error. The plan includes actions taken during the past year to address these concerns plus consideration of other possible fixes for plants under construction, as well as possible backfitting for operating plants.

The investigations of the accident confirm that inspection and enforcement are among the most important functions of NRC in providing assurance that nuclear power plants are designed, constructed, and operated safely. Various investigations called for improved inspection and auditing of licensees (and their agents) for compliance with requirements, application of quality assurance measures to safety-related as well as nonsafety-related components and systems, systematic assessment of operational experience for use as a base for specific programs aimed at curing deficiencies and improving safety, clear instructions on reporting requirements, and improved enforcement procedures.

Planned improvements common to inspection programs for both operating plants and plants under construction include modifications in inspection procedures that will redirect the IE inspector's efforts into subject areas where recent experience, as noted in operational and construction event reports, show ongoing problems. The several equipment malfunctions, the human-hardware interface question and the faulty design features associated with the TMI-2 accident are examples of subject areas amenable to redirected IE inspection effort. Placement of resident inspectors at all construction sites and in the architect-engineer and nuclear steam system supplier design headquarters is another proposed effort common to both programs. This proposal seeks to provide an overall improvement in IE's capability for assuring compliance against requirements at the design level, as recommended by the Commission.

Another major initiative involves the development of a system for establishing priorities for the inspection of vendors. Input into the system will include feedback experience from operating reactors and construction sites. It will not limit the scope of effort to the traditionally defined safety-related areas but will also consider other areas not now defined as safety related, thereby addressing, in part, another of the lessons learned at TMI-2.

Other planned efforts for program improvement incorporated in this part of the Action Plan include the procurement of services and facilities to provide IE an independent capability for conducting both destructive and nondestructive examination of materials. A study of the feasibility of licensing architect-engineers and nuclear steam system suppliers to enhance enforceability of design and quality requirements is also included. Preparation of new criteria requiring greater involvement of licensees in design and construction activities is also planned.

Since the accident, a substantial effort has been under way to provide technical assistance, regulatory guidance and review of the TMI-2 recovery activities, including system modification activities. The activities of the staff have been to (a) review systems modifications and systems additions proposed by the licensee, the industry review group or NRC, (b) review all procedures related to postaccident activities, (c) provide close and continuous monitoring of ongoing operation, and (d) provide consultation, review and analysis of the ongoing radwaste, cleanup and health physics activities. In addition, NRC and the Department of Energy have recognized a need for developing and implementing a program for postaccident examination of the plant. It is included in the plan.

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 reevaluation with regard to the new siting criteria of facilities either under construction or operating.

B. NRC ACTIONS

1. Siting policy reformulation.

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 emergency response preparedness and capability; (2) numerical values for standoff distances from offsite hazards; and (3) the objectives expressed in the remaining recommendations of the Report of the Siting Policy Task Force (NUREG-0625) (except Recommendations 4 and 9, which will be handled by separate actions). All items are specific recommendations of the NRC Siting Policy Task Force (NUREG-0625), and item (1) addresses the President's Commission Recommendation A.6, and the recommendations of the NRC Special Inquiry Group.

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 a 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, including elements of items II.B, "Consideration of Degraded or Melted Cores in Safety Reviews," item III.A, "NRC and Licensee Preparedness," and item III.D, "Public Radiation Protection Improvements."

b. Schedule: SD will issue an Advance Notice of Proposed Rulemaking by July 1980. Draft rule will be published by October 1980.

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

2. Site evaluation of existing facilities.

a. Description: Prepare an analysis for Commission decision of the NRC staff plans to reconsider, with regard to the revised siting policy, facilities either under construction or operating. The analysis would take as a point of departure the criteria expressed in the Proposed Rule on Siting (item II.A.1) and would address a strategy for consideration of siting decisions of plants that have construction permits or operating licenses. Since the elements of this analysis are applicable to plants that are to be assessed in item II.B, "Consideration of Degraded or Melted Cores in Safety Reviews," there will be close coordination with that action item. In addition, the results of Item V.1, "NRC Policy Statement on Safety," will be directly applicable to this plan, as will the emergency preparedness aspects of items III.A and III.D.

b. Schedule: A Commission Action Paper will be issued by October 1980.

c. Resources: NRR FY80 - 1.0 my. (This task does not include the resources needed in the actual reviews of past siting decisions.)

C. <u>LICENSEE ACTIONS</u>

1. Siting policy reformulation.

a. Description: Applicants will develop and implement procedures to incorporate siting criteria.

b. Implementation: This action relates only to applicants for construction permits filed after the proposed rule is adopted.

c. Resources: Requires no substantial change.

2. Site evaluation of existing facilities: No applicant or licensee action is required prior to the start of review of past siting decisions (which is not included in this action item).

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

E. <u>REFERENCES</u>

President's Commission Report: Item A.6

Other: NUREG-0625
NUREG/CR-1250, Vol. I, pp. 129-131; Vol. II, Part 3, pp. 989, 1027.
Letter from Chairman, ACRS, to Chairman, NRC, dated December 17, 1979, Subject: "A Review of NRC Regulatory Processes and Functions"
Letter from Chairman, ACRS, to Chairman, NRC, dated February 14, 1980, Subject: "Report of the Siting Policy Task Force."

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.

B. NRC ACTIONS

1. Reactor coolant system vents.

a. Description: NRR will require (1) the installation of high-point reactor coolant system and reactor vessel head vents that are remotely operable from the control room; (2) analysis of loss-of-coolant accidents initiated by a break in the vent pipe; and (3) analyses demonstrating that direct venting of noncondensable gases with perhaps a high hydrogen concentration limit does not result in violation of combustible gas concentration limits in the containment structure. The vents are to provide the ability to deal effectively with the unexpected presence of noncondensable gases in the reactor vessel and primary coolant system, particularly in quantities that could interfere with coolant flow and distribution, by establishing a safe vent path. IE will inspect implementation.

b. Schedule: Requirements for reactor coolant system vents were issued to (1) operating reactor licensees in NRR letters dated September 13 and October 30, 1979; (2) operating license applicants in NRR letters dated September 27 and November 9, 1979; (3) licensees of plants under construction in NRR letters dated October 10 and November 9, 1979; and (4) construction permit applicants in NRR letters dated October 10 and November 9, 1979.

c. Resources: NRR FY80 - 1.7 my, FY81 - 0.7 my and $75,000; IE FY80 - 0.25 my, FY81 - 0.5 my, ADM FY80 - 0.2 my and $7,000.

2. Plant shielding to provide access to vital areas and protect safety equipment for postaccident operation.

a. Description: NRR will require (1) a radiation and shielding design review of spaces around systems in which personnel occupancy may be unduly limited or safety equipment may be unduly degraded by radiation during operation following an accident resulting in a degraded core and (2) implementation of identified plant modifications that will permit access to vital areas and protect safety equipment. IE will inspect implementation.

b. Schedule: Requirements were issued to (1) operating reactor licensees in NRR letters dated September 13 and October 30, 1979; (2) operating license applicants in NRR letters dated September 27 and November 9, 1979; (3) licensees of plants under construction in NRR letters dated October 10 and November 9, 1979; and (4) construction permit applicants in NRR letters dated October 10 and November 9, 1979. SD will issue the regulatory guide for comment by March 1981.

c. Resources: NRR FY80 - 1.6 my and $165,000, FY81 - 0.8 my and $90,000; IE FY80 - 0.2 my, FY81 - 0.3 my; SD FY80 - 0.3 my, FY81 - 0.5 my; ADM FY80 - 0.1 my and $5,000, FY 81 - 0.1 my and $5,000.

3. Postaccident 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; (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;

and (3) procedures for obtaining and analyzing these samples with existing equipment. IE will inspect implementation. SD will revise Regulatory Guide 1.21 by October 1, 1980.

b. Schedule: Requirements were issued to (1) operating reactor licensees in NRR letters dated September 13 and October 30, 1979; (2) operating license applicants in NRR letters dated September 27 and November 9, 1979; (3) licensees of plants under construction in NRR letters dated October 10 and November 9, 1979; and (4) construction permit applicants in NRR letters dated October 10 and November 9, 1979.

c. Resources: NRR FY80 - 1.25 my and $120,000, FY81 - 0.5 my and $95,000; IE FY80 - 0.5 my, FY81 - 0.5 my; SD FY80 - 0.3 my, FY81 - 0.3 my; ADM FY80 - $5,000.

4. Training for mitigating core damage.

Description: NRR will require that a training program be developed to instruct all operating personnel in the use of safety and nonsafety systems to control and mitigate accidents in which the core may be severely damaged. The program emphasis will be on recognizing symptoms and dealing with them by using a selection of systems and methods rather than attempting to diagnose the transient or condition and using a single prescriptive procedure. The objective is for the operator to prevent the accident from proceeding any further, regardless of the present plant condition. The program should emphasize a total knowledge of all instruments, equipment and systems that can be used to implement basic safety functions. NRR will not review the plant-specific training program, but IE will inspect the revised training program. See also Table C.1, item 14.

b. Schedule: NRR will establish requirements and guidelines by October 1, 1980. Requirements to train licensed operators were contained in letters to all licensees dated March 28, 1980 (see item I.A.2.1, above).

c. Resources: NRR FY80 - 0.5 my; IE FY80 - 0.35 my, FY81 - 0.3 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 oxidation and 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 these areas 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. Complementary efforts conducted within NRR will address specific licensing issues related to the subject research. 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 FY82 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 heating and cooling rates on damage to the bundle, rod fragmentation, distortion, and debris formation. 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 understanding of the formation of hydrogen in a reactor from metal-water reactions, radiolytic decomposition of coolant, and corrosion of metals, 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, (4) a study of the effects of hydrogen embrittlement on reactor vessel materials, and (5) a review of means of handling accident-generated hydrogen, with recommendations on improving current methods.

(c) Studies of postaccident 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 postaccident 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, oxidation and 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 semipermanent 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. The loading and structural response associated with hydrogen explosions in the containment will also be studied.

(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.

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 FY82. 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 FY81. A large fuel-melt test facility should begin operation in FY80. Milestones to be achieved in FY81 and FY82 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 FY80 - 4.5 my and $8,4000,000, FY81 - 7.3 my and $12,915,000.

6. Risk reduction for operating reactors at sites with high population densities.

a. Description: To ensure that the public health and safety is adequately protected, NRC is undertaking a review of operating reactors located in areas of high population density to determine what additional measures and/or design changes can and should be implemented that will further reduce the probability of a severe reactor accident and will reduce the consequences of such an accident by reducing the amount of radioactive releases and/or by delaying any radioactive releases, and thereby provide additional time for evacuation near the sites.

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, full-pressure residual heat removal system, "bunkered" emergency decay-heat removal system, and hydrogen control measures. Pursuant to item (3) the licensees will be examining and performing conceptual design studies to determine if any of these features or a combination of them could be employed in these plants to mitigate the effects of core degradation and core melt accidents. In parallel to the licensee effort, the staff will be studying and examining these features in order to establish design criteria and bases, as well as performance or reliability requirements. The initial program applies to the two operating nuclear power plant sites listed above. Severe accident mitigation features for operating reactors at other sites, whether close to areas of relatively high population density or not, will be covered by item II.B.8 below.

b. Schedule: The NRC staff issued on February 11, 1980 a set of Confirmatory Orders requiring that a number of interim measures should be taken to assure continued safe operation of Indian Point Units 2 and 3. These measures are to be implemented by the licensees at various time intervals, as specified in the order. Additional design changes, such as a vented, filtered containment atmospheric release system, core-retention devices and hydrogen control measures are being examined for later implementation. Similar confirmatory orders will be issued for Zion Units 1 and 2 in March 1980. NRR will provide a set of (1) preliminary design criteria and bases and (2) performance requirements for the design of severe accident mitigation features by April 15, 1980 and a more complete set by July 15, 1980. NRR will complete its review of licensee designs by December 31, 1980.

c. Resources: NRR FY80 - 4 my, $75,000, FY81 - 3 my, $150,000; IE FY80 - 0.5 my, FY81 - 1.6 my; RES FY80 - 1.5 my.

7. Analysis of hydrogen control.

a. Description: Certain LWR containment structures having small volumes 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. See also Table C.1, item 14.

b. Schedule: In Commission papers (SECY-80-107 and -80-107A) the staff discussed interim hydrogen control requirements for small containments structures, such as BWR Mark I and II, and the bases for continued operation and licensing of nuclear plants pending the rulemaking proceeding in item II.B.8, below.

A rulemaking is being prepared that, in part, will establish hydrogen control measures to deal with accident conditions involving large amounts of hydrogen generation in all types of containment structures. The proposal will be sent to the Commission soon (see item II.B.8).

c. Resources: NRR FY80 - 1.2 my; SD FY80 - 0.2 my.

8. Rulemaking proceeding on degraded-core accidents.

a. Description: NRC will conduct a rulemaking on consideration of degraded or melted cores in safety reviews to solicit comments on the issues and facts relating to procedures, interim requirements and design features necessary to deal effectively with degraded-core and core-melt accidents and to mitigate the consequences. Specific areas for comment will include, but not be limited to, the objectives, as well as the characteristics and effectiveness, of possible design features to cope with and mitigate the consequences of these types of accidents; additional and supplemental means of preventing core damage or core-melt accidents through improved engineered safety features; the probabilities and consequences of the various sequences of events that could cause the release of significant amounts of radioactivity to the environment; the expected effectiveness and performance of suggested means to reduce the consequences of such events; and the possible modification of other requirements, particularly those for siting, emergency plans and procedures, if such design features were required.

The first steps in the proceeding will be the issuance of an advance notice of rulemaking and an Interim Rule. The second step will be a long-term rulemaking. Comments from interested persons and/or parties will be invited on the interim rule and on the final rule.

In the development of the interim rule, the following matters are being considered: (1) providing an inert atmosphere for all Mark I and II BWRs, (2) installing high-point reactor coolant system and reactor vessel head vents, (3) providing additional plant shielding, as needed, (4) improving postaccident sampling requirements, (5) augmenting present training for operating personnel to include training to control and mitigate an accident in which the core is severely damaged, (6) developing criteria for leakage monitoring and control of highly radioactive fluids, (7) providing (a) additional accident monitoring instrumentation to measure containment pressure, containment water level, containment hydrogen concentration, containment radiation intensity, and plant radioactive effluents, (b) providing equipment to detect and aid in recovery planning from conditions leading to inadequate core cooling, such as status of coolant level in the reactor vessel or the existence of core voiding, and (c) providing instruments for monitoring accident conditions involving a source term typical of a severely damaged core and capability of the instruments to survive the accident environment (see revised Regulatory Guide 1.97, item II.F.3, below), and (8) determining the need for addition of hydrogen recombiner capability.

In developing the interim rule the Commission will consider whether, in the course of the long-term rulemaking, all licensees holding construction permits or operating licenses should be required by the interim rule to provide conceptual designs for (1) filtered, vented containment, (2) a core-retention system, or (3) a hydrogen control system for their plants. It is intended that NRC would, in parallel, perform analyses of conceptual designs to include achievable safety improvements; additional introduced hazards, if any; the design basis; reliability requirements; and proposed cost and schedule. This NRR conceptual design program will be initiated to establish design criteria and reliability requirements and to provide feedback to related RES research programs.

The long-term rulemaking will go beyond the interim rule and include consideration of (1) the use of filtered-vented containment systems to mitigate the consequences of core-degraded and core-melt accidents, (2) hydrogen control measures to deal with accident conditions involving large amounts of hydrogen generation in BWR pressure-suppression containment structures, ice condenser, and subatmospheric and dry containment structures in PWR plants, (3) core-retention devices, (4) reexamination of design criteria for decay heat removal, radwaste and other related sytems, such as the makeup and purification systems, so that they can perform their functions under degraded-core conditions, (5) plans and other preparation for postaccident recovery, (6) criteria for locating highly radioactive systems (e.g., should they be in isolated buildings), and (7) effects of an accident in a reactor plant on an adjacent plant in a multiple reactor site. In addition a number of other TMI-related studies will be coordinated, and, as appropriate, factored into this long-term rulemaking activity. These other studies are (1) evaluation of radwaste system design features to aid in accident recovery and decontamination, (2) provision of a ventilation system outside the containment structure, (3) large-volume noble-gas recovery or delay systems (see item III.D.1), and (4) liquid-pathway radiological control (item III.D.2.3). Also, the research described in item II.B.5, above, will be coordinated with the long-term rulemaking.

In the course of development of the long-term rulemaking, NRC will initiate a comprehensive review and evaluation of all the related regulations and regulatory guides to assure that degraded-core cooling is considered and applied in a uniform and consistent manner in all affected areas. It is estimated that as many as 40 regulatory guides and 5 different areas of the regulations may have to be revised to achieve a consistent regulatory approach.

b. Schedule: NRC will publish an interim rule and an advanced notice of rulemaking by July 1980 and will publish a final rule two or more years later, depending upon public comments, the course of research and design studies, and the possible need for a hearing.

c. Resources: SD FY80 - 2.0 my, FY81 - 7.0 my; NRR FY80 - 1.5 my, $250,000, FY81 - 3.0 my, $375,000; ADM FY81 - 0.6 my and $455,000; RES FY80 - 0.4 my, FY81 - 1.0 my.

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 head 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.

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 postaccident 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.

c. Resources: 1.0 my and $50,000 per plant.

3. Postaccident 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.

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 January 1, 1981 and implement the training program, based on NRR requirements, by April 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.

c. Resources: 1.2 my and $50,000 for development of initial training program.

5. Research on phenomena associated with core degradation and fuel melting: No licensee action is required.

6. Risk reduction for operating 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 were required to submit the results of their evaluations to the NRC staff by February 20, 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. Analysis of hydrogen control.

a. Description: No licensee action is required.

8. Rulemaking proceeding on degraded-core accidents.

a. Description: Licensees will be required to address the feasibility of mitigating features arising from severe accident considerations, including the conduct of conceptual designs for filtered, vented containment, core-retention and hydrogen control systems. It is expected that licensees will address the issues through owners' groups.

b. Implementation: As ordered.

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.5.2.) Conceptual designs: 100 my industry total to study these concepts.

D. <u>OTHER ACTIONS</u>

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. Risk reduction for operating reactors at sites with high population densities: None.

7. Analysis of hydrogen control: None.

8. Rulemaking proceeding on degraded-core accidents: 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.

E. REFERENCES

President's Commission Report: Items A.6, A.7, C.3.c, D.2, D.4, D.4.b, D.4.c(i) and D.4.d

President's Response dated December 17, 1979: Proposal D.1.e.

Other: NUREG-0578, Secs. 2.1.5(a)(b)(c); 2.1.6(a)(b); 2.1.8(a)(b)(c)

NUREG-0585, Recommendations 1.2 and 10

NUREG-0616, Recommendation 2.6.1.5

NUREG/CR-1250, Vol. I, pp. 105, 133, and 151; Vol. II, Part 1, p. 105, Part 2, pp. 368, 411, 448, 460, 462, and 612, Part 3, pp. 834 and 1027.

Letter from Chairman, ACRS, to Chairman, NRC, dated March 21, 1979, Subject: "Status of Generic Items Relating to LWR's: Report No. 7"

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2."

Letter from Chairman, ACRS, to Chairman, NRC, dated August 13, 1979, Subject: "Short-Term Recommendations of TMI-2 Lessons Learned Task Force"

Letter from Chairman, ACRS, to Commissioner Bradford, NRC, dated December 13, 1979, Subject: "Identification of NRC Regulatory Requirements Which Need Changing"

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

Letter from Chairman, ACRS, to Chairman, NRC, dated, April 7, 1979, Subject: "Interim Report on Recent Accident at the Three Mile Island Nuclear Station Unit 2"

Letter from Chairman, ACRS, to Chairman, NRC, dated, December 17, 1979, Subject: "A Review of NRC Regulatory Processes and Functions"

Letter from Chairman, ACRS, to Chairman, NRC, dated, March 11, 1980, Subject: "ACRS Report on NTOL Items From Draft 3 of NUREG-0660, NRC Action Plans Developed as a Result of the TMI-2 Accident"

Memorandum from J. M. Allan, Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendations C.1.a, C.1.c, C.1.e, C.2.c.

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for Long-Term TMI Improvements and/or For Other Other Power Reactor Sites," Recommendations 10, 18, 32, 35, 36, 50-52.

TASK II.C 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 NRC, its contractors, and 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. These will all lead to an improved basis for the licensing review process.

Either directly through the projects described here or in activities deriving from them, reliability requirements and the single-failure criterion will be improved. 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 items 1 and 2, below, was conceived to obtain the most significant safety benefits of reliability evaluation on all these plants over the next few years using available resources in government and industry.

In many respects the quantitative IREP program has much in common with the Systems Interaction (SI) program described in item 3, 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 4 below).

B. NRC ACTIONS

1. Interim Reliability Evaluation Program (IREP).

a. Description: 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 a few selected operating reactors. 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. Initiating events will include a wide range of transient and LOCA events. In this 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 (PWR), reactor core isolation cooling system (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).

The initial IREP will consist of a 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. The IREP continuation, described in item 2, below, will be an integrated study of the remaining operating plants. The program is directed toward expanding the number of people competent to use or evaluate these analytical techniques as rapidly or possible. As part of the program, standard instruction manuals for these techniques and for failure-rate data collection and analysis are being developed. These manuals will facilitate use of the techniques by reactor owners and their contractors.

Following the pilot study, the six plant study, and at annual intervals thereafter (for the duration of the total 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.

In addition, the availability of risk-assessment analyses for so many plants and systems should provide a basis for evaluating additional improvements in present licensing review methods and requirements. Examples of improvements in the Standard Review Plan that might be found from this examination are: (a) extension of the scope of applicability of safety system design requirements, (b) the consideration of requiring engineered safety features actuation signals that automatically remove components and systems important to safety from off-normal position and place them back to normal alignment for safety actuation, and (c) requirements for analyses to determine the consequences of inadvertent interruption of engineered safety feature operation from loss of power during a transient or accident mitigation sequence. These examples of areas deserving consideration were recommended by the NRC Special Inquiry Group. The IREP studies will also consider certain items recommended by the Bulletin and Orders Task Force; such as, power-operated relief valve (PORV) reliability and functional requirements (see Table C.3, items 4, 8, 33, and 48). These same studies might ultimately provide a basis for reevaluation and change of the design-basis accident approach used in licensing.

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.

b. Schedule: The first IREP plant study (Crystal River Unit 3) is currently under way and will be completed by May 1980. Six teams consisting of RES, NRR and contractor analysts will then perform IREP studies in parallel on six stations. Selection of the six plants will be made by the end of April 1980. These studies will begin in May 1980 and will be completed in March 1981.

Initial draft recommendations based on the generic IREP findings are to be available in July 1980 after the pilot study and in May 1981 after the six-plant study. Regulatory evaluation and requirements for implementation of the generic findings of the pilot study will be completed in September 1980 and in October 1981 for the six-plant study.

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, May 1980; six-plant study, March 1981).

c. Resources: conduct of pilot study: RES FY80 - 2 my and $575,000; conduct of six-plant study: RES FY80 - 3.5 my and $1,200,000, FY81 - 2.5 my and $1,000,000; NRR FY80 - 3.0 my, FY81 - 3.0 my; ADM FY80 - 3.0 my and $167,000, FY81 - 3.0 my and $680,000.

2. Continuation of IREP.

a. Description: Following completion of the initial Interim Reliability Evaluation Program (described in item 1, above), IREP studies on all remaining operating reactors will be initiated, with the goal being to complete these studies in 1983. The details of this implementation will be based on the results of the preceding studies and decisions to be made about division of the work between NRC and industry. During the initial IREP studies, discussions will be held with reactor owners and industry groups to explore possible efforts by industry in IREP-like studies on an expedited bases. 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. Consideration will also be given to expanding the coverage of IREP to include plants under construction, in which the design is sufficiently final to allow a meaningful evaluation (i.e., applicant for an operating license or well-developed standardized designs). A Commission paper will be prepared, with discussion of these alternatives, to recommend the approach to be used for the continuation of the IREP program, as well as the breadth of coverage.

b. Schedule: A Commission paper on the approach to be used in the continuation of the IREP program will be prepared in October 1980.

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

3. Systems interaction.

a. Description: The purpose of this action is to coordinate and expand ongoing staff work on systems interaction (Unresolved Safety Issue USI A-17) so as to incorporate it into an integrated plan for addressing the broader question of system reliability in conjunction with IREP and other efforts. Phase I of the USI A-17 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 by Sandia under contract to NRC and is being applied to a reference plant. This technique addresses interactions that could compromise the subcriticality function, the shutdown cooling function, or the integrity of the reactor coolant pressure boundary. There is some overlap of this effort with the IREP described in the preceding section. As these programs go forward, there will be a conscious effort to coordinate these activities, including possible combination of resources, to eliminate unnecessary duplication. See also Table C.3, item 4).

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 by NRR 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. Ultimately, a regulatory guide will be developed by SD to provide the NRC position on application of systems interaction methodology.

A plan is being prepared by NRR for discussion with ACRS to implement a two-part alternative approach proposed by ACRS to a systems interaction study for Indian Point Unit 3. First, a failure modes and effects analysis (FMEA) will 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 will be conducted to look for potential systems interaction due to failure of systems in close proximity to safety systems; for example, pipe break effects.

Another type of systems interaction study has been required by the NRR staff on the Diablo Canyon docket as a result of review of the TMI accident. The NRR staff has required the applicant to evaluate, for a severe earthquake at Diablo Canyon, the overall effects on safety system function of failure of nonseismic equipment, components and structures.

Upon completion of these three alternate systems interaction approaches, the lessons learned will be factored into decisions on the implementation of item 2, above.

b. Schedule: Phase I of the systems interaction study (USI A-17) was completed in January 1980. By June 1980 procedures are to be developed for broad application of the systems-interaction methodology developed in Phase I. Requirements for modifications emanating from the studies in USI A-17 will be issued by August 1980 and followed by a draft regulatory guide in December 1980 which will be effective in June 1981.

The alternative approach being followed on Indian Point 3 pursuant to ACRS advice is being studied.

The seismic effects study of Diablo Canyon should be completed prior to full-power operation.

c. Resources: NRR FY80 - 3.9 my and $360,000, FY81 - 1.5 my; IE FY81 - 1.0 my; SD FY80 - 0.4 my, FY81 - 0.2 my; RES FY80 - 0.3 my; ADM FY80 - 0.1 my and $17,000, FY81 - 0.1 my and $12,000.

4. 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 by NRR to apply reliability engineering practices to nuclear plant activities on a comprehensive and consistent basis.

Specifications will be developed by NRR for acceptable reliability assurance programs to be implemented by operating license holders, construction permit holders, and future construction permit applicants. The role of applicant-supplied probabilistic safety or reliability analysis in future safety analysis reports will be defined in this program. Ultimately, reliability assurance program requirements will be promulgated by SD in a new regulatory guide.

b. Schedule: Initiate NRC work in FY 1982 or later, depending on resource availability.

c. Resources: First year, NRR - 1.0 my, SD - 0.3 my, RES - 0.2 my; second year, NRR - 0.5 my, SD - 0.3 my, RES - 0.1 my.

C. <u>LICENSEE ACTIONS</u>

1. Interim Reliability Evaluation Program (IREP).

a. Description: 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.

NSSS vendors will also 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 licensee actions will be required at the same time as the NRC IREP studies and subsequent to the issue of licensing orders based on IREP findings.

c. Resources: Up to 3 mm for Crystal River study.

2. Continuation of IREP.

a. Description: No direct license action is required for preparation of the Commission paper on the approach to be used with regard to who will perform the continuation of IREP beyond the six-plant study. Licensee involvement in the evaluation of the remaining operating reactors may vary from that required for item 1, above, to direct participation in the actual IREP studies.

3. Systems interaction.

a. Description: Requirements will be placed on licensees 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 to a systems interaction study is to be performed for the Indian Point 3 Plant. First, a failure modes and effects analysis (FMEA) will be conducted, and then the plant will be inspected for potential systems interactions.

In a study of seismic effects, the Diablo Canyon applicant 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 on Indian Point 3 are to be completed by April 1, 1981.

The seismic effects study of Diablo Canyon is to be completed prior to full-power operation.

4. Reliability engineering.

a. Description: Applicants and operating license holders will be required to develop reliability assurance programs for NRC approval and implementation.

b. Implementation: The schedule will be defined in the reliability assurance specifications to be published in 1982, or later, depending on NRC resource availability.

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>: None.

E. REFERENCES

President's Commission Report: Items A.4.b, A.4.c(i), and D.4

Other: NUREG-0585, Recommendations 8 and 9

NUREG-0616, Recommendations 2.6.3.1, 2.6.3.5

NUREG/CR-1250, Vol. I, pp. 148, 150, 151; Vol. II, Part 1, pp. 24, 105, 138, 199, and Part 2, pp. 448, 463, 464, 466, 468, 471, and 486.

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on the Three Mile Island Nuclear Station Unit 2"

Letter from Chairman, ACRS, to Chairman, NRC, dated August 14, 1979. Subject "Studies to Improve Reactor Safety"

Letter from Chairman, ACRS, to Chairman, NRC, dated October 12, 1979, Subject: "Systems Interactions Study for Indian Point Nuclear Generation Unit No. 3"

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

Letter from Chairman, ACRS, to Chairman, NRC, dated March 11, 1980, Subject: "ACRS Report on NTOL Items From Draft 3 of NUREG-0660, NRC Action Plans Developed as a Result of the TMI-2 Accident"

Letter from Chairman, ACRS, to Chairman, NRC, dated April 17, 1980, Subject: "NUREG-0660, 'NRC Action Plans Developed as a Result of the TMI-2 Accident,' Draft 3"

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendation B.2.C.

TASK II.D REACTOR COOLANT SYSTEM RELIEF AND SAFETY VALVES

A. OBJECTIVE: Demonstrate by testing and analysis that the relief and safety valves, block valves and associated piping in the reactor coolant system are 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, design changes or modifications will be made that are necessary to provide positive indication of valve position.

B. NRC ACTIONS

1. Testing requirements.

a. Description: On September 12, 1979, all operating plant licensees were issued the NRR near-term operating license requirement to meet the testing portion of the objective. 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. A letter to the GE Owners' Group was sent on November 14, 1979 reiterating the requirement for qualification testing for BWR plants. NRR will review licensee submissions (most likely to be an EPRI generic program) and require changes, as needed. Following conclusion 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 2, below. NRR and SD will explore the feasibility of developing a new national standard or modifying an existing standard in contrast to a possible NRC initiative, to incorporate valve qualification requirements based on the results from this task.

b. Schedule: Testing requirements have been issued for PWRs and BWRs. Review of the proposed generic PWR test program will be completed by July 1, 1980. The schedule for testing BWR valves has not been developed. Inspection and research review will be performed in FY 1980 and FY 1981. Additional test requirements will be developed during or after completion of the generic test program, as necessary.

c. Resources: NRR FY80 - 0.9 my and $260,000, FY81 - 0.3 my; IE FY81 - 0.35 my; SD FY80 - 0.1 my, FY81 - 0.2 my.

2. Research on relief and safety valve test requirements.

a. Description: RES has contracted with the Idaho National Engineering Laboratory to act as a systems integrator to technically monitor and analyze the planned industry valve test and analytical program at EPRI and to 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 has 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 - 0.4 my and $150,000, FY81 - 1.2 my and $1,700,000.

3. Relief and safety valve position indication.

a. Description: The letters setting forth the testing requirements (item 1, above) also included the requirement for installing direct indication of relief and safety valve position in the control room to be derived from a reliable valve-position-detection device or a reliable indication of flow in the discharge pipe. NRR will review method. IE will inspect compliance with this requirement. See also Table C.1, item 16.

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.

c. Resources: IE FY80 - 0.1 my, FY81 - 0.25 my.

C. LICENSEE ACTIONS

1. Testing requirements.

a. Description: Licensees and their agents (probably EPRI contractors) will plan and carry out the test program and model development. The licensees will demonstrate applicability of the generic tests to their particular plants. 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: The PWR Owners' Group submitted a preliminary program description January 1, 1980. The final test matrix is scheduled to be completed by July 1, 1980. PWR operating reactor licensees and operating reactor applicants have agreed to the generic (EPRI) program, which must be completed by July 1, 1981.

c. Resources: FY80 - $5,000,000 to $10,000,000.

2. Research on relief and safety valve test requirements: No licensee action is required.

3. Relief and safety valve position indication.

a. Description: Licensees are installing devices for determining valve position. These may include acoustic monitoring devices, stem-position indicators, and flow indicators in the valve discharge pipe.

b. Implementation: Operating reactor licensees were required to complete installation by January 1, 1980, and operating license applicants prior to fuel loading.

c. Resources: $100,000 per plant.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: None

Other: NUREG-0578, Section 2.1.2 and 2.1.3a
NUREG/CR-1250, Vol. II, Part 2, p. 455.
Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendations C.1.a, C.1.c, C.7.d.

TASK II.E SYSTEM DESIGN

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 all operating plant licensees and operating license applicants to reevaluate their PWR plant auxiliary feedwater system. They are to (1) perform simplified 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 (see Volume 2 of NUREG-0645) 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. See also Table C.1, items 7 and 8, and Table C.2, items 1 and 8.

The same letters that were issued to operating Westinghouse (<u>W</u>) and Combustion Engineering (CE) plants requiring certain AFW system modification also requested 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 review and evaluate operating plant licensee responses to staff recommendations for improving AFWS reliability and requested information on AFWS flow design bases subsequent to 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 1982.

NRR will send requirements to applicants for operating licenses in March 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 licensing.

c. Resources: NRR FY80 - 3.0 my and $152,000, FY81 - 4.0 my and $112,000; IE FY80 - 0.4 my, FY81 - 0.4 my; RES FY80 - 0.3 my.

2. Auxiliary feedwater system automatic initiation and flow indication.

a. Description: NRR requires the installation of a control-grade system for automatic initiation of the auxiliary feedwater system that meets the single-failure criterion, is testable, and is powered from the emergency buses; and control-grade indication of auxiliary feedwater flow to each steam generator that is powered from emergency buses, in accordance with short-term lessons learned Recommendations 2.1.7.a and 2.1.7.b in NUREG-0578.

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 the containment structure (MSLBIC) and its effect on containment pressure design capability and return to reactor power. In March 1980, NRR issued a letter to all licensees informing them that NRC approval is no longer required prior to implementing modifications needed to meet control-grade requirements of 2.1.7.a. However, NRC review and approval of safety-grade system designs to meet the criteria of 2.1.7.a and 2.1.7.b are required. NRR will also review the PWR operating license applications to verify that the AFW system meets these recommendations. See also Table C.1, item 15, and Table C.2, items 1 and 8.

b. Schedule: Control-grade design to meet the criteria of 2.1.7.a is to be implemented by June 1980. The staff will complete its analysis of main steam-line breaks inside the containment structure to support licensee implementation of control-grade (short-term) AFW automatic initiation (2.1.7.a) by June 1980. By January 1981, the staff will complete its review of the operating plants with automatically initiated AFW systems to verify that these plants satisfy the safety-grade criteria of long-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.

NRR issued requirements to operating reactor licensees on September 13 and October 30, 1977, and to applicants for operating licenses on September 27 and November 9, 1979, 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 January 1, 1981.

c. Resources: NRR FY80 - 1.5 my and $80,000, FY81 - 1.0 my and $80,000, FY82 - 0.5 my, FY83 - 0.2 my, FY84 - 0.4 my; IE FY81 - 0.35 my.

3. Update Standard Review Plan and develop regulatory guide.

a. Description: NRR will update Standard Review Plan Section 10.4.9 and SD will issue a regulatory guide on auxiliary feedwater systems that will possibly endorse ANSI/ANS-51.10.

b. Schedule: This is a Decision Group D item. Therefore schedules and resources will be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

C. <u>LICENSEE ACTIONS</u>

1. Auxiliary feedwater system evaluation.

a. Description: Licensees of Westinghouse and Combustion Engineering plants are to respond to the staff requirements for short-term and long-term AFWS actions and provide information describing how the recommendations are being implemented. Also, they are to 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 are to 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 are to perform simplified reliability analyses of the AFW system and modify it as necessary.

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 1982. Applicants for operating licenses will be required to perform simplified reliability analyses and modify the AFW system as necessary prior to full-power operation.

c. Resources: 0 to $30,000 per plant ($600,000 total for the industry).

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. The remaining 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 in conformance with 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 January 1, 1981.

c. Resources: FY80 - 0.4 my per plant and $20,000 per plant.

3. Update Standard Review Plan and develop regulatory guide: This is a Decision Group D item.

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

E. REFERENCES

President's Commission Report: Item A.4.b.

Other: NUREG-0578, Sections 2.1.7.a and 2.1.7.b

NUREG/CR-1250, Vol. II, Part 2, p. 468.

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendations C.1.a, C.1.b, C.1.e.

TASK II.E.2 EMERGENCY CORE COOLING SYSTEM

A. OBJECTIVE: Decrease reliance on the emergency core cooling system (ECCS) for other than loss-of-coolant accidents; ensure that the ECCS design-basis reliability and performance are 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. Reliance on ECCS.

a. Description: NRR will instruct all operating reactor licensees 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. See also Table C.3, item 26.

b. Schedule: Initiate NRC work in FY82 or later, depending on resource availability.

c. Resources: First year: NRR - 1 my, IE - 0.7 my; second year: NRR 0.5 my, IE - 0.7 my.

2. Research on small-break LOCAs and anomalous transients.

a. Description: This research focuses on small breaks and transients. It includes experimental research in the loss of fluid test (LOFT) facility, systems engineering, and materials effects programs, as well as analytical methods development and assessment in the code development program.

The LOFT test series for FY 1980 has been reordered to include three small-break experiments and three operational transients. In addition, an electronics package with CRT display has been installed on LOFT to provide instant information display for the operators that will allow rapid diagnosis of an accident. This equipment was installed to evaluate its potential for installation on commercial nuclear plants to help the operators diagnose plant upset conditions.

The Semiscale facility small-break test series will provide experimental data on two-phase 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. Code model and nodalization assessment will be carried out on Semiscale and LOFT. System mass distribution, critical flow, depressurization, accumulator flow, pump two-phase performance and other system response effects are being tested against code predictions. LOFT test results are compared to Semiscale results to verify scaling. Both facilities will be used to provide information to NRR on pump-on vs. pump-off conditions during recovery from a small-break LOCA.

The ORNL blowdown heat transfer (BDHT) separate effects program will conduct tests in the thermal-hydraulic test facility to provide heat transfer and hydraulic information during a slow transient at high pressure with bundle uncovery and recovery.

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. It will be performing, to a limited degree, essentially the same assessment tasks for BWRs that are described above for LOFT and Semiscale for PWRs. Tests will be conducted with ECC on and off.

The FLECHT SEASET system effects test facility will be used to study modes of postaccident core cooling related to both small- and large-break transients, including natural circulation and small-break information in the solid, two-phase, and reflux boiling modes.

RES is coordinating plans with Japan and FRG for tests on small breaks, transients, flow blockage, and natural circulation. 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. Previous thermal-shock tests have been conducted without internal pressure, to simulate the large LOCA. The pressurized thermal-shock tests will provide a licensing basis for postulated material condition, flaw size and accident loads in small breaks.

Research on analytical methods development and assessment is directed toward improving current codes (see Table C.3, items 32 and 47) and development and application of advanced codes for small-break LOCA and other accident analyses and analyses of thermohydraulic phenomena in LWR plants in the presence of heavy core damage.

b. Schedule: For the LOFT facility, six 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; tests were begun in January 1980. 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: TRAC-PF1 - December 1980, TRAC-BF1 - December 1981, TRAC-PF2 - December 1981, and TRAC-BF2 - December 1982.

c. Resources (RES):

	FY80	FY81
LOFT (small-break and transient tests)	$39,300K	$29,500K
Separate effects and integral system tests (small breaks and transients)	9,500	11,700

Resources (continued):	FY 80	FY 81
Thermal-shock tests (internal pressure)	300	1,000
Analysis development (small breaks and transients)	3,900	3,600
Total RES Contractor	$53,000K	$45,800K
RES	8.2 my	8.0 my
Total NRR	0.3 my	0.5 my
Total ADM	$600K	$800K

3. Uncertainties in performance predictions.

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 or inaccuracies. It is necessary to establish that these assumptions or inaccuracies are properly accounted for in determining the acceptability of ECCS performance pursuant to Appendix K of 10 CFR Part 50. 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: Initiate NRC work in FY82 or later, depending on resource availability.

c. Resources: First year, NRR - 1 my, ADM FY80 - $100,000 computer cost.

C. LICENSEE ACTIONS

1. Reliance on ECCS.

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 at some time beyond 1982, depending on NRC schedule. No action is required for operating license applicants.

c. Resources: 0.3 my per plant.

2. Research on small-break LOCAs and anomalous transients: No licensee action is required.

3. Uncertainties in performance predictions.

a. Description: Holders of approved evaluation models will evaluate the uncertainty of small-break ECCS performance calculations.

b. Implementation: Licensees' evaluations will be completed on a schedule to be determined by NRC, but will be beyond 1982.

c. Resources: 15 my and $1,000,000 computer costs for industry total (based on five evaluation models to be assessed).

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items D.4 and D.4.a
President's Response dated December 7, 1979: Proposal D.1.e

Other: NUREG-0572
NUREG-0578, Sections 2.1.1 and 3.1
NUREG/CR-1250, Vol. II, Part 1, p. 199; Part 2, p. 456.
Letter from Chairman, ACRS, to Chairman, NRC, dated August 14, 1979, Subject: "Studies to Improve Reactor Safety"
Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979,

Subject: "Interim Report No. 2 on Three Mile Island Nuclear Station Unit 2"

Letter from R. Fraley, ACRS, to Commissioners, NRC, dated April 18, 1979, Subject: "Recommendations of the NRC ACRS Regarding the March 28, 1979 Accident at the Three Mile Island Nuclear Station Unit 2"

Letter from Chairman, ACRS, to Chairman, NRC, dated April 7, 1979, Subject: "Interim Report on Reactor Accident at the Three Mile Island Nuclear Station Unit 2"

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 postaccident conditions.

B. NRC ACTIONS

1. Reliability of power supplies for natural circulation.

a. Description: NRR issued requirements for (1) upgrading the pressurizer heater power supply and associated motive and control power interfaces sufficient to establish and maintain natural circulation in hot standby conditions, 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: 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. NRC completed its review of operating reactors by December 21, 1979. NRC review of operating licenses will be completed prior to full-power operation.

c. Resources: NRR FY80 - 0.1 my staff, FY81 - 0.1 my; IE FY80 - 0.1 my, FY81 - 0.1 my.

2. Systems reliability.

a. Description: NRR will conduct a generic study to assess the capability and reliability of 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 1982.

c. Resources: NRR FY80 - 0.3 my, FY81 - 0.3 my and $75,000; RES FY81 - 0.1 my.

3. Coordinated study of shutdown heat removal requirements.

a. Description: A coordinated effort to evaluate shutdown heat removal requirements in a comprehensive manner is required, thereby permitting a judgment of adequacy in terms of overall system requirements. As part of this effort, NRR will conduct a study to assess the desirability of and possible requirement for a diverse heat-removal path, such as feed and bleed, particularly if all secondary-side cooling is unavailable. The NRC staff will work with the recently established ACRS Ad Hoc Subcommittee on this matter to develop a mutually acceptable overall study program. See also Table C.3, item 8.

b. Schedule: Study to be completed by January 1, 1981.

c. Resources: NRR FY80 - 0.1 my.

4. Alternate concepts research.

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: This is a Decision Group D item. Therefore schedules and resources will be developed in connection with agency budgetary processes.

c. Resources: See "Schedule" above.

5. Regulatory Guide.

a. Description: SD will issue Revision 1 of Regulatory Guide 1.139, "Guidance for Residual Heat Removal to Achieve and Maintain Cold Shutdown," which includes requirements for reaching cold shutdown using safety-grade equipment. The experience from the accident at TMI-2 (i.e., the effect of a highly radioactive source on system functional requirements, noncondensibles, core debris, leakage, etc.) and its effect on RHR design will not be treated in this revision. These effects are to be considered in the context of the interim and final rulemaking on degraded or melted core conditions, as appropriate; see item II.B.8.

b. Schedule: This is a Decision Group D item. Therefore schedules and resources will be developed in connection with agency budgetary processes.

c. Resources: See "Schedule" above.

C. <u>LICENSEE ACTIONS</u>

1. Reliability of power supplies for natural circulation.

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. Systems reliability: No licensee action is required.

3. Studies of feed and bleed decay heat removal: No licensee action is required.

4. Alternate concepts research: No licensee action is required.

5. Regulatory Guide: No licensee action is required.

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

E. <u>REFERENCES</u>

President's Commission Report: Item D.4.a
President's Response dated December 7, 1979, Proposal D.1.e.

Other: NUREG-0578, Section 2.1.1
NUREG/CR-1250, Vol. II, Part 2, p. 471.
Memo from Director, NRR, to R. Fraley, ACRS, dated September 7, 1979, Subject: "Requirements for Shutdown and Decay Heat Removal Using Safety-Grade Equipment"
Letter from Chairman, ACRS, to Chairman, NRC, dated August 14, 1979, Subject: "Studies to Improve Reactor Safety"
Letter from Chairman, ACRS, to Chairman, NRC, dated March 11, 1980, Subject: "ACRS Report on NTOL Items from Draft 3 of NUREG-0660, NRC Action Plan Developed as a Result of the TMI-2 Accident."
Letter from R. Fraley, ACRS, to Commissioners, NRC, dated April 18, 1979. Subject: "Recommendations of the NRC ACRS Regarding the March 28, 1979 Accident at the Three Mile Island Nuclear Station Unit 2"
Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 2 on Three Mile Island Nuclear Station Unit 2"
Letter from Chairman, ACRS, to Chairman, NRC, dated December 13, 1979, Subject: "Report on TMI-2 Lessons Learned Task Force Final Report."
Letter from Chairman, ACRS, to Chairman, NRC, dated April 17, 1980, Subject: "NUREG-0660, NRC Action Plans Developed as a Result of the TMI-2 Accident, Draft 3"

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendation C.1.c.

TASK II.E.4 CONTAINMENT DESIGN

A. OBJECTIVE: 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.

B. NRC ACTIONS

1. Dedicated penetrations.

a. Description: NRR will require that (1) the procedures for the use of combustible gas control systems following an accident resulting in a degraded core and release of radioactivity to the containment be reviewed and revised, if necessary, and (2) 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 violating single-failure criteria, such as having to open large containment purging ducts or otherwise jeopardize the containment function. IE will review the implementation. See also Table C.1, item 14.

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. 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 its review of implementation by July 1981.

c. Resources: NRR FY80 - 0.5 my, FY81 - 0.5 my; IE FY80 - 0.25 my, FY81 - 0.45 my.

2. 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) provide containment isolation on diverse signals in conformance with Section 6.2.4 of the Standard Review Plan, review isolation provisions for nonessential systems and revise as necessary, and modify isolation designs as required to eliminate the potential for inadvertent reopening upon reset of the isolation signal; (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.

NRR will issue instructions to licensees requiring that the setpoint pressure for the signal that initiates containment isolation be reduced to the minimum compatible with normal operating conditions. Requirements for three diverse containment isolation signals (i.e., ESF actuation, containment pressure and containment radiation) will be issued in Revision 1 to Regulatory Guide 1.141. See also Table C.1, items 6 and 9.

b. Schedule: Letters requiring licensees of operating reactors to include provisions for items 1 and 2 were issued on September 13, October 15, and October 30, 1979. Requirements for item (3) above will be issued by March 1, 1980. Letters requiring applicants for operating licenses to include provisions for items (1) and (2) were issued on September 27 and November 9, 1979. Requirements for applicants for operating licenses to have provisions for item (3) above, will be issued in March 1980. Similar notices to construction permit holders and applicants discussing the three requirements will be issued in March 1980. NRR will issue a letter to all licensees requiring containment pressure setpoint changes by April 1, 1980. SD will issue Revision 1 to Regulatory Guide 1.141, "Containment Isolation Provisions for Fluid Systems," by July 1980. SD will issue Revision 2 to Regulatory Guide 1.141 to include the designation of essential versus nonessential systems by June 1981.

*Item II.3.f of Standard Review Plan Section 6.2.4 provides the staff's definition of "sealed closed" valves.

c. Resources: NRR FY80 - 2.0 my, FY81 - 1.0 my; IE FY80 - 0.4 my, FY81 - 0.35 my; SD FY80 - 0.3 my, FY81 - 0.40 my; ADM FY80 - $5,000, FY81 - $5,000.

3. Integrity check.

a. Description: NRR will issue requirement for a feasibility study to evaluate need and possible testing methods to ensure that there are no gross openings in the containment structure. Short-duration, low-pressure tests after each cold shutdown or periodic monitoring of containment pressure during operation are possible tests that should be evaluated. Based on results of the studies and NRR review, NRR will either issue appropriate criteria, require tests on one or two plants for demonstration purposes, and then issue final implementation criteria, or drop the proposed requirement.

b. Schedule: Initial NRC work in FY82 or beyond, depending on resource availability.

c. Resources: First year, NRR 0.5 my, second year, 1.0 my.

4. Purging.

a. Description: NRR has issued requirements on containment purging and venting limits, adequacy of valve performance, 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 from technical specification conditions through design-basis accidents.

(5) Issue modified purging and venting requirements based on results of studies above.

b. Schedule: NRR issued letters to licensees of operating plants on November 28, 1978; October 15, 1979; and September 27, 1979 requiring justification of purging, demonstration of valve performance, and guidance on valve operability. These requirements are in the SRP and letters were not issued to applicants. NRR will complete the generic evaluation of radiological consequences offsite by April 1980. Modified purging and venting requirements will be issued by December 1981.

c. Resources: NRR FY80 - 0.5 my and $50,000, FY81 - 1.0 my and $50,000.

C. <u>LICENSEE ACTIONS</u>

1. Dedicated penetrations.

a. Description: The licensee will modify and implement the design and review and revise procedures, as necessary.

b. Implementation: Operating reactors were to plan and commit by January 1, 1980 and to complete implementation by January 1, 1981. Applicants for operating licenses will provide designs and will review and revise procedures prior to fuel loading. They will implement the plans prior to full-power operation or January 1, 1981, whichever is later.

c. Resources: 0.2 my per reactor and minimal capital cost.

2. Isolation dependability.

a. Description: Licensees will evaluate present installations for isolation dependability and for purge valve closure on high airborne radiation signal and will modify present installations as needed. Licensees will review containment pressure setpoint and reduce, as necessary. They will also install high-radiation isolation-signal circuity.

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 are to complete their evaluations by June 1, 1980; operating reactors are to complete modifications by November 1, 1980. Applicants for operating licenses and construction permit holders are to complete before full-power operation. All plants will have reduced the containment-pressure setpoint for isolation by July 1, 1980 or before full-power operation, whichever is later. All plants will have installed high-radiation isolation circuity by July 1, 1981 or before full-power operation, whichever is later.

c. Resources: 1.0 my per plant and $350,000 per plant (average).

3. Integrity check.

a. Description: Licensees will perform feasibility studies of changes in procedures and special tests to ensure containment integrity.

b. Implementation: Feasibility study to be performed on a schedule determined by NRC.

c. Resources: 0-0.5 my and 0-$25,000 recurring cost per plant; 0-1.2 my and 0-$300,000 one-time cost per plant.

4. 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 were to 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 and $25,000 per plant. Items (4) and (5) not known.

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

E. <u>REFERENCES</u>

President's Commission Report: Items D.2 and D.4

Other: NUREG-0578, Sections 2.1.4 and 2.1.5(a and c)
NUREG/CR-1250, Vol. II, Part 2, p. 461.
Letter from Chairman, ACRS, to Chairman, NRC, dated March 11, 1980, Subject: "ACRS Report on NTOL Items from Draft 3 of NUREG-0660, NRC Action Plans Developed as a Result of the TMI-2 Accident"

Letter from Chairman, ACRS, to Chairman, NRC, dated August 14, 1979, Subject: "Studies from Chairman, ACRS, to Chairman, NRC, dated August 14, 1979, Subject: "Studies to Improve Reactor Safety."

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2"

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendations C.1.b, C.1.e.

TASK II.E.5 DESIGN SENSITIVITY OF B&W REACTORS

A. OBJECTIVE: Reduce the sensitivity of B&W plants to feedwater transients, with emphasis on the overcooling transients that have been observed at B&W operating plants.

B. NRC ACTIONS

1. Design evaluation.

a. Description: NRR has issued show-cause orders that require all holders of construction permits for B&W type reactors to (1) identify the most severe overcooling events (considering both anticipated transients and accidents) that could occur at the facility, (2) show in the light of the arrival rate of these events that the design criterion for the number of actuation cycles of the ECCS and RPS is adequate, (3) recommend changes to systems or procedures that would reduce primary system sensitivity. NRR will evaluate the proposed changes and direct applicants and licensees to make required changes. See also Table C.1, Item 19.

b. Schedule: Orders were issued to constuction permit holders on October 25, 1979. Responses have been received and are being reviewed. Requests for additional information will be sent by April 1, 1980. The staff evaluation will be completed by June 1, 1980. Requirements for changes in design or procedures will be sent to all licensees and applicants with B&W reactors by September 1980.

c. Resources: NRR FY80 - 2.5 my and $200,000.

2. B&W Reactor Transient Response Task Force.

a. Description: On March 12, 1980, NRR established a task force to provide a short-term assessment of the B&W operating plants in light of recent operating history and to recommend any additional licensing requirements which will assure satisfactory response to anticipated operational transients. The main areas of review were to include: sensitivity of response to and recovery from overcooling and undercooling transients; effects and consequences of malfunctions and failures in the Integrated Control System (ICS) and non-nuclear instrumentation (NNI); and effectiveness of ongoing actions of TMI-2 Lessons Learned and Bulletins and Orders Task Forces. Proposed implementation of final recommendations were to be based on risk-reduction potential. NRR will evaluate the proposed recommendation and direct applicants and licensees to make required changes.

b. Schedule: The draft report of the task force findings, NUREG-0667, was released on April 2, 1980. The final version of the report, including implementation recommendations, will be provided by May 1, 1980.

c. Resources: Resources included in Item II.E.5.1.

C. LICENSEE ACTIONS

1. Design evaluation.

a. Description: All licensee and construction permit holders will modify plants as required.

b. Implementation: Construction permit holders with B&W reactors have responded to the show-cause orders. All licensees and construction permit holders will be required to describe the design changes and provide implementation schedules by April 1, 1981 or before full-power operation, whichever is later.

c. Resources: 5.5 my per plant; capital expenditures are not yet determined.

2. B&W Reactor Transient Response Task Force: No licensee action is required at this time.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.4.b

Other: NUREG-0667 NUREG/CR-1250, Vol. II, Part 1, p. 199, Part 2, p. 454.
Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operation Team Recommendations-IE/TMI Unit 2 Investigation," Recommendation C.1.b.

TASK II.E.6 IN SITU TESTING OF VALVES

A. OBJECTIVE: Evaluate whether current requirements for valve testing provide adequate assurance of performance under design conditions.

B. NRC ACTIONS

1. Test adequacy study.

a. Description: NRR will contract for a study of the adequacy of valve testing in verifying valve function. The study will include a survey of current practices and requirements for the design, specification and qualification, preoperational, and surveillance testing of valves in safety-related systems, and a comparison of the tests with the performance requirements and specifications. Performance requirements that are not adequately verified by analysis or test will be identified. Recommendations for alternate means of verifying performance requirements will be proposed and evaluated.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTIONS

1. Test adequacy study: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: None

Other: NUREG/CR-1250, Vol. II, Part 2, p. 471.

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 needed 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 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; (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; and (6) improve requirements and guidance for classifying nuclear power plant instrumentation, control, and electrical equipment important to safety.

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 effluents from PWR steam safety and atmospheric-steam-dump valves. See also Table C.1, item 14.

b. Schedule: Requirements for additional accident monitoring instrumentation were submitted to (1) operating reactor licensees in NRR letters dated September 13 and October 30, 1979; (2) operating license applicants in NRR letters dated September 27 and November 9, 1979; (3) licensees of plants under construction in NRR letters dated October 10 and November 9, 1979; and (4) construction permit applicants in NRR letters dated October 10 and November 9, 1979. NRR will review and IE will audit the implementation.

c. Resources: NRR FY80 - 1.6 my and $130,000, FY81 - 1.2 my and $100,000; IE will incorporate the audit as part of routine inspection efforts; IE FY80 - 0.1 my, FY81 - 0.7 my; ADM FY80 - 0.1 my, FY81 - 0.1 my.

2. Identification of 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 primary coolant saturation meters in PWRs and unambiguous indicators of inadequate core cooling, such as status of coolant level in the reactor vessel. See also item I.D.5(4) and Table C.1, items 4d, 23 and 27, and Table C.3, item 6.

b. Schedule: Requirements for specific equipment were submitted to (1) operating reactor licensees in NRC letters dated September 13 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. NRR will review and IE will audit the implementation.

c. Resources: NRR FY80 - 2.4 my and $100,000, FY81 - 1.3 my and $100,000; IE FY80 - 0.1my, FY81 - 0.35 my.

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. Effective timing for implementation will consider other Action Plan requirements related to the Technical Support Center, control room upgrade, safety parameter console, system status monitoring, etc. See item I.D.5(4) and Table C.3, item 6.

b. Schedule: Draft Regulatory Guide 1.97 was issued for public comment on December 4, 1979. The Guide will be issued in effective form by October 1980. NRR will issue requirements for licensees and applicants to meet appropriate portions of the guide and will review their designs for conformance to the guide starting in FY1982. IE will audit the implementation.

c. Resources: NRR FY80 - 0.1 my, FY81 - 0.1 my; SD FY80 - 1.0 my, FY81 - 1.1 my; IE FY81 - 1.4 my.

4. Study of control and protective action design requirements.

a. Description: NRR will study the need to incorporate, in the Standard Review Plan, three specific recommendations concerning control and protective action made by the Special Inquiry Group, as follows: (1) automatic reactor protection actions should be derived from independent process variables; (2) automatic actions through coincidence of independent process variables should be limited for nonreactor protection functions; (3) control circuit components should be designed and periodically tested at expected degraded power supply conditions to ensure that they are capable of performing their intended function.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

5. Classification of instrumentation, control, and electrical equipment.

a. Description: SD, in conjunction with IEEE, will prepare a standard that will provide a classification approach for determining the applicability of design criteria and design requirements for nuclear power plant systems, based on the level of their importance to safety. The standard will set forth criteria for determining the level of importance to safety of the instrumentation, control, and electrical portions of nuclear power plant systems. Methods will be provided to determine the design basis for each of these systems and to determine the degree of applicability of the requirements of other standards to each of these systems, with such determination to be based on the level of importance to safety of each system.

SD will prepare a Regulatory Guide that will endorse, as appropriate, the IEEE standard development as described in the preceding paragraph. This effort may be used to judge the potential improvements that may be realized by similar efforts in the mechanical systems and structures area.

b. Schedule:

(1) A joint NRC/IEEE working group will be constituted by the end of April 1980 and the first working group meeting is planned for mid-May 1980.

(2) Drafts of a standard will be written, commented upon, and rewritten from May 1980 through September 1980, with a third draft expected to be available for IEEE management committee review by the end of September 1980.

(3) Assuming IEEE allows use of a draft IEEE standard as the basis for an NRC Regulatory Guide, the standard would be published for public comment along with the Regulatory Guide early in 1981.

(4) A draft Regulatory Guide will be issued in early 1981 with a final version published as soon as resolution of public comments allows.

c. Resources: SD FY80 - 0.4 my, FY81 - 1.0 my.

C. <u>LICENSEE ACTIONS</u>

1. Additional accident monitoring instrumentation.

a. Description: Licensees will replace or procure additional instrumentation to measure containment pressure, containment water level, containment hydrogen concentration, and containment radiation intensity (high range), and to monitor high-range effluents.

b. Implementation: Operating reactors will complete development of mathematical procedures for quantifying required information by January 1, 1980, and complete installation of instruments by January 1, 1981; applicants for operating licenses will complete procedures prior to fuel load and will also complete instrument installation 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: Except for the instrument to detect conditions with a potential that may lead to inadequate core cooling, operating reactors were to complete this work by January 1, 1980; applicants for operating licenses will complete before fuel loading. The instrument to detect inadequate core cooling will be installed by January 1, 1981.

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 $6,000,000 per plant, depending somewhat on the attention given to this area in the original design.

4. Study of control and protective action design requirements: No licensee action is required.

5. Classification of instrumentation, control, and electrical equipment: No licensee action is required.

D. OTHER ACTIONS: None.

1 through 4: None.

5. Classification of instrumentation, control, and electrical equipment: IEEE, in conjunction with NRC, will prepare a standard to provide a classification approach for instrumentation, control, and electrical equipment.

E. REFERENCES

President's Commission Report: Items A.4.b, A.4.c(ii), D.1, D.2, E.4.a (see item I.D for Control Room Design)

Other: NUREG-0578, Recommendations 2.1.3.b and 2.1.8.b
NUREG-0585, Recommendation 9

NUREG/CR-1250, Vol. I, p. 127; Vol. II, Part 1, p. 199, Part 2, pp. 429, 456, 464, and 486.

Letter from Chairman, ACRS, to Chairman, NRC, dated August 13, 1979, Subject: "Short-Term Recommendations of TMI-2 Lessons Learned Task Force"

Letter from Chairman, ACRS, to Chairman, NRC, dated August 14, 1979, Subject: "Studies to Improve Reactor Safety."

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 2 on Three Mile Island Nuclear Station Unit 2"

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2"

Letter from R. Fraley, ACRS, to Commissioners, NRC, dated April 18, 1979, Subject: "Recommendations of the NRC ACRS Regarding the March 28, 1979 Accident at the Three Mile Island Nuclear Station Unit 2"

Letter from Chairman, ACRS, to Chairman, NRC, dated April 7, 1979, Subject: "Interim Report on Recent Accident at the Three Mile Island Nuclear Station Unit 2"

Letter from Chairman, ACRS, to Chairman, NRC, dated April 17, 1980, Subject: "NUREG-0660, 'NRC Action Plans Developed as a Result of the TMI-2 Accident,' Draft 3"

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendations C.1.a, C.1.b, C.1.e, C.3.b.

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investgiation Team Recommendations for Long-Term TMI Improvements and/or For Other Power Reactor Sites," Recommendations 18, 19, 51.

TASK II.G ELECTRICAL POWER

A. OBJECTIVE: Increase the reliability and diversification of the electrical power supplies for certain 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 operating reactor licensees in NRR letters dated September 13, 1979 and October 30, 1979; operating license applicants in NRR letters dated September 27, 1979 and November 9, 1979; licensees of plants under construction and construction permit applicants in NRR letters dated October 10, 1979 and November 9, 1979.

c. Resources: NRR FY80 - 0.9 my, FY81 - 0.1 my; IE FY80 - 0.1 my, FY81 - 0.1 my.

C. LICENSEE ACTIONS

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 more than 50% built).

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: None

Other: NUREG-0578, Section 2.1.1
NUREG/CR-1250, Vol. II, Part 1, p. 199;
Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2."

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 postaccident 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) onsite 24-hour systems and health physics coverage; (2) preparation as required by 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) IE 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.

A special task force was appointed by the Commission to evaluate cleanup operations at TMI. The task force studied how these operations are currently being carried out, the rate at which they are being conducted, public health and safety aspects, and assessed plans for future activities. The task force was made up of senior level managers from various NRC offices. It completed its work by February 29, 1980. A number of improvements were made regarding NRC management of the TMI-2 activities as a result of this study. For example, NRR has established a TMI Program Office to direct and oversee NRC activities at the site.

b. Schedule: The current schedule is to issue a final environmental impact statement by December 1980. The licensee is expected to decontaminate the containment structure by FY82, remove the fuel by FY83, and complete decontamination of the reactor containment structure by FY83-84. The schedule may change significantly, however, 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.

c. Resources:

	Manpower (my)		Supplemental Funds	
	NRR	IE	NRR	IE
FY80	9	4.6	$1,500,000	$41,000
FY81	12	7.4	1,500,000	66,200

2. Obtain technical data on the conditions inside the TMI-2 containment structure.

a. Description: Pertinent technical information is to be obtained 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 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. The 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 non-destructive 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 - 0.5 my and $525,000, FY81 - 1.9 my and $1,185,000, FY82 - 3.0 my and $5,000,000, FY83 - 2.5 my and $4,000,000, FY84 - 2.0 my and $2,500,000.

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 goals will be met as cleanup and evaluation of technical data proceed between 1981 and 1984.

c. Resources: Resources are included in item II.H.1 above.

4. Determine impact of TMI on socioeconomic and real property values.

a. Description: RES is sponsoring the following studies: (1) 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 - 0.2 my and $70,000; FY81 - 0.1 my. (Studies initiated in FY79.)

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 estimates for cleanup and decontamination are about $300,000,000.

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 and real property values: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items D.6, G.5
President's Response dated December 7, 1979: Proposal D.1.g.

Other: Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2."

TASK II.J GENERAL IMPLICATIONS OF TMI FOR DESIGN AND CONSTRUCTION ACTIVITIES

TASK II.J.1 VENDOR INSPECTION 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 (LERs), deficiency reports from holders of construction permits and non-licensees and other relevant information (related to IREP; see item II.C.1).

b. Schedule: This is a Decision Group D item. Therefore schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

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: This is a Decision Group D item. Therefore schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

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 designated 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: This is a Decision Group D item. Therefore schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

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: This is a Decision Group D item. Therefore schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

C. <u>LICENSEE ACTIONS</u>: These are Decision Group D items.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.11.d
President's Response dated December 7, 1979

Other: NUREG/CR-1250, Vol. II, Part 1, p. 24.
Letter from Chairman, ACRS, to Chairman, NRC, dated April 17, 1980, Subject: "NUREG-0660, NRC Action Plans Developed as a Result of the TMI-2 Accident, Draft 3"
NUREG-0616, Recommendation 2.6.2.1(b)

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 construction inspection program.

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 followup of reported incident information, as applicable, from operating reactors (including TMI-2).

b. Schedule: IE will complete its revisions by June 1981.

c. Resources: IE FY80 - 1.0 my; FY81 - 0.5 my.

2. Increase emphasis on independent measurement in 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 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 these assessments 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 - 0.2 my.

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: This is a Decision Group D item. Therefore schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTIONS

1. Reorient construction inspection program: No licensee action is required.

2. Increase emphasis on independent measurement in construction inspection program. No licensee action is required.

3. Assign resident inspectors to all construction sites. This is a Decision Group D item.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.11.d
President's Response dated December 7, 1979: Proposal A.6.c.

Other: NUREG-0616, Recommendations 2.2.2, 2.6.2.2, 2.6.2.3, and 2.6.3.2, 2.6.3.3, 2.6.3.4

NUREG/CR-1250, Vol. I, p. 100.

TASK 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. These criteria will be developed as an inherent part of those criteria planned under item I.B.1.1, management for operations, and will consider results of studies to be conducted by NSAC and INPO.

Specific items relating to design and construction activities 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.

The sequences and timing for development of the criteria are documented in item I.B.1.1, parts (1) through (5). A new Regulatory Guide will be prepared to codify the criteria relating to design and construction (see next item, II.J.3.2).

b. Schedule: See item I.B.1.1, parts (1) through (5).

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 draft regulatory guide for comment by March 1, 1981, and a final regulatory guide by October 1981.

c. Resources: SD FY80 - 0.3 my, FY81 - 0.5 my; ADM FY81 - 0.1 my and $5,000.

C. <u>LICENSEE ACTIONS</u>

1. Organization and staffing to oversee design and construction.

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 decisionmaking 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.

b. Implementation: Same as Item I.B.1.1.

c. Resources: Included in Item I.B.1.1.

2. Issue regulatory guide. No licensee action is required.

D. <u>OTHER ACTIONS</u>: NSAC and INPO, in consultation with NRC, will perform appropriate studies to assist in the development of recommendations for NRC criteria.

E. REFERENCES

President's Commission Report: Items A.5, B.3, B.3.a
President's Response dated December 7, 1979: Proposal B.1.d

Other: Letter from Chairman, ACRS, to Chairman, NRC, dated August 14, 1979, Subject: "Studies to Improve Reactor Safety."

TASK II.J.4 REVISE DEFICIENCY REPORTING REQUIREMENTS

A. OBJECTIVE: To clarify deficiency reporting requirements to obtain uniform reporting and earlier identification and correction of problems.

B. NRC ACTIONS

1. Revise deficiency reporting requirements.

a. Description: NRC will improve, as necessary, the event-reporting requirements (10 CFR Part 50.55(e) for holders of construction permits and Part 21) to assure that all reportable items are reported promptly and that information submitted is complete. Improvements will be implemented by rule changes as appropriate and coordinated with those made under Task I.E.6. 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 draft proposed changes to Part 50.55(e) by April 1980. SD will process and issue an amended Part 50.55 (e) rule by April 1981. Based on IE's inspection and enforcement experience, IE will propose changes to Part 21 and/or Section 206 of the Reorganization Act of 1974 by August 1980. SD will have the lead in accomplishing Part 21 rule changes on a schedule consistent with any needed legislative action.

c. Resources: IE FY80 - 0.3 my; SD FY80 - 0.40 my, FY81 - 0.8 my.

C. LICENSEE ACTIONS

1. Revise deficiency reporting requirements.

a. Description: Licensee will be required to report deficiencies in accordance with new guidelines.

b. Implementation: Same as in Item I.E.6.

c. Resources: 0.2 my per plant.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Item A.11.a

Other: NUREG/CR-1250, Vol. I, p. 99.
Letter from Chairman, ACRS, to Chairman, NRC, dated April 17, 1980, Subject: "NUREG-0660, 'NRC Action Plans Developed as a Result of the TMI Accident,' Draft 3"

TASK II.K MEASURES TO MITIGATE SMALL-BREAK LOSS-OF-COOLANT ACCIDENTS AND LOSS-OF-FEEDWATER ACCIDENTS

A. OBJECTIVE: To perform systems reliability analyses and to effect changes in 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: Between April 1, 1979 and July 26, 1979 the Office of Inspection and Enforcement (IE) issued nine bulletins to various operating plant licensees, depending on the design of the reactor, and reviews of licensee responses were conducted by the NRR Bulletins and Orders Task Force. The responses were determined to be acceptable, and separate evaluation reports have been prepared and issued to some licensees. The effort to complete these reports for all operating plant licensees is continuing.

NRR will require all operating license applicants to evaluate their plants against the requirements specified in applicable IE Bulletins and not otherwise addressed in this Action Plan, and to take corrective actions as necessary prior to fuel loading. Ultimately, these requirements will be codified by NRR and SD, as appropriate, and required of all plants as preconditions for receipt of an operating license.

A comparison of the composite requirements from the nine bulletins with the action items in this plan is provided in Appendix C. The Bulletin requirements not covered by action items are listed below:

(1) Review all safety-related valve positions and positioning requirements and positive controls, as well as all related test and maintenance procedures, to assure proper ESF functioning, if required (see Appendix C, Table C.1, item 5).

(2) Review and modify (as required) procedures for removing safety-related systems from service (and restoring them to service) to assure that operability status is known (see Appendix C, Table C.1, item 10).

(3) Provide a trip for the pressurizer low-level bistable so that the pressurizer low-pressure signal alone (rather than the low-level/low-pressure coincidence) will trip the reactor. For testing, provide for resetting the pressurizer low-level bistable (see Appendix C, Table C.1, item 17).

(4) Provide procedures and training to operators for prompt manual reactor trip for LOFW, TT, MSIV Closure, LOOP, LOSG level, and PZR Low Level (see Appendix C, Table C.1, item 20).

(5) Provide automatic safety-grade anticipatory reactor trip for LOFW, TT, or significant decrease in SG level (see Appendix C, Table C.1, item 21).

(6) Describe automatic and manual actions for proper functioning of auxiliary heat removal systems when main feedwater system is not operable (see Appendix C, Table C.1, item 22).

(7) Describe uses and types of RV level indication for automatic and manual initiation of safety systems. Also describe alternative instrumentation and methods (see Appendix C, Table C.1, item 23).

b. Schedule: NRR will complete the Bulletin evaluation reports for operating plants by March 31, 1980. NRR will issue requirements to all pending operating license applicants and all plants under construction by July 1, 1980.

c. Resources: NRR FY80 - 1.0 my, FY81 - 0.8 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. (These are items 1 through 12 in Appendix C, Table C.2.) Additional items were identified in the review that required further work by the licensees. These items are numbered 13 through 21 in Appendix C, Table C.2; all 21 items are to be implemented by operating B&W reactors. However, because some were superseded by actions elsewhere in this plan, only seven of these actions apply to operating license applicants with B&W reactors (see Table C.2, Appendix C). License applicants with B&W plants will be required by NRR to demonstrate conformance with these seven requirements prior to operating license issuance.

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. NRR will issue these seven unique requirements, described above, to B&W designed plants now under construction by July 1, 1980.

c. Resources: NRR FY80 - 1.5 my, FY81 - 2 my; IE FY80 - 0.5 my, FY81 - 0.5 my.

3. Final recommendations of B&O Task Force.

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 were developed and issued in reports NUREG-0565 (B&W), NUREG-0611 (W), NUREG-0626 (GE), NUREG-0635 (CE), and NUREG-0623.

Upon approval of these recommendations (shown in Table C.3, Appendix C), NRR will notify licensees of the 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 early 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 during calendar year 1980 (i.e., before fuel loading, before full-power operation, or later). Ultimately, these generic requirements will be codified by NRR and SD and will be applied to all plants as preconditions for receipt of an operating license.

b. Schedule: NRR will issue requirements to operating plant licensees in early 1980 and will review the responses on a schedule to be completed in 1983. 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 - 7.7 my, FY81 - 11.2 my, FY82 - 4.5 my, FY83 - 4.0 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 on the schedules specified in Table C.2 of Appendix C.

c. Resources: 1 my per plant.

3. Final recommendations of B&O Task Force.

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. Operating license applicants must complete actions on the schedules specified in Table C.3 of Appendix C.

c. Resources: 2 my per plant.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: D.4.a

Other: NUREG-0565, NUREG-0611, NUREG-0626, NUREG-0635, and NUREG-0645.
NUREG/CR-1250, Vol. II, Part 2, pp. 454, 458, 460, 465, and 468.
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.
Letter from Chairman, ACRS, to Chairman, NRC, dated March 11, 1980, Subject: "ACRS Report on NTOL Items from Draft 3 of NUREG-0660, NRC Action Plans Developed as a Result of the TMI-2 Accident"

CHAPTER III

EMERGENCY PREPAREDNESS AND RADIATION EFFECTS

INTRODUCTION

The investigations of the Three Mile Island accident have shown that the overall state of planning and preparedness for nuclear emergencies was inadequate. Among other findings, the various reports state that: emergency planning had a low priority in NRC; the role of NRC in an emergency was ill-defined; and coordination and interaction among NRC, Federal agencies, the utility, and State and local emergency organizations was insufficient to ensure an adequate level of preparedness. Further, the public was insufficiently informed about nuclear power plants and the effects of radiation. The Three Mile Island accident also brought to light significant deficiencies in the worker radiation protection program at that plant and some needed changes in public radiation protection as well.

The President's Commission was disturbed by its findings of a highly uneven quality of emergency plans, by the problems created by multiple jurisdictions in radiation emergencies, and by an almost total lack of detailed plans in the local communities around Three Mile Island. In its recommendations, the President's Commission included the centralization of emergency planning and response in a single agency at the Federal level, with close coordination between it and State and local agencies. The President, in a statement made December 7, 1979, assigned the Federal Emergency Management Agency (FEMA) lead responsibility for improving the state of emergency preparedness of State and local governments affected by nuclear facilities.

The NRC has responded to the call for change with the actions described in this Chapter of the Action Plan. These actions include improvements to upgrade emergency preparedness of licensees, affected State and local agencies, and NRC. NRC teams are now visiting each plant site to evaluate the status of emergency planning and preparedness among the licensees and State and local agencies and to identify needed improvements and requirements for integration. The actions include the upgrading of facilities and equipment, promulgation of regulatory requirements, and, in conjunction with FEMA, the development of performance and acceptance criteria. FEMA has the lead for developing a program for assessing State and local emergency response plans for all elements of off-site radiological emergency planning and, for making findings and determinations important to approval of the overall state of emergency preparedness necessary for licensing. Other NRC actions in coordination with FEMA involve the testing of the state of preparedness at nuclear plant sites by integrated emergency drills and exercises involving licensees and State, local and Federal agencies.

In the actions just described, NRC is working with FEMA to ensure an orderly transfer of the lead responsibility for reviewing and assessing the emergency preparedness of State and local agencies. A Memorandum of Understanding (MOU) between the agencies, which became effective January 14, 1980, provides for this transfer of functions and coordination of the near-term efforts. The MOU also treats the longer term question of findings and determinations on the adequacy and capability of implementing State and local plans in the NRC licensing process for nuclear facilities.

Near-term actions in the plan that speak to upgrading the status of emergency planning and preparedness within NRC include the development of an expression of the "NRC role" as a basis for defining the agency's emergency organization and functions. Definition of the role of NRC also helps to resolve questions about the extent to which it must be able to monitor and evaluate an emergency situation and potential hazards in order to advise the operating staff of an affected facility or, if necessary, order certain emergency actions or operations by the licensee. Other near-term improvements reflected in the plan are under way and partially completed. They include the installation of dedicated telephone "hot-lines" between the nuclear power plant sites and the NRC Operations Center in Bethesda, Maryland.

The physical facilities and equipment of the NRC's Operations Center are being upgraded. Current work under the Action Plan includes improvements in the procedures for staffing and running the operations center and periodic emergency drills to test the practicality of facilities, equipment and procedures and the functioning of the staff under simulated emergency situations. Longer term actions for improving NRC's emergency preparedness program include study and definition of other types of communications and information needed by NRC to fulfill its function of assuring protection of public health and safety. These actions include the conceptual study of the "nuclear data link" included in the plan.

One major difference between the recommendations of different investigations was whether the utility or NRC should take the lead in providing information to the media and the public. NRC believes that this must be a cooperative effort involving all agencies, Federal and State, and the utility. The Action Plan responds to various recommendations regarding a public information program on nuclear power, radiation and its effects, and protective measures against radiation. The actions call for coordination with Federal agencies and professional societies to enlist their aid and cooperation in providing such a program on an ongoing basis. The other specific recommendations related to organizational arrangements and functions for public information during emergencies will be considered in the development of the NRC organization and procedures for emergency response and should be considered by FEMA in its lead role in developing a Federal response plan.

The investigations of the accident have confirmed the existence of deficiencies in licensee radiation protection programs, and have identified changes needed in the NRC review and inspection process and acceptance criteria for radiation protection programs. The criticisms can be grouped into several broad categories, as follows: (1) licensee (management) and NRC underemphasis of the importance of worker radiation protection, particularly for accident conditions; (2) inadequate qualifications of radiation protection personnel; (3) inadequate training for radiation protection, particularly regarding the accident environment; and (4) design and equipment deficiencies under accident conditions, both related to radioactive source control and to radiation protection programs. In response, NRC has identified a number of actions in the area of radiation protection that are designed to determine the feasibility of improvement or applying known improvements to facilities on a uniform basis. The thrust of these actions and of the current ongoing IE Health Physics Appraisal Program is to assure that radiation protection programs are capable of dealing with events that follow an accident, as well as providing appropriate protection during normal operations.

The action items related to radiation protection can be separated into three main groups. The first group provides for additional control of radioactive sources related to accidents. The actions are directed to both in-plant source control and control of releases to the environment. The second group provides measures to improve radiation protection for the public. The third group covers improvements in nuclear power plant worker radiation protection. Since nuclear power plant workers are trained in radiation protection and the public is not, the major thrust of the radiation protection effort, as it will be upgraded by the actions in this plan, is to contain the radioactivity produced by the accident in the plant even though this could increase exposure to workers. Chapter II of this plan includes design activities that reduce the radiation exposure to workers if the accident does occur and if radioactive gases and liquids get into systems in the auxiliary, radwaste or control buildings. Actions in this chapter (Chapter III) are based on the premise that there is radioactivity in such systems and it is necessary to minimize the in-plant hazard from the radiation sources and to reduce the likelihood that radioactivity will be released from the plant, in order to keep hazards to the public to a minimum. As a second step, actions are included that will provide for predicting what the real hazard to the public will be, in order to be able to make decisions about the need to implement emergency preparedness programs.

TASK III.A EMERGENCY PREPAREDNESS AND RADIATION EFFECTS

TASK III.A.1 IMPROVE LICENSEE EMERGENCY PREPAREDNESS - SHORT TERM

A. OBJECTIVES: Promptly 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: The overall state of emergency preparedness for nuclear power plant accidents will be upgraded, including the integration of emergency preparedness onsite and offsite, according to the NRC/FEMA Memorandum of Understanding (item III.B). Approval of the overall state of preparedness will be required (primarily subitem (1) below) prior to issuance of an operating license. The review and upgrading for operating reactors is under way.

(1) Six NRC teams were formed in September 1979 to implement the "Action Plan for Promptly Improving Emergency Preparedness" (SECY 79-450). That 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. In the short term, the teams are making an integrated assessment of licensee, local, and State capabilities and interfaces based on:

(a) A review of existing plans and a meeting in the site area to communicate upgraded criteria and to identify to licensees the areas requiring improvements. This includes an opportunity for expression of concerns by the public through an open meeting. An objective of the teams is to help improve working relationships and communications concerning emergency plan development among all parties. The criteria being used by the NRC teams reflect a number of the recommendations made as a result of the TMI-2 accident by the President's Commission and the NRC Special Inquiry Group.

(b) A review of upgraded licensee, local and State plans submitted by the licensee after the site visit is summarized in a safety evaluation report. This includes 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 encompasses the points in SECY-79-450 and reflects any input from the Federal Regional Advisory Committees (RAC). Items in local or State plans requiring improvement to meet the upgraded criteria of NUREG-0654 but which are adequate to meet the essential planning elements of "NRC Guide and Checklist," NUREG-75/111, and Supplement 1 thereto, are not being required for issuance of licenses for low-power testing.

(2) 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:

(a) 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.

(b) Observing and critiquing exercises involving licensee, local and State capabilities.

(c) Observing and critiquing exercises involving licensee, local, State and Federal capabilities. For new operating license applicants, this must be completed before full-power licensing and within about five years for operating reactors.

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.

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: NRR FY80 - 15 my and $1.35 million, FY81 - 23 my and $1.5 million; IE FY80 - 6 my and $54,000, FY81 - 12 my and $108,000; SP FY80 - 8 my, FY81 - 8 my; ADM FY80 - $70,000, FY81 - $70,000.

2. Upgrade licensee emergency support facilities.

a. Description: Emergency operations will be improved by the establishment of dedicated areas for command and control, support, and coordination of onsite and offsite functions during reactor accident situations.

(1) Technical Support Center (TSC). The activities of plant engineering and management personnel are an important part of the overall station response to an accident; these people provide the in-depth technical support of control room activities and typically are responsible for the implementation of inplant emergency procedures. During the first two days following the accident at TMI-2, it was difficult for senior government officials to establish contact with plant management, and implementation of emergency plans by personnel in the control room acted to congest and confuse the reactor operations control activities. A dedicated Technical Support Center will provide a place for management and technical personnel to support reactor control functions, to evaluate and diagnose plant conditions, and for a more orderly conduct of emergency operations.

Requirements and details for Technical Support Centers were described to operating reactor licensees in NRR letters of September 13 and October 30, 1979 and April 25, 1980, and to operating license and construction permit applicants and holders of construction permits in letters of September 27, October 10, and November 9, 1979. In summary, the Technical Support Center is to be separate from but near the control room and have the capability to display and transmit plant status (i.e., data link with the control room and emergency operations facility) to those individuals who are knowledgeable of and responsible for engineering and management 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 (2), below), the near-site Emergency Operations Facility (item (3), below), and NRC. The center will be habitable to the same degree as the control room for postulated accident conditions or an alternate habitable center on or near the site will be provided (see item 23, Table C.3, Appendix C).

In the near term, the NRR letters required the center to be established, provisions made for planning, 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. The near-term requirements were to be completed by operating reactor licensees by January 1, 1980 and are to be completed by operating license applicants prior to fuel loading. Final action to upgrade the center is to be completed by operating reactors by January 1, 1981 and by operating license applicants prior to licensing or January 1, 1981, whichever is later.

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) will review the interaction of the center with the other facilities used in an emergency 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). During the TMI-2 accident, operational support personnel (e.g., auxiliary operators not assigned to the control room, health physics personnel, and technicians) reported to the

control room. This contributed to the congestion and confusion there and tended to interfere with reactor operations control activities. There is need to restrict access to the control room to only those people requested to be present by the person supervising reactor control activities. A designated Operational Support Center will provide an area in which shift and other support personnel will report for further instructions from the operations staff.

Requirements and details for Operational Support Centers were described to reactor licensees, license applicants, and construction permit holders in the same NRR letters identified in item (1) above. In summary, the Operational Support Center is to be established separate from the control room as a place in which operations support personnel assemble and report in an emergency situation to receive instructions from the operating staff. The OSC is to be provided with communications with the plant control room, Technical Support Center (item (1), above), and the near-site Emergency Operations Facility (item (3), following).

Operating reactors were to establish the OSC by January 1, 1980; and operating license applicants are to establish the OSC prior to fuel loading.

NRR will review commitments and implementation schedules in the responses to its letters and will revise Section 13.3, "Emergency Planning," of the Standard Review Plan.

Actions of the Emergency Preparedness Review Teams and of IE will be as described for Technical Support Centers (item (1) above).

(3) Near-site Emergency Operations Facility (EOF). During and following the TMI-2 accident, the primary interface and coordination of onsite and offsite activities (involving the licensee and Federal and State agencies) were carried out mainly from the TMI visitor center and a collection of temporary trailers and structures in the vicinity of the visitor center. Communications were hastily installed and arrangements made for other supporting and logistical services. Some agencies, Federal and State, operated from their own offices, some of which were near but others rather remote from the plant site. A

near-site Emergency Operations Facility will provide a planned, organized central focal point for coordination of onsite and offsite activities for reactor emergency situations.

The Emergency Operations Facility will be operated by the licensee and will be sized and equipped to function as (a) a center for the licensee's command and control functions of onsite operations and evaluation and coordination of all licensee activities, onsite and offsite, related to an emergency having actual or potential environmental consequences, and (b) a center for the analysis of plant effluent monitors, meteorological conditions, and offsite radiation measurements, and for offsite dose projections.

The major State and local response agencies may (and are encouraged to) provide for data analysis jointly with the licensee at this location. Included in the functions of the facility will be the provision of information regarding current and projected plant status needed by Federal, State and local authorities for implementation of offsite emergency plans, in addition to making available a centralized meeting location for key representatives of the agencies. Some press facilities will be available.

The requirement for a near-site Emergency Operations Facility is stated in SECY 79-450, the NRC "Action Plan for Promptly Improving Emergency Preparedness," which was distributed to all licensees during regional meetings in August 1979, and in the recently issued NRC/FEMA criteria (item III.A.2.2).

Final action is required to upgrade the facility in accordance with "lessons learned" recommendations for the onsite Technical Support Center, including a data link with the Control Room and/or Technical Support Center.

Near-term requirements were to be completed by operating reactors by January 1, 1980 and are to be completed by operating license applicants prior to fuel loading. Final action to upgrade the facility is to be completed by operating reactors by January 1, 1981 and by operating license applicants prior to licensing or January 1, 1981, whichever is later.

NRR will revise Section 13.3, "Emergency Planning," of the Standard Review Plan. Actions of the Emergency Preparedness Review Teams and of IE will be as described for Technical Support Centers (item (1) above).

b. Schedule:

(1) Technical Support Center (TSC). Requirements were issued to operating reactor licensees in NRR letters dated September 13 and October 30, 1979 and April 25, 1980, and to operating license and construction permit applicants and holders of construction permits in letters of September 27, October 10, and November 9, 1979. NRR will revise the SRP by December 1980. Inspection of the TSC is covered in the schedules under item III.A.1.1.

(2) Operational Support Center (OSC). Initial requirements were issued to operating reactor licensees in NRR letters dated September 13 and October 30, 1979 and April 25, 1980, and to operating license and construction permit applicants and holders of construction permits in letters of September 27, October 10, and November 9, 1979. NRR will revise the SRP by December 1980. Inspection of the OSC is covered in the schedules under item III.A.1.1.

(3) Emergency Operations Facility (EOF). Initial requirements were issued to operating licensees and operating license and construction permit applicants in NRR letters of September 13, September 27, October 10, and October 30, 1979 and April 25, 1980. NRR will revise the SRP by December 1980. Inspection of the EOF is covered in the schedules under item III.A.1.1.

c. Resources:

(1) Technical Support Center (TSC). NRR resources are included in item III.A.1.1.

(2) Operational Support Center (OSC). NRR resources are included in item III.A.1.1.

(3) Emergency Operations Facility (EOF). NRR resources are included in item III.A.1.1; SD FY80 - 0.9 my, FY81 - 0.3 my; SP FY80 - 0.25 my and $90,000.

3. Maintain supplies of thyroid-blocking agent (potassium iodide).

a. Description:

(1) Workers: NRC will require licensees 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 [now Department of Health and Human Services (HHS)] 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 with 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 under way at Sandia Laboratories. FEMA and NRC are discussing the issue of responsibility for distributing and maintaining the potassium iodide stockpile for general public use.

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 was completed in April 1980. An interim recommendation on the extent to which potassium iodide should be stockpiled will be established by May 1980. A final recommendation is scheduled for August 1980.

c. Resources:

(1) Workers: NRR resources are included in item III.A.1.1.

(2) Public: NRR resources are included in item III.A.1.1.

C. LICENSEE ACTIONS

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 (NUREG-0654). 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 Facility.

(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 periodic joint exercises involving Federal, State, and local government emergency response organizations.

b. Implementation: Emergency plans for operating reactors are to be upgraded by August 1980.

Prior to fuel loading, operating license applicants will comply with Appendix E, "Emergency Facilities," to 10 CFR Part 50, Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants," and for the offsite plans, meet essential elements of NUREG-75/111 or have a favorable finding from FEMA.

Prior to issuance of a full-power license, operating license applicants will (1) provide an emergency response plan in substantial compliance with NUREG-0654, except that only a description of the means for providing prompt notification to the population (including a completion schedule), the staffing for emergencies in addition to that already required, and an upgraded meteorological program need be provided, and (2) perform an emergency response exercise to test the integrated capability and a major portion of the basic elements existing within the emergency preparedness plans and organizations.

c. Resources: Included in item III.A.1.2 below.

2. Upgrade licensee emergency support facilities.

a. Description:

(1) Technical Support Center (TSC). In the near term, licensees and applicants will establish a TSC. The center will be established, provisions made for planning, procedures, staffing, and communications, and a plan and schedule will be 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 unless such a center has already been established.

(3) Emergency Operations Facility (EOF). Licensees and applicants will establish an EOF.

b. Implementation:

(1) Technical Support Center (TSC). The near-term requirements were to be completed by operating reactors by January 1, 1980, and by operating license applicants prior to fuel loading. Action to upgrade the center is to be completed by operating reactors by January 1, 1981, and by operating license applicants prior to licensing or January 1, 1981, whichever is later.

(2) Operational Support Center (OSC). Operating reactors were to establish the OSC by January 1, 1980; operating license applicants will establish the OSC prior to fuel loading.

(3) Emergency Operations Facility (EOF). Operating reactors were to establish an EOF by January 1980 and upgrade it by January 1981; operating license applicants will establish an EOF prior to fuel loading and upgrade it by January 1981.

c. Resources: Industry estimates for Item III.A.1.1 and this action item range from $4.8 to $11.4 million for each facility, with the range indicating an upgrade of emergency preparedness programs and, primarily the site-specific variations in the cost of support facilities.

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/FEMA position is defined.

c. Resources:

(1) Workers. 0.2 my per plant at a cost of approximately $5,000 per plant.

(2) Public. This requirement will not be defined until the NRC/FEMA position is defined.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items B.3, B.3.c, D.1, D.3, E.4.b, E.5, F.1.b, F.1.c, F.1.d, F.2, F.2.a, F.2.b, F.2.c, G.1, G.1.a, G.2.c

President's Response, dated December 7, 1979: Proposal E.1.b

Other: NUREG-0396
NUREG-0578, 2.2.2.b and 2.2.2.c
NUREG-0610
NUREG-0616, 2.6.1.5, 3.4.4.1, 3.7.1.1, 3.7.1.2, 3.9.1, 3.10.5.2, 3.11.1, 3.11.3, 3.11.4, 3.12.1.2, 3.13.2, 3.13.3, 3.13.5, 3.13.8.3, 3.13.9, 3.15.3
NUREG-0654
SECY-79-450

NUREG/CR-1250, Vol. I, pp. 108, 127, 132, 146 and 157; Vol. II, Part 2, pp. 438, 486, 645; Part 3, pp. 854, 874, 892, 930, 986, 1025-1027, 1034, 1049, 1050, 1074, 1075.

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Station Unit 2"

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendation C.5.a.

Memorandum from J. M. Allan, NRC Region I, To J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for Long-Term TMI Improvements and/or For Other Power Reactor Sites," Recommendations 1, 2, 6, 7, 55.

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 10 CFR 50 and 10 CFR 50, 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), and the comment period ended February 19, 1980.

(2) The staff conducted four public regional meetings with state and local authorities and licensees in the formulation of recommendations for final effective rules. These meetings were 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 recommendations of the President's Commission and the NRC Special Inquiry Group.

(4) IE will revise its inspection program to cover upgraded requirements in the changes to the rules.

b. Schedule:

(1) The proposed rule was published in the Federal Register on December 19, 1979.

(2) The last of the four regional meetings was held January 24, 1980.

(3) The Commission paper recommending the adoption of the effective rules will be completed by June 30, 1980.

c. Resources: SP FY80 - 3 mm (total cost for workshops is estimated to be $90,000); SD FY80 - 0.9 my, FY81 - 0.3 my.

2. Development of guidance and criteria.

a. Description: NRC and FEMA have jointly published a document (NUREG-0654/FEMA-REP-1) entitled "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." These criteria, published for interim use and comment and noticed in the Federal Register, are directed to NRC licensees and operators of commercial nuclear power reactors and to State and local governments. The criteria contain detailed guidance for planning objectives and evaluations and include, among other factors, proposed requirements for shift manning and staffing levels for nuclear power plant licensees.

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 (10 CFR 50, 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 (with the exception of shift manning and meteorological instrumentation criteria) in judging the adequacy of nuclear power plant licensees, State and local government emergency plans and preparedness until the time that final agency requirements and guidance are promulgated. The final agency guidance, which will include shift manning and meteorological instrumentation criteria, may take the form of regulations.

b. Schedule: The NRC/FEMA criteria have been published in the Federal Register for interim use and public comment.

c. Resources: The resources for NRC/FEMA criteria are included in item III.A.1.1.

C. LICENSEE ACTIONS

1. Amend 10 CFR 50 and 10 CFR 50, 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 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.

c. Resources: Estimates are included in item III.A.1.2.

2. Development of guidance and criteria.

a. Description: Licensees will participate in the development of guidance and criteria.

b. Implementation: The schedule for implementation will be published in the guidance and criteria documents.

c. Resources: Estimates are included in item III.A.1.2.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items A.8.c, B.3, E.3, F.1, F.2, G.4, and G.5.

Others: NUREG-0396

NUREG-0553

NUREG-0578, 2.2.2.b and 2.2.2.c

NUREG-0616, 3.4.4.4, 3.7.1, 3.9.1, 3.9.2, 3.11.4, 3.12.1.1, 3.13.1, 3.13.6, 3.13.7, 3.13.8, 3.13.9, 3.13.10, 3.13.12

NUREG-0654

SECY-79-591

NUREG/CR-1250, pp. Vol. I, pp. 130-133, 146; Vol. II, Part 3, pp. 854, 874, 892, 911, 930, 986, 989, 1026, 1027, 1034, 1039, 1047, 1048, 1049.

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2"

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for Long-Term TMI Improvements and/or For Other Power Reactor Sites," Recommendations 1-8, 14, 15, 20, 43, 44.

TASK III.A.3 IMPROVING NRC EMERGENCY PREPAREDNESS

A. OBJECTIVE: To enable 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. NRC role in responding to nuclear emergencies.

a. Description: The role of NRC has been more explicitly defined. Organizational arrangements and functions for NRC emergency response operations are being revised based on that definition of the NRC role, and emergency plans and procedures are being revised and upgraded accordingly. These changes will be incorporated into appropriate NRC Manual Chapters.

(1) The staff met with the Commission on February 6, 1980, to report and discuss the status of current efforts on the NRC emergency response program, primarily the nuclear data link (Item III.A.3.4) and the definition of the NRC role in emergency situations involving NRC licensees.

(2) The Mitre Corporation, under contract to IE, is evaluating and preparing a report on operational implications of the spectrum of actions that may be taken by NRC in response to incident and accident situations involving nuclear materials. The Mitre report and the definition of the NRC emergency response role, as approved by the Commission at the February 6 meeting, will be used by IE in revising and upgrading plans and procedures for the NRC emergency operations center.

(3) IE, with input from other NRC offices, will revise NRC Manual Chapter 0502, other agency procedures, and NUREG-0610, "Action Level Guidelines," to describe and implement the NRC emergency response program. These revised documents, and the procedural revisions in item (2) above, will reflect the adoption of a number of recommendations for improving NRC emergency operations made by the President's Commission, the NRC Special Inquiry Group, and other internal NRC studies.

(4) IE will prepare a Commission paper on the final version of Manual Chapter 0502 and other agency procedures.

(5) IE will revise implementing procedures and instructions for Regional Offices and incorporate these into the IE Manual.

b. Schedule: The staff met with the Commission in February 1980 to discuss the current status of the work. The Mitre report was scheduled to be completed in March 1980. The revision of plans and procedures for the emergency operations center, including revision of NRC organizational arrangements and functions for emergency response, is continuing in conjunction with training, tests and drills under Item III.A.3.5. The revisions to Manual Chapter 0502, NUREG-0610, and other agency procedures will be completed in April 1980. The Commission paper will be completed by May 1, 1980. Implementing procedures and instructions for Regional Offices will be incorporated into the IE Manual by June 1980.

c. Resources: IE FY80 - 0.3 my, FY81 - 0.5 my; SD FY80 - 0.1 my; SP FY80 - 0.5 my and $200,000, FY81 - 0.5 my and $200,000; ADM FY80 - 0.7 my, FY81 - 0.7 and $25,000.

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 physical facilities for 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 upgraded concurrently.

b. Schedule: The improvements of physical space, arrangement, and equipment for the OC will be completed by June 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). Regional OC modifications will be completed by January 1981.

c. Resources: IE FY80 - 1.25 my and $500,000; ADM FY80 - 0.5 my and $200,000.

3. Communications.

a. Description:

(1) Direct dedicated telephone lines (OPX) have been installed at each operating power plant and at 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. Installation of direct, dedicated telephone lines must be completed before issuance of an operating license (see item 12, Table C.1, Appendix C).

(2) 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.

IE will work with ADM Telecommunications Branch on a study of the needs and requirements for a high-frequency (HF) radio network as a backup communications system between power reactor sites, the NRC Operations Center, and Regional Offices. Another element to be included in this work on backup communications is a study of whether a National Warning System (NAWAS) communications drop should be required at each reactor, Regional Offices, and at the NRC's Operations Center. This work will be coordinated with FEMA. A Commission paper will be prepared on the subject of backup communications networks.

NRR will coordinate meteorological data acquisition from the National Oceanic and Atmospheric Administration (NOAA) for the NRC emergency operations center and obtain NRC access capability to NOAA forecast offices. NRR will also coordinate with the Federal Emergency Management Agency (FEMA) and the States regarding meteorological information and assessments of transport and diffusion. NRR will also coordinate with the National Weather Service, USGS, FEMA, and EPA to acquire access to hydrological information necessary to estimate dilution and transport for liquid releases.

NRR has funded a pilot program with Lawrence Livermore Laboratory for use of the Atmospheric Release Advisory Capability (ARAC) in the NRC Operations Center. Future use of ARAC will be evaluated upon completion of the pilot program.

b. Schedule: By March 1980, the OPX telephone lines and the health physics and environmental network were installed. 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. The study on backup radio communications network and Commission paper will be completed by August 1, 1980. 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 - 1.0 my for telephone hotlines and $1.35 million for annual maintenance of telephone hotlines, 0.2 my for study on backup communications; FY81 - 1.1 my for telephones, and $1.9 million for telephone maintenance; IE FY80 - 0.1 my for study of backup communication.

ARAC and meteorological data: NRR FY80 - 0.5 my and $200,000, FY81 - 0.9 my and $125,000.

Forest Service and DOE communications support: IE FY80 - 0.5 my and $50,000.

4. Nuclear data link (NDL).

a. Description: "Nuclear data link" is the term given to a system that will remotely access facility data and transmit the data and display 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. This work will be coordinated with the criteria being developed by NRR for licensee data links in the TSC and EOF (item III.A.1.2) and with various groups in the industry. 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? What standardization criteria must be developed for interfacing and tiein with the licensee data links for the TSC and EOF (item III.A.1.2) and the industry-operated data centers recommended by the NRC Special Inquiry Group?). (See also item 23, Table C-3, Appendix C.)

A status report on the Sandia study was presented to the Commissioners in February 1980. Commission decisions will determine future direction of the NDL.

b. Schedule: The NDL system Phase I study, including development of an implementation schedule and cost estimates, was completed in April 1980.

c. Resources: IE FY80 - $250,000 (also possible $300,000 from supplemental); RES FY80 - 0.3 my and $300,000 (future resources are dependent on Commission decisions); ADM FY80 -0.3 my, FY81 - 0.4 my and $126,000.

5. Training, drills, and tests.

a. Description: Headquarters and regional drills and exercises presently being conducted will continue. The scope of the exercises will be slowly expanded to include joint exercises with 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 the NRC incident response program will be continued.

b. Schedule: This is a Decision Group D item. Therefore schedules and resources are to be developed in connection with routine budgetary processes.

c. Resources: See "Schedule" above.

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. 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 inspection efforts.

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 scheduling of Item III.A.1.1 and routine IE efforts.

c. Resources: International agreements, IP FY80 - 0.3 my; Federal plan, IE FY80 - 0.1 my; State and local, SP FY80 - 0.3 my; ADM FY80 - 0.1 my.

C. <u>LICENSEE ACTION</u>

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: Communications networks will be established as described under NRC actions.

b. Implementation: Ongoing.

c. Resources: Less than 0.05 my per plant, considered to be zero (land lines only).

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: This is a Decision Group D item.

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. 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.5 and F.6

President's Response, dated December 7, 1979: Proposals A.6.e and E.1.b

Other: NUREG-0585, Recommendation 13

NUREG-0600, OPS C.5a, B.2e

NUREG-0610

NUREG-0616, Recommendations 3.2, 3.3.3, 3.3.4, 3.3.5, 3.4.2, 3.4.3, 3.4.4, 3.6.1, 3.6.2, 3.6.4, 3.7.3, 3.8.2 3.9.4, 3.9.5, 3.11.2, 3.11.5, 3.11.6, 3.11.8, 3.11.9.2, 3.11.10, 3.13.10, 3.14.1, 3.14.4, 3.14.5, 3.14.7, 3.15.5.4.

NUREG/CR-1250, Vol. I, pp. 107, 108, 127, 134-137, 157; Vol. II, Part 2, p. 645; Part 3, pp. 892, 911, 986-989, 1007-1009, 1018, 1026, 1027, 1039, 1047, 1048, 1050, 1074, 1075.

Memorandum from L. Gossick, NRC, to J. Ahearne, November 8, 1979, Subject: "Supplement to Action Level Guidelines."

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)

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Station Unit 2"

Letter from Chairman, ARCS, to Chairman, NRC, dated March 11, 1980, Subject: "ACRS Report on Near-Term Operating License Items from Draft 3 of NUREG-0660"

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for Long-Term TMI Improvements and/or For Other Power Reactor Sites," Recommendations 13, 56, 57, 59, 60.

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendations B.2.e, C.4, C.5.a.

TASK III.B EMERGENCY PREPAREDNESS OF STATE AND LOCAL GOVERNMENTS

A. <u>OBJECTIVES</u>: To upgrade the state of emergency preparedness of State and local governments affected by nuclear facilities. The Federal Emergency Management Agency was given the lead on this effort by the President on December 7, 1979.

B. <u>NRC ACTIONS</u>

1. Transfer of responsibilities to the Federal Emergency Management Agency.

a. Description: NRC has entered into a Memorandum of Understanding (MOU) with the Federal Emergency Management Agency (FEMA) to achieve a prompt improvement in the state of emergency preparedness and to ensure effective transfer of responsibility. The Office of State Programs (SP) has provided for the detail of NRC staff with State and local emergency preparedness expertise to work with FEMA. The staff will participate with FEMA in preparing assessments of the state of emergency preparedness offsite for all operating reactors. 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. The preparation of the exercise scenarios is expected to be complete by October 1980.

c. Resources: SP FY80 - 2.5 my and $350,000, FY81 - 0.5 my; NRR FY80 - included in Item III A.1.1. The NRC/FEMA Emergency Preparedness Steering Committee will oversee the preparation of exercise scenarios. (The manpower requirement will be insignificant.)

2. Implementation of NRC and FEMA responsibilities.

a. Description:

(1) The licensing process. NRC will utilize State and local emergency preparedness expertise developed at FEMA in NRC licensing reviews. NRC will 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. Near-term operating license applicants will be required to obtain NRC approval prior to fuel loading of the overall state of emergency preparedness based on the integration of emergency preparedness onsite and offsite. (see item III.A.1.1)

(2) Federal guidance. NRC will provide FEMA the opportunity to review and comment on emergency preparedness guidance developed by NRC for the licensee and will review and comment on emergency preparedness guidance developed by FEMA for State and local agencies.

b. Schedule: NRC, with input from FEMA, will establish the 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) The licensing process. 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 four man-years of effort per 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 three to four additional man-years per year of IE effort. Two man-years per year of NRR effort will be required to coordinate the FEMA reviews as they related to the licensing process. The Memorandum of Understanding also assigns NRC continued responsibility for the overall state of emergency preparedness (i.e., the integration of emergency

preparedness onsite as determined by NRC and offsite 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 basis for review of State and local plan adequacy. NRR resources are included in Item III.A.1.1

(2) Federal guidance. The review and comment on FEMA guidance to State and local governments will be the responsibility of the NRC/FEMA Emergency Preparedness Steering Committee, as will be any joint NRC/FEMA guidance. (The manpower requirement will be insignificant.)

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: 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. According to the President's December 7, 1979 directive, FEMA is to develop and issue an updated series of interagency assignments that will delineate respective agency capabilities and responsibilities and define procedures for coordination and direction for emergency planning and response. This is recognized in the FEMA/NRC MOU. It is expected by the NRC staff that FEMA will have lead responsibility to develop and issue an updated series of interagency assignments pursuant to recommendations F.1 through F.6 of the President's Commission on TMI.

E. REFERENCES

President's Commission Report: Items A.8.c, E.3, F.1, F.2.d, F.5, G.1, G.2.c, G.4.

President's Response; dated December 7, 1979: Proposal E.1.b, E.1.c and F.1.b.

Other: NUREG-0632, Letter to Dr. Frank Press
NUREG/CR-1250, Vol. I. pp 130, 131, 132, 137, 157; Vol II. Part 2, p. 645 and Part 3, pp. 874, 930, 1007-1009, 1018, 1025-1027, 1039, 1043, 1044, 1047, 1050, 1074, 1075.

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2"

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 4, 1980

TASK III.C PUBLIC INFORMATION

A. OBJECTIVE: Have information available for the news media and the public describing how nuclear plants operate, radiation and its health effects, and protective actions against radiation; provide training for members of the technical staff on how to interface with the news media and other interested parties.

B. NRC ACTIONS

1. Have information available for the news media and the public.

a. Description:

(1) The Office of Public Affairs (OPA) will review the publicly available documents in the following areas: (a) how nuclear plants operate, (b) radiation and its health effects, and (c) protective actions against radiation. Based on this review, OPA will issue a NUREG-series report containing a "readers guide" to publicly available documents containing relevant information in the above areas.

(2) Where OPA finds insufficient information available, OPA will recommend to the Department of Energy's Education Programs Division that additional information be published.

(3) OPA and IE have under way a pilot program of seminars for news media personnel. It covers the basics of nuclear power plants and radiation protection. The staff contemplates that a professional organization will take the lead in carrying out a longer range program under NRC sponsorship.

b. Schedule: These tasks should be completed by September 1980.

c. Resources: OPA FY80 - 0.5 my, FY81 - 0.5 my; IE FY80 - 0.1.

2. The Office of Public Affairs (OPA) will develop agency policy and provide training for interfacing with the news media and other interested parties.

a. Description:

(1) OPA will develop policy and procedures for dealing with briefing requests from State and local officials, Congress, other Federal officials, the media, and others during emergencies. A plan for prompt but accurate notification of the news media will also be included.

(2) OPA will provide training for members of the technical staff on how to interface with the news media during an emergency. Response teams will be designated and trained.

b. Schedule: The tasks were to be addressed in a Commission paper by May 1, 1980.

c. Resources: OPA FY80 - 0.1 my.

C. LICENSEE ACTIONS: None.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items F.4, G.1, G.2.a, G.2.b, and G.5

President's Response, dated December 7, 1979: Proposal E.1.b and G.1.a.

Other: NUREG-0616, Recommendation 2.4.1.3
NUREG/CR-1250, Vol. I, pp. 91, 154, 157; Vol. II, Part 2, pp. 342, 645; Part 3, pp. 986-989, 1018, 1043, 1044, 1074, 0175.

TASK III.D RADIATION PROTECTION

TASK III.D.1 RADIATION SOURCE CONTROL

A. OBJECTIVE: Perform evaluations to establish additional design features that should be included in the rulemaking proceeding of Item II.B.8. The purpose of these evaluations is to identify design features that will reduce the potential for exposure to workers at nuclear power plants and to offsite populations following an accident.

B. NRC ACTIONS

1. Primary coolant sources outside the containment structure.

a. Description: NRR will evaluate the likelihood of worker exposure and of releases of radioactivity due to potential sources of radiation and airborne radioactivity from primary coolant that may be in systems outside the containment structure following an accident. The adequacy of the existing acceptance criteria for the design of vent-gas and other systems outside the containment structure will be evaluated and the need for leak-detection systems will be determined. Criteria will then be developed for inclusion in the rulemaking of Item II.B.8.

Noble gases released to the environment during both the accident at 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 leakage detection and control, overpressurization design, pressure relief mechanisms, flow restriction, permanently installed path to vent the system to containment, system discharge point for vent-gas systems, and other systems outside the containment structure. Such evaluations may point out design features that would not only reduce airborne radioactive effluent releases during operational occurrences anticipated at a plant (such as a blown rupture disk) and accounted for in the Appendix I source term, but could also provide the benefit of reducing the potential for release from the vent-gas system and other systems outside the containment structure during accident conditions. Rulemaking for consideration of design features necessary to mitigate the consequences of degraded-core and core-melt accidents (as described in Item II.B.8) may lead to additional requirements for such systems. This action plan supplements the Lessons-Learned Short-Term Recommendation 2.1.6.a, which calls for implementation of all practical leak-reduction measures for all plant systems that could carry radioactive fluids outside the containment structure. A summary of actions that are being taken, or will be taken, follows:

(1) NRR is reviewing information submitted by operating plant licensees and near-term operating license facilities to satisfy Lessons-Learned Short-Term Recommendation 2.1.6.a pertaining to reducing leakage from operating systems and the resultant effluent releases.

(2) An NRR contractor will review information on provisions for leak detection, equipment arrangement drawings, piping drawings, and fabrication criteria (specifications) for systems (e.g., makeup and purification, RHR, RCIC, vent gas, etc.; see NUREG-0578, Section 2.1.6.a) that may contain substantial amounts of radioactivity after an accident and primary-to-secondary steam-generator leakage for selected operating reactors and for plants in the operating-license review stage. The plants will be selected to provide those typical of each NSSS supplier.

(3) NRR will develop proposed system acceptance criteria and the need for requiring leak-detection systems based on findings of item (2) above. These criteria will be included as part of the rulemaking proceeding described in Item II.B.8.

b. Schedule: NRR issued the requirement to operating reactor licensees and applicants by letters dated September 13 and 27, October 10 and 30, and November 9, 1979. NRR will complete review of program plans submitted by operating reactors and Operating-license applicants in response to Short-Term Lessons-Learned requirements in the spring of 1980. NRR will issue a contract for evaluation in the spring of 1980, and the contractor will complete review and evaluation of the selected plants in late 1980. NRR will develop proposed system acceptance criteria and the need for leak-detection systems by early 1981 for inclusion in the rulemaking proceeding of Item II.B.8.

c. Resources: NRR FY80 - 1.0 my and $135,000, FY81 - 0.5 my.

2. Radioactive gas management.

a. Description: An accident at a nuclear power plant may result in significant quantities of radioactive noble gases in the containment atmosphere. Since no noble-gas recovery systems are installed or currently planned to be installed at nuclear power plants to process these large volumes of noble gases, there is presently no viable alternative to eventual discharge of the long-lived noble gases to the environment. 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 and following various postulated accident conditions. An investigation of viable alternatives for storage or disposal of the gases will be conducted. The study will include assessment of the various potential pathways for radioactivity, such as gaseous releases, as well as considerations of accelerated rates of treatment of large gas volumes, such as those existing in large containment structures. The RES contractor will coordinate with Argonne National Laboratory, which has developed some preliminary information on noble-gas recovery through its work on the TMI-2 Recovery Programmatic Environmental Impact Statement.

b. Schedule: Research will be initiated in FY82 or later. One year of study will be required.

c. Resources: NRR first year - 0.2 my, second year - 0.2 my; RES first year - $150,000, second year - $75,000; ADM first year - 0.1 my, second year - 0.1 my.

3. Ventilation system and radioiodine adsorber criteria.

a. Description: Provisions will be made to assure that there is adequate filtration of radioactivity in ventilation exhausts and that acceptable collection efficiencies of radioiodine adsorbers are maintained during accident conditions.

(1) Based on the information obtained from the radioiodine pathway dose analysis described in Item III.D.2.2 (1) and (3), NRR will decide whether licensees should perform studies and make modifications to: (a) improve the control of airborne radioactive leakage within the auxiliary and radwaste buildings under accident conditions; and (b) provide for the collection of airborne radioactive particulates and radioiodine and their processing through filters and adsorbers before release. Damper design and operation to minimize by-pass leakage should be included in licensee's assessments.

(2) In view of the experience of TMI and other reactors and the findings and recommendations of the Special Inquiry Group, NRR will review and revise, if necessary, the design criteria of Standard Review Plans 9.4.1, "Control Room Area Ventilation System," 9.4.2, "Spent Fuel Pool Area Ventilation System," 9.4.3, "Auxiliary and Radwaste Area Ventilation System," 9.4.4, "Turbine Area Ventilation System," and 9.4.5, "Engineered Safety Feature Ventilation System," to include additional radiation protection design features. In addition, Standard Review Plans, in Sections 11 and 12, and Regulatory Guides 1.52, "Design, Testing, and Maintenance Criteria for Post Accident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorption Units for Light-Water Cooled Nuclear Power Plants," and 1.140, "Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants," will also be revised if necessary.

(3) NRR will require licensees to upgrade filtration systems 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 existing surveillance testing criteria of Regulatory Guides 1.52 or 1.140 for non-ESF filtration systems (ESF systems presently require surveillance) and to upgrade filtration systems with performance criteria developed by NRR to improve radioiodine holding capacity. NRR will amend plant technical specifications (RETS) to include the surveillance requirements.

(4) 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. The feasibility will also be investigated of (a) requiring inplace online testing of ventilation systems (such as continuous upstream/downstream sampling) to ascertain overall filter system performance, (b) requiring the development of procedures to evaluate spent carbons exposed to accident conditions, and (c) requiring committed filtration systems for accidents only. Based on the results of this research, SD will revise Regulatory Guides 1.52, "Design, Testing, and Maintenance Criteria for Engineered-Safety-Feature 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 Adsorption Units of Light-Water-Cooled Nuclear Power Plants."

b. Schedule: Initiate NRC work in FY82, or later.

c. Resources: NRR first FY - 0.3 my, second FY - 0.8 my, third FY - 1.0 my and $160,000, fourth FY - 0.2 my; IE first FY - 0.5 my, second FY - 0.1 my, third FY - 0.5 my, fourth FY - 0.5 my; RES first FY - $110,000, second FY - $115,000, third FY - $200,000, fourth FY - $100,000, fifth FY - $100,000; SD fifth FY - 1.0 my; ADM first FY - 0.2 my, second FY - 0.2 my and $10,000.

4. Radwaste system design features to aid in accident recovery and decontamination.

a. Description: An NRR contractor will evaluate radwaste system design features that will provide capability to process accident-related liquids and gases and to conduct decontamination effectively. Features to be evaluated include those that may contribute to accident mitigation (see also Item II.B.8). Factors such as capacity, shielding, layout, compatibility with expected decontamination agents, connections for portable systems, sampling overflow, multiunit impacts on shared systems, etc., will be evaluated. This generic item is related to Item II.H, "TMI-2 Cleanup and Examination," which is site specific.

b. Schedule: Initiate NRC action in FY 82, or later.

c. Resources: NRR first FY - 0.5 my and $40,000; NRR second FY - 0.5 my, contractor 1.0 my and $40,000; SD second FY - 0.3 my; ADM first FY - $10,000.

C. LICENSEE ACTIONS

1. Primary coolant sources outside the containment structure.

a. Description: Licensees are required to implement the leak-reduction program specified in NUREG-0578 Recommendation 2.1.6.a and report on implementation to the NRC. Selected operating plants and operating license applicants must gather and forward to NRR's contractor the information requested in Subtask (2) of this item.

b. Implementation: Operating reactors are to complete implementation of the leakage-reduction program by January 1980. Applicants for operating licenses are to implement the leak-reduction program before full-power operation. Selected operating and operating license review stage plants must submit the requested information for the NRR contractor by August 1980.

c. Resources: FY80 - $5,000 per plant for implementation of Recommendation 2.1.6a of NUREG-0578.

2. Radioactive gas management: No licensee or applicant action is required.

3. Ventilation systems and radioiodine adsorber criteria.

a. Description:

(1) Licensees and applicants will perform the evaluations identified by NRR and implement improvements. If filtration is needed, local filters in the areas of identified sources of radioactivity will be acceptable.

(2) Licensees and applicants will comment on revisions to the Standard Review Plan and to Regulatory Guides 1.52 and 1.140.

(3) Licensees are required to implement the site-specific surveillance testing programs described in Regulatory Guides 1.140 and 1.52 for non-ESF filtration systems and to improve filtration systems in accordance with revised performance criteria. They must submit surveillance requirements for NRC review.

(4) No licensee action involved in radioiodine adsorber research.

b. Implementation: Depends on NRC schedule.

c. Resources:

(1) 2 my per plant; $1,000,000 per plant capital expenditure (average estimate) if additional ventilation cleanup system is required for auxiliary buildings that do not now have charcoal beds installed.

(2) 0.1 my per plant to review revised Regulatory Guides.

(3) 0.1 my and $200,000 capital costs for operating reactors (assume no cost for new plants). 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.

(4) No licensee resources required for NRC-sponsored research.

4. Radwaste system design features to aid in accident recovery and decontamination: No licensee or applicant action is required.

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

E. <u>REFERENCES</u>

President's Commission Report: Item D.4.c(ii), Item D.2
President's Response dated December 7, 1979: Proposal E.1.b

Others: NUREG-0578, Recommendation 2.1.6.a

NUREG-0585, Recommendation 10

NUREG/CR-1250, Vol. I, p. 151, Vol. II, Part 2, pp 368 and 411.

Letter from Chairman, ACRS, to Commissioner Gilinsky, NRC, dated October 9, 1979

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendation C.1.e.

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for Long-Term TMI Improvements and/or For Other Power Reactor Sites," Recommendations 34, 35, 45, 46, 48, 49, 53.

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 carbon-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 made appropriately.

B. NRC ACTIONS

1. Radiological monitoring of effluents.

a. Description: NRR 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, covered in Item II.F.1), 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 background-compensating monitoring systems,

(b) establishment of a requirement for direct and potentially continuous quantification of individual radioisotopes (such as radioiodine) in effluent streams, (c) the effectiveness of various radioiodine adsorbers in sampling systems, (d) establishment of a requirement for locating effluent monitors in an area that will have a low background (from noneffluent sources) 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 study the feasibility of requiring the development of effective means for monitoring and sampling noble gases and radioiodine released to the atmosphere during a PWR steam dump. Results of the study will be used to develop criteria for backfit and forward fit. Note that the implementation of Lessons-Learned Short-Term Recommendation 2.1.8.b (covered in Item II.F.1) will require that PWR steam-safety and atmospheric-steam-dump valves have a noble-gas monitor.

(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.

b. Schedule: Initiate NRC work in FY82, or later.

c. Resources: NRR first FY - 0.3 my and $100,000, second FY - 0.35 my and $60,000; SD third FY - 0.3 my; ADM second FY - 0.2 my and $10,000.

2. Radioiodine, carbon-14, and tritium pathway dose analysis.

a. Description: Improve the understanding of radioactive iodine partitioning in the primary coolant and in the containment structure. Radioiodine, carbon-14, and tritium behavior in the environment following an accident and during normal operation will be developed.

(1) NRR will perform a study of radioiodine, carbon-14, and tritium 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. Research will be sponsored if the results of the TMI-2 study indicate that additional information is needed. Regulatory Guides 1.3, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors," and 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors," for accident source terms, and the models (GALE Code) used to predict radioiodine releases during normal operation may also be revised.

(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 radionuclide concentrations with the results calculated using the models described in Regulatory Guides 1.109, "Calculation of Annual Doses to Man from Routing Releases of Reactor Effluents for the Purpose of Evaluating Compliance With 10 CFR Part 50, Appendix I," and 1.111, "Methods for Estimating Atmospheric Transport and Dispersion for Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors." The results of the comparison will be used to develop an improved understanding of radionuclide transport through the atmosphere and food chains. Calculational methods will be modified to ensure accurate prediction of offsite public doses during the course of an accident, as well as for routine releases.

(3) NRR will determine the distribution of the chemical species of radioiodine in air-water-steam mixtures. In addition, the physical and biological transport of chemical forms of radioiodine, carbon-14, and tritium in the environment will be studied. The atmospheric behavior of radionuclides under dry and wet conditions will be studied and the effect on iodine-air-grass-milk models will be determined. A special study to determine the radionuclide environmental physical mechanism for pathway behavior under accident conditions will be conducted. The results will be used to improve calculational methodology.

(4) Depending on the results of these studies, Standard Review Plan sections and Regulatory Guides will be revised.

b. Schedule: Initiate NRC work in FY82, or later.

c. Resources: NRR first FY - 1 my and $280,000, second FY - 1.4 my and $240,000; SD first FY - 0.6 my, second FY - 1.0 my; RES second FY - $100,000; ADM second FY - 0.3 my and $25,000.

3. Liquid pathway radiological control.

a. Description: Provisions will be made, as needed, 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 food sources, etc.

(1) NRR will develop procedures to discriminate between sites/plants which should be evaluated with respect to the need and ability to interdict the consequences of a core-melt accident. Models have been developed both by NRR and Sandia Laboratories to compute the radiological doses for populations exposed to radioactivity released from core-melt accidents and transported through the liquid pathway.

The staff will use the results of the Sandia study, combined with site specific data, in a procedure to estimate the consequences of Class 9 accidents at each site and tentatively assign an order to the sites from highest to lowest on the basis of population dose in person-rems.

Most of the information necessary for this ranking will be available from NRC records. In some cases, the licensees or applicants may be requested to provide additional data. Credible release scenarios and radioactive source terms for each plant will be developed. Population dose calculations will be performed and the sites will be ranked.

(2) NRR will use the above approximate population dose evaluations to discriminate between sites and plants that require consideration of liquid-pathway interdiction techniques. The procedure will consist of a comparison

of the estimated population dose from each site with that of the four, generic, land-based sites used in NUREG-0440, "Liquid Pathway Generic Study" (LPGS), which were analyzed for a core-damage and a core-melt accident. At sites and plants for which postulated population doses are greater than for the LPGS counterpart sites (i.e., river, Great Lakes, coastal and dry sites), the feasibility of developing effective external interdiction techniques will be assessed.*

(3) NRR will assess, directly or by the use of consultants, the study sites and plants identified above to establish feasible methods of pathway interdiction. A soon-to-be-completed study by Argonne National Laboratory (ANL) is expected to establish the effectiveness of slurry-wall construction as an interdiction technique. Other techniques will be assessed, as appropriate, matched with pathway conditions identified at the study sites.

The effectiveness of various types of interdiction will be quantified by comparing the interdicted population dose with the uninterdicted population dose.

(4) NRR will prepare a summary assessment of (a) the postulated effects, via the liquid pathway, on population doses; (b) the potential (modification) of the doses by site-specific interdiction techniques; (c) the feasibility of the techniques, and (d) attendant ground and surface water-monitoring requirements. The summary will serve as a part of the basis for the rulemaking on degraded cores (see item II.B.8).

b. Schedule: Some assessments have been completed and assessment of high-population-density sites (see item II.B.6) has been started. This and other work, if feasible, will be factored into the rulemaking. Additional site assessments will be initiated in FY82, or later.

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*There is no implication that the LPGS population doses meet any acceptability criterion. The determination that interdiction is feasible and effective, however, for plant sites worse than the LPGS sites, establishes that interdiction can be designed for any site that exhibits unacceptable dose characteristics.

c. Resources: Developing methods to estimate population doses at each site: 0.5 my and $15,000; gathering site-specific data from NRC records and requesting information from licensees and applicants where needed for dose calculation: 1.5 my; performing calculations of population doses and ranking on all sites: 1.0 my; gathering site-specific data and requesting information from licensees and applicants for mitigation and interdiction at sites identified in (2) above: 0.15 my; performing study of feasibility of interdiction and resultant population-dose reduction at identified plants: 1.0 my and $30,000.

4. Offsite dose measurements.

a. Description: Additional means are required for determining dose rates and doses associated with large accidental releases of radionuclides.

(1) RES will study the feasibility of 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 and desirability of providing the information in the control room or in another appropriate technical support center will be determined. This activity supports proposed revisions to Regulatory Guide 1.97 (Item II.F.3) and will provide a basis for further changes to the Guide as results become available.

(2) IE will place 50 TLDs around each site in coordination with States and utilities. During normal operation, IE quarterly reports from these dosimeters 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:

(1) The dose rate measurement desirability and feasibility study is to be initiated in FY 80. The results of the study will be reported to the Commission with recommendations and alternatives.

(2) IE will complete TLD installation before full-power operation of new reactors and by August 1980 for operating reactors.

c. Resources:

(1) NRR FY81 - 0.5 my; RES FY80 - 0.1 my and $400,000 for contract, FY81 - 0.1 my.

(2) IE FY80 - 5 my and $200,000 for contract to install TLDs, FY81 - 3 my and $100,000 for contract; ADM FY80 - 0.2 my, FY81 - 0.1 my and $7,000.

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: Initiate NRC work in FY82, or later.

c. Resources: NRR first FY - 0.7 my and $80,000 for contract, second FY - 0.1 my; IE second FY - 0.2 my.

6. Independent radiological measurements.

a. Description: An IE task force has developed a plan and requirements for upgrading the capability of Regional Offices to perform independent radiological measurements during routine inspections and emergency response operations. The objective of the upgrade is to achieve consistent capability among the regional offices, including standardization in major equipment items, such as mobile laboratory vans, gamma spectrum analysis equipment, radiation survey instrumentation, and air-sampling and monitoring devices. The inspection program will be revised to reflect requirements for independent measurements during inspections and investigations. The procedural work for emergency response under Item III.A.3.1

will contain guidance and policy for independent measurements during emergency operations.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

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 18 months after issuance of revised criteria. If vendors cannot supply upgraded monitors in time for installation within the prescribed time period, the monitors 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.

2. Radioiodine, carbon-14, and tritium 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: Licensees and applicants 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.

b. Implementation: Depends on NRC schedule and on results of the rulemaking of Item II.B.8.

c. Resources: Because of the presently unknown characteristics of mitigation requirements, no firm estimates of capital costs can be made. For the plants requested to submit additional information as much as 4 mm per plant could be required.

4. Offsite dose measurements.

a. Description: Based on the results of the feasibility study, plants could be required to install a system of detectors capable of real-time monitoring.

b. Implementation: This depends on the results of the feasibility study.

c. Resources: The NTOL portion of this action item is NRC cost only (installing TLDs at each site) Licensee cost to be determined upon completion of the study.

5. Offsite dose calculation manual.

a. Description: Licensees must rewrite procedures to implement the new calculational manual.

b. Implementation: Depends on NRC schedule. Procedures must be complete 18 months after NRC issues the requirement.

c. Resources: 0.2 my and $5,000 capital cost per plant (for printing).

6. Independent radiological measurements: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Items D.2, D.4.c(ii), D.5, E.4.a
President's Response dated December 7, 1979: Proposal E.1.b

Other: NUREG-0440
NUREG-0578, Recommendation 2.1.8.b
NUREG-0616, Recommendations 2.2.2, 2.6.1.5, 3.6.3, 3.9.3, 3.14.3
NUREG-0625
NUREG/CR-1250, Vol. I, p. 137, Vol. II, Part 2, pp. 342 and 395, and Part 3, pp. 874, 988, 1074, and 1075.
Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for Long-Term TMI Improvements and/or For Other Power Reactor Sites," Recommendations 9, 11, 12, 13, 16, 27.

TASK III.D.3 WORKER RADIATION PROTECTION IMPROVEMENT

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) that 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.

The results of the following task action items will be incorporated into the RPP; Item I.A.1, "Operating Personnel and Staffing," to determine the necessary number and types of radiation protection personnel for each shift and to investigate the desirability of separation of the radiation protection and chemistry functions; Item I.A.2, "Training and Qualifications of Operating Personnel," to review the training program for radiation protection personnel and develop new regulations or guides for such personnel; Item I.A.3, "Licensing and Requalifications of Operating Personnel," to study the need for licensing radiation protection personnel; and Item I.B.1, "Organization and Management Criteria," to determine the organization and qualifications of the radiation protection staff.

(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 and will send an information notice to licensees providing clarification that all health physics personnel, including temporary contractor personnel, must meet the technical specification training and qualifications requirements.

(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: Initiate NRC work in FY82, or later.

c. Resources: NRR first FY - 2 my, second FY - 0.1 my per site for 40% of sites, third FY - 0.1 my per site for 60% of sites; SD first FY - 0.7 my, third FY - 0.2 my; IE first FY - 0.55 my; ADM first FY - 0.1 my and $10,000, second FY - 0.2 my and $20,000.

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 (utilities could themselves become certified if they desire).

(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, the Los Alamos Scientific Laboratory 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. NRR will evaluate the need to specify the quantity and types of respirators necessary for normal and emergency use.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

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).

(2) NRR will set criteria requiring licensees to evaluate in their plants the need for additional survey equipment and radiation monitors in vital areas and requiring, as necessary, installation of area monitors with remote readout. NRR will evaluate the need to specify the minimum types and quantities of portable monitoring instrumentation, including very high dose rate survey instruments. 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.

(3) SD will issue a rule change providing acceptable methods for calibration of radiation-monitoring instruments.

(4) SD will issue a Regulatory Guide providing acceptable methods for calibration of air-sampling instruments.

b. Schedule: NRR issued requirements regarding radioiodine monitoring by letter to licensees and applicants on September 13 and 27, October 10 and 30, and November 9, 1979. NRC work on requirements regarding area monitors and portable instrumentation will be initiated in FY82, or later. Items (3) and (4) above are Decision Group D items; schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: NRR FY 80- 0.3 my and $60,000 for contract, FY81 0.1 my and $120,000 for contract; IE FY80 - 0.1 my, FY81 - 0.2 my; ADM FY 80 - 0.1 and $5,000, FY81 - 0.1 my and $5,000.

4. Control room habitability.

a. Description: NRR will follow a two-step approach to assure that workers are adequately protected from radioactivity, radiation, and other hazards, and that the control room can be used in the event of an emergency. First, 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 do the evaluations and establish a schedule for necessary modifications. This will be a condition of full-power operation for near-term operating license facilities. Then, NRR will, in conjunction with the rulemaking proposed in Item II.B.8, examine and evaluate other sources and pathways of radioactivity and radiation that may lead to control room habitability problems, and will, if necessary, make changes in the requirements of the Regulatory Guides and the Standard Review Plan. Such potential internal (to the plant) pathways for potential control room contamination were flagged by the TMI-2 accident. Review and quantification of potential control room operator doses due to such airborne radioactivity ingress and radiation penetration from pathways internal to plant structures will be the basis for such changes.

b. Schedule: NRR will issue the requirements for operating reactors in May 1980, regarding the existing criteria listed above. NRR will complete evaluation of licensee responses and notify licensees of acceptance by July 1981. IE will complete inspections on a case-by-case basis for conformance by no later than July 1983. Longer term changes in criteria will be dependent on the results of the rulemaking proceeding on degraded cores.

c. Resources: NRR FY80 - 0.7 my, $110,000, FY81 - 1.2 my, $90,000; IE FY80 - 0.1 my, FY81 - 0.7 my; ADM FY80 - 0.1 my, FY81 - 0.2 my.

5. Radiation worker exposure data base.

a. Description: NRC will continue its efforts to improve and expand the data base on industry employees to facilitate possible future epidemiological studies on worker health.

(1) The NRC staff has been actively engaged in this and similar efforts for some time. Examples are our participation in the working groups of the Interagency Task Force on the Health Effects of Ionizing Radiation (the so-called Libassi Committee), the Fredrickson Committee on Federal Research on the Biological Effects of Ionizing Radiation Research (NIH), and the Upton Subcommittee on TMI Followup Studies (NIH).

More recently, NRC and NIOSH have been cooperating to establish a worker registry at TMI to facilitate possible future health studies. We also have been in contact with EPRI to investigate expansion of our efforts to the entire U.S. nuclear utility industry. In addition, SD has funded an epidemiology feasibility and planning study which, among other things, will provide information on how to improve the worker's health and exposure data base.

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 (both within and outside of the workplace).

(2) NRC will investigate methods of obtaining employee health data by nonlegislative means until such time as legislation is passed allowing routine collection of these data by NRC.

(3) SD will, following appropriate legislative action to permit such regulatory requirement, revise 10 CFR 20 to require licensees to collect worker data.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources are to be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTIONS

1. Radiation protection plans.

a. Description: Operating reactor licensees 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 15 months after issuance of requirement by NRC; operating license applicants will complete before fuel loading or by 15 months after issuance of requirement by NRC, whichever is later.

c. Resources: 1.0 my per reactor; $5,000 for printing RPP and related procedures.

2. Health physics improvements: This is a Decision Grouo D item.

3. Inplant radiation monitoring.

a. Description: Licensees must evaluate locations and ranges of radio-iodine 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 operating license applicants shall (1) have radioiodine detection capability by January 1, 1980 or before fuel loading, whichever is later, (2) have the capability to accurately measure radioiodine concentrations by January 1, 1981 or before the operating license is issued, whichever is later, and (3) add area monitors and a low-background area for iodine analysis by June 1982 or before the operating license is issued, whichever is later.

c. Resources: Evaluation of radioiodine detection capability will require 0.2 my per reactor, and the addition of monitors will require 0.2 my and $50,000 per monitor.

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 January 1981, and modifications must be complete by January 1983; operating license applicants will provide schedules for necessary modifications before full-power operation.

c. Resources: 2.0 my and $500,000 per reactor for operating reactors. Estimate one-tenth of this for NTOLs that are likely to be substantially in compliance with existing guidance.

5. Radiation worker exposure data base: This is a Decision Group D item.

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

E. <u>REFERENCES</u>

President's Commission Report: Items A.4.c.3(iii), A.5, E.1.c, E.4
President's Response, dated December 7, 1979: Proposal E.1.b and E.1.d

Other: NUREG-0578, Recommendation 2.1.8.c

NUREG-0616, Recommendations 2.5.5.1, 2.6.1.5

NUREG/CR-1250, Vol. I, p. 155; Vol. II, Part 2, pp. 342, 411, 419, 420, 421, 424, 429, 430, 432, 438; Part 3, p. 874.

NUS-3364, "Generic Review of the Health Physics Program at the Three Mile Island Nuclear Station," March 20, 1979

Letter from Chairman, ACRS, to Chairman, NRC, dated March 11, 1980; Subject: "ACRS Report on NTOL Items from Draft 3 of NUREG-0660, NRC Action Plans Developed as a Result of the TMI-2 Accident"

Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, October 16, 1979, Subject: "Operations Team Recommendations-IE/TMI Unit 2 Investigation," Recommendations C.1.a, C.1.e.

Memorandum from J. M. Allan, NRC Region I, to J. H. Sniezek, September 28, 1979, Subject: "IE/TMI Radiological Investigation Team Recommendations for Long-Term TMI Improvements and/or For Other Power Reactor Sites," Recommendations 10, 17, 18, 21-23, 25, 26, 28, 32, 34, 39-44.

CHAPTER IV

PRACTICES AND PROCEDURES

INTRODUCTION

Both Chapters IV and V deal with actions that are directed primarily toward NRC. In this chapter, actions are described that have the purpose of improving the practices and procedures of the agency and thereby improving the safety regulation of nuclear power plants.

One area of improvement is the formulation, issuance, and enforcement of regulatory requirements. By providing for greater public participation, improving the present rulemaking procedures, and periodically reevaluating existing rules, NRC will formulate better regulatory requirements. The present NRC practices for issuing instructions and information to licensees are to be studied to determine whether the process can use NRC and licensee resources more effeciently. The enforcement of requirements is to be improved by requesting increase in the civil penalties currently allowed by law and by revising enforcement policy to use currently available sanctions more effectively.

The improvement of NRC inspections by reexamining training requirements and programs is to be studied by IE. An investigation of the requirements, if any, or other actions that should be taken regarding the effect on safety due to financial status or regulation of utilities is also being performed. Improvements in the closely associated area of safety decision-making are also included. These actions include expanded research on the quantification of safety objectives; development of a plan for the early identification, assessment, and resolution of safety issues; implementation of a specific plan for resolving issues applicable to plants under construction before major financial commitments are made; and the development of a program for resolving generic issues by rulemaking.

IE will also develop a plan for the systematic assessment of the safety of all operating reactors.

NMSS will study the possible application of the lessons learned from TMI to other areas in which a potential for nuclear accidents may exist.

TASK IV.A STRENGTHEN ENFORCEMENT PROCESS

A. OBJECTIVE: Substantially improve licensee awareness of 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. Seek legislative authority.

a. Description: NRC has requested Congressional approval to increase the civil penalty limit to $100,000 per violation with no upper limit on the number of violations. NRC is presently considering whether it is desirable to seek further legislative modifications to (1) permit civil penalties for a category of 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. (See also II.J.1.3, "Increase regulatory control over present nonlicensees.")

b. Schedule: The approval of increased civil penalty limit will be implemented upon Congressional approval. A Commission paper will be written on the other items being considered by October 1980. OGC is the lead office.

c. Resources: OGC FY80 - 1 my; ELD - 0.5 my; IE - 0.2 my.

2. Revise enforcement policy.

a. Description: NRC is revising its enforcement policy and guidance for the imposition of civil penalties, orders, and other sanctions. Consideration will be given to the use of 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. IE has the lead responsibility.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in the connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTIONS: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Recommendations A.11.c and A.11.f

Other: NUREG-0616, Recommendations 2.6.2.1 and 2.8

President's Response dated December 7, 1979, Proposal A.6.c

NUREG/CR-1250, Vol. II, Part 1, p. 24

TASK IV.B ISSUANCE OF INSTRUCTIONS AND INFORMATION TO 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.

B. NRC ACTIONS

1. Revise practices for issuance of instructions and information to licensees.

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 inefficiency or duplication results. 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 IE as the lead office) will be established to review overall NRC practices concerning issuance of information to licensees, requests 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: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTION: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES:

President's Commission Report: None

Other: NUREG/CR-1250, Vol. II, Part 1, p. 25
NUREG-0616, Recommendations 2.3.1 and 3.16.1
Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979,
Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station
Unit 2"

TASK IV.C EXTEND LESSONS LEARNED TO LICENSED ACTIVITIES OTHER THAN POWER REACTORS

A. OBJECTIVE: Assure that the lessons learned from TMI are applied to other NRC programs.

B. NRC ACTIONS

1. Extend lessons learned from TMI to other NRC programs.

a. Description: The lessons learned from TMI will 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 will 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 NMSS will be completed by November 1, 1980, and the results, with appropriate recommendations, will be submitted for Commission consideration by December 1, 1980. NRR has deferred its study to FY82 and beyond.

c. Resources: NMSS FY80 - 2.0 my; NRR - 0.5 my first year.

C. LICENSEE ACTIONS: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: None

Other: NUREG-0616, Recommendations 3.13.11.1, 3.15.2, 3.15.3

TASK IV.D NRC STAFF TRAINING

A. OBJECTIVE: Improve and expand the NRC training program for the technical staff and resident inspectors, including, where appropriate, hands-on training; establish a program to provide technically qualified entry-level professionals to counter recruiting difficulties resulting from increased industry demands and reduced university output.

B. NRC ACTIONS

1. NRC staff training.

a. Description: The Office of Inspection and Enforcement intends to conduct a needs analysis of technical training requirements and to reexamine its training program in reference to this analysis. Inspector training and reactor technology training will be modified accordingly. Contractor support will be needed to:

(1) Determine skills required to perform professional duties.

(2) Compare skills of the newly hired and incumbents to job skill requirements; identify deficient areas which can be improved through change in IE training.

(3) Develop or modify courses to meet identified requirements.

In addition, the following actions are currently under way:

(1) Simulator training is being increased.

(2) NRC has identified relevant graduate-level education in the areas of Safety, Safety Management, Systems Management, and Engineering Systems Analysis and Management, and will fund such education as Master's degree programs.

(3) NRC is developing the alternatives available to obtain qualified technical employees and inspectors in a climate of heavy competition for nuclear engineers and nuclear-trained individuals. A major shortage has been created by Lessons Learned and Action Plan-based industry requirements and shrinking university output.

b. Schedule: Contractor assistance to the Office of Inspection and Enforcement should commence in late fall 1980 and is expected to require approximately nine months to complete. Simulator training is currently being expanded. The degree programs are currently funded. A Commission paper will be presented in late spring 1980 by ADM on the recruitment and subsequent education of college graduates.

c. Resources: ADM FY80 - 0.27 my and $197,000, FY81 - 0.32 my and $187,000.

C. LICENSEE ACTIONS: No licensee action is required.

D. OTHER ACTIONS: Courses may be expanded to include participants from relevant State and Federal agencies.

E. REFERENCES

President's Commission Report: None

Other: NUREG/CR-1250, Vol. I, p. 101, 120; Vol. II, Part 3, p. 911
Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Interim Report No. 3 on Three Mile Island Nuclear Station Unit 2"
Letter from Chairman, ACRS, to Chairman, NRC, dated December 13, 1979, Subject: "Report on TMI-2 Lessons Learned Task Force Final Report"
NUREG-0601, Recommendations 2.3.3.3, 2.4.1, 3.7.2, 3.7.3, 3.10.4, 3.15.5.1
Memorandum from J. M. Allan, NRC Region I, to N. C. Moseley, IE, October 16, 1979, Subject: "Operations Team Recommendations - IE/TMI Unit 2 Investigation" Recommendations A.1.b, A.1.c, B.1.b

TASK IV.E SAFETY DECISION-MAKING

A. OBJECTIVE: To develop plans for an integrated program of safety decision-making. These plans include (1) an expanded program of regulatory research covering methodologies for making safety decisions and safety-cost tradeoffs, with application both to decisions regarding the overall risk of nuclear power plants and the nuclear fuel cycle and to specific licensing and inspection decisions; (2) early resolution of safety issues after they are identified, including application of the decisions to operating reactors, reactors under construction, and standard designs; (3) elimination of repetitive consideration of identical issues at several stages of the licensing process; (4) expanded use of rulemaking to implement safety criteria developed as a result of the various Task Action Plans; and (5) improved and expanded systematic assessments of operating reactors.

B. NRC ACTIONS:

1. Expand research on quantification of safety decision-making.

a. Description: The purpose of this task is to proceed toward better quantification of safety objectives, including safety-cost tradeoffs. The concept will use ongoing research that one might quantify risk and possible application of formal decision-making techniques to the regulatory environment. Future programs will build on the risk assessment and systems reliability work currently under way and incorporate a better assessment of common-mode and human failures. Safety objectives will be developed for components and systems, and eventually these might be amalgamated into a more tightly bounded, quantitative safety standard, as opposed to a safety objective having fairly large inherent uncertainties. The RES program for this task, in cooperation with the other program offices, follows:

(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) with cooperation from other professional societies.

(2) Brookhaven National Laboratory has been contracted to independently formulate criteria to investigate the implications of safety criteria and to determine the impact of attempting to satisfy such criteria.

(3) Decision theory and survey methods for obtaining criteria are being investigated as extensions of previous projects on risk analysis. These methods can provide a separate approach to obtain acceptable risk criteria.

(4) Negotiations are under way with various governmental and private agencies for information on proposed criteria. In addition, letters have been sent to several hundred individuals announcing the project and requesting their contributions.

(5) To assure that the criteria receive rigorous peer review, negotiations are under way with the National Science Foundation, the National Academy of Sciences, and the American Statistical Association.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine agency budgetary processes.

c. Resources: See "Schedule" above.

2. Plan for early resolution of safety issues.

a. Description: NRR, in consultation with other appropriate offices, will develop a plan for the early identification, assessment, and resolution of safety issues. This plan will include the following elements:

(1) Identification of possible safety issues through evaluation of operating experience (item I.E), results of safety-related research, results

of risk assessment analyses (item II.C.1), licensing reviews by the NRC staff and ACRS, and public allegations.

(2) Decisions identifying those issues that are deemed to have substantial potential for adverse impacts on safety.

(3) Explicit time requirements for notifying Boards of these issues.

(4) Development of a timely program for evaluating the significance of each issue and determining any appropriate resolution, including realistic evaluations of expected plant responses to combinations and permutations of events or potential failure sequences and the subsequent course, consequences, and probabilities of possible accidents.

(5) Development of recommended changes to the regulations, Standard Review Plan, review methods, and/or inspection procedures to implement any necessary criteria resulting from the evaluation of the problem, including criteria for modification of standardized designs.

(6) A management and quality assurance program to assure the effective and reasonable implementation of the program and effective interaction with the industry and the public.

b. Schedule: The plan will be completed for presentation to the Commission by October 1980.

c. Resources: NRR FY80 - 1.0 my; SD, RES, AEOD, IE FY80 - 0.1 my each.

3. Plan for resolving issues at the construction permit stage.

a. Description: NRR and ELD transmitted a consent calendar item to the Commission on February 14, 1980, entitled "Response to Staff Requirements Memorandum (Affirmation Session 79-40) With Respect to Post-CP Design and Other Changes" (SECY-80-90). This paper discussed five options regarding the establishment of construction requirements: (1) status quo, (2) establishing general criteria for determining circumstances requiring notification and construction permit amendment, (3) a more prescriptive approach to defining "principal architectural and engineering criteria," (4) requiring compliance with all details in the Preliminary Safety Analysis Report, and (5) requiring all plant design details at the construction permit stage. The recommendation of this consent paper is to publish an advance notice of public rulemaking to obtain comments on these options.

After receipt of public comment on the above, the staff will prepare a plan to implement methods to resolve as many issues as possible at the construction permit stage before major financial commitments in construction occur. Such a plan will consider previous work done in conjunction with proposed licensing legislation. In addition to the five options described above (which could require 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, review by steps of design implementation during the course of construction, and/or consideration of the issuance of the equivalent of Technical Specifications for construction or other criteria governing construction or the necessity to amend the construction permit), the plan will include (1) an assessment of hearing rights under the present statute, (2) an assessment of needed revisions to the construction permit format, (3) identification of possible incentives (or a mandate) to use standard designs (this interfaces strongly with the results of item IV.E.2, which could be a disincentive to standardization), and (4) identification of any needed rulemaking or legislative changes. The plan will include consideration of whether to use an outside "blue ribbon" committee, an inside task force, or other arrangements to develop any proposed position or rules, and will discuss methods for industry and public input.

b. Schedule: The plan will be prepared in FY82 or later. Subsequent implementation will depend on Commission action on the plan.

c. Resources: First year - 2.0 my technical, 0.5 my ELD.

4. Resolve generic issues by rulemaking.

a. Description: Although the Commission already makes use of rulemaking to resolve generic issues, means to enhance the Commission's rulemaking efforts are addressed in a "Preliminary Statement on General Policy for Rulemaking to Improve Nuclear Power Plant Licensing" (NUREG-0499, November 1978), and some of the action items in this plan specifically call for additional rulemaking. SD will undertake the additional task of developing a program, in coordination with other offices, for reviewing new criteria before their promulgation to determine whether rulemaking would be the desirable means of implementation. The intent will be to implement new NRC criteria by rule, wherever feasible and timely, instead of by license changes, orders, or changes in regulatory guides.

b. Schedule: By January 1981, SD will develop a program for review of new criteria for the desirability of rulemaking.

c. Resources: SD FY80 - 0.4 my, FY81 - 0.7 my; ADM FY80 - 0.1 my.

5. Assess currently operating reactors.

a. Description: NRR, in consultation with other appropriate offices, will develop a plan for approval by the Commission for the systematic assessment of the safety of all operating reactors. Development of such a plan will take into account the SEP program, the ACRS comments on the program, the IREP plan, and on-going TMI lessons learned activities. There will be a discussion of options for accomplishing the assessments, such as (1) a complete review of all operating plants against all requirements in the regulations, and (2) a review of all operating plants against selected requirements, chosen on a judgment/risk assessment basis, designed to represent areas of greatest potential for improving safety. Implementation of any plan will require substantial NRC and industry resources for several years; therefore, such a plan will have to address priorities and the methodology of making safety-cost tradeoffs in a substantive manner. Currently proposed legislation (the Bingham amendment), if enacted, would require all operating reactor licensees to report the conformance of their plant(s) to (1) NRC regulations and (2) the resolution of generic safety issues. It is proposed in this amendment that these reports be compiled, analyzed, and sent to Congress by NRC.

b. Schedule: The Commission paper will be completed and presented to the Commission for approval by July 1, 1980.

c. Resources: NRR FY80 - 0.5 my; RES FY80 - 0.1 my; IE FY80 - 0.2 my; SD FY80 - 0.1 my.

C. <u>LICENSEE ACTIONS</u>: No licensee action is required.

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

E. <u>REFERENCES</u>:

President's Commission Report: Recommendations A.4, A.8.a, A.9.b, A.10, A.10.a, A.10.b, A.11.a, A.11.e

Other: NUREG-0585, Recommendations 11 and 12
NUREG-0616, Recommendation 2.6.1.2
NUREG/CR-1250, Vol. I, pp. 141, 142, 148, 150 and 151; Vol. II, Part 1, pp. 24-25, 105, 138
Commission letters of December 17, 1979, and January 3, 1980, to the Honorable Morris Udall
Letter from Chairman, ACRS, to Chairman, NRC, dated December 17, 1979, Subject: "A Review of NRC Regulatory Processes and Functions"
Letter from Chairman, ACRS, to Chairman, NRC, dated December 13, 1979, Subject: "Report on TMI-2 Lessons Learned Task Force Final Report"
Letter from Chairman, ACRS, to Chairman, NRC, dated October 11, 1979, Subject: "Systematic Evaluation Program"
Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Report on Quantitative Safety Goals"

TASK IV.F FINANCIAL DISINCENTIVES TO SAFETY

A. OBJECTIVES: Public safety may be enhanced through the reduction of disincentives to safety resulting from financial pressures on the utility at the construction, operation, and decommissioning stages.

B. NRC ACTIONS

1. Increased IE scrutiny of the power-ascension test program.

a. Description: Inspection by NRR and IE of the power-ascension test program will be increased to make certain that full attention is paid to safety during the expanded startup test program and the power ascension test program, and that the economic incentives to avoid further delay in commercial operation do not detract from the attention paid to safety, particularly for plants that have been completed and are awaiting issuance of an operating license. All tests on all shifts will be witnessed by NRC personnel.

b. Schedule: The schedule will be in conformance with each facility's startup testing program.

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

2. Evaluate the impacts of financial disincentives to the safety of nuclear power plants.

a. Description: NRR, in consultation with SD, RES, and IE, will study the recommendations of the NRC/TMI Special Inquiry Group and focus on questions such as the following:

(1) Does the financial status of a utility impact safety or indicate when impacts of a safety nature may occur?

(2) Would continuing evaluation of a licensee's financial condition be a useful method to alert IE to times when the licensee might be tempted to cut corners, or are there more pragmatic actions that accomplish this objective?

(3) Will improved communications with NARUC, PUCs, IRS, and FERC sufficiently increase their understanding of a sensitivity to safety matters and financial disincentives?

(4) Do the requirements of the various financial regulatory agencies result in reducing nuclear safety, and, if so, how could improvements in financial regulation best be achieved?

Recommendations will be made to the Commission as to what, if anything, the NRC should do regarding each of these questions.

b. Schedule: The Commission requested that this action be completed by April 11, 1980 (SECY-79-299).

c. Resources: NRR FY80 - 0.3 my; FY81 - 0.3 my.

C. LICENSEE ACTIONS: No licensee action is required.

D. OTHER ACTIONS: Discuss the subject with other State and Federal bodies such as public utility commissions and FERC, as needed.

E. REFERENCES:

President's Commission Report: Recommendations A.5 and B.6

Other: NUREG-0616, Recommendation 2.2.3.3
NUREG-0584, Rev. 1, Assuring the Availability of Funds for Decommissioning Nuclear Facilities
NUREG/CR-1250, Vol. I, p. 164; Vol. II, Part 1, pp. 241-246

Also, there are a number of NRC Special Inquiry recommendations that relate to improved training and/or testing of equipment, and item 1 would partially accommodate these improvements as well as provide added assurance that any financial disincentives that might exist would not affect safety.

SECY-79-299, Generic Issue of Financial Qualifications.

SECY-80-60, Assuring Licensee Financial Arrangements for Recovery from a Major Accident

Memorandum J. M. Allan, NRC Region I, to N. C. Moseley, IE, October 16, 1979, Subject: "Operations Team Recommendations - IE/TMI Unit 2 Investigation" Recommendation B.2.c

TASK IV.G. IMPROVE SAFETY RULEMAKING PROCEDURES

A. OBJECTIVE: Improve NRC rulemaking procedures to provide a greater opportunity for public participation, to assure a periodic and systematic reevaluation of NRC rules, and to include appropriate provision for backfitting in all new regulations. (Item V.12 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: ADM/DRR, in consultation with other program offices, will publish a semiannual agenda for significant rulemaking actions as called for in Executive Order 12044. SD will develop the "criteria for determining significant regulations," as called for in Section 2e of Executive Order 12044. At present, NRC issues quarterly status reports on petitions for rulemaking and proposed rules, a status summary report listing those regulations under development by SD, and publishes advance notice of proposed rulemaking on major actions.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

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 and that regulations be written in plain English. It will first review its rules for content, quality, and clarity 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 accident at Three Mile Island. These include rules involving operator training, emergency planning, environmental monitoring, radiation protection, and consistent treatment of fission product release from fuel cladding failure. The initial review should be completed within five years and repeated every five years thereafter.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

3. Improve rulemaking procedures.

a. Description: NRC will 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. NRC will then consider a proposal to codify in NRC regulations and practice a procedure under which all new rules would include consideration of backfitting to existing plants.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

4. Study alternatives for improved rulemaking process.

a. Description: NRC will study alternatives to the present rulemaking system. Several means to enhance the Commission's rulemaking efforts have been addressed, in part, in a "Preliminary Statement on General Policy for Rulemaking to Improve Nuclear Power Plant Licensing" (NUREG-0499, December 1978), in Supplement 1 to NUREG-0499 (December 1978), and in the OGC/OPE Memorandum to the Commission on "Review of Delegations of Authority Within NRC" (October 4, 1979). In addition, the Commission has delegated substantial rulemaking authority to SD. Procedures are being developed to effect this delegation of authority.

b. Schedule: This is a Decision Group D item. Therefore, schedules and resources will be developed in connection with routine NRC budgetary processes.

c. Resources: See "Schedule" above.

C. LICENSEE ACTIONS: No licensee action is required.

D. OTHER ACTIONS: None.

E. REFERENCES

President's Commission Report: Recommendations A.9.a, A.9.c, A.9.d
President's Response dated December 7, 1979, Proposal A.6.a

Other: NUREG-0499: "Preliminary Statement on General Policy for Rulemaking to Improve Nuclear Power Plant Licensing" (December 1978)
NUREG/CR-1250, Vol. 1, p. 142; Vol. II, Part 1, pp. 24-25
Supplement 1 to NUREG-0499 (December 1978)
Letter from Chairman, ACRS, to Chairman, NRC, dated December 13, 1979, Subject: "Report on TMI-2 Lessons Learned Task Force Final Report"
Letter from Chairman, ACRS, to Chairman, NRC, dated December 17, 1979, Subject: "A Review of NRC Regulatory Processes and Functions"

TASK IV.H NRC PARTICIPATION IN THE RADIATION POLICY COUNCIL

A. <u>OBJECTIVE</u>: To respond to the President's request for NRC participation in the Radiation Policy Council.

B. <u>NRC ACTIONS</u>

1. NRC participation in the Radiation Policy Council.

a. Description: In his announcement of December 7, 1979 regarding TMI-2, the President requested, among other things, that NRC "submit for review all actions affecting workers and public health and safety to the Radiation Policy Council." NRC plans to be an active participant on the Radiation Policy Council. The NRC representative on the Council has been designated and NRC has already submitted a list of candidate topics for the initial council meeting. Through this representation, the Council will be made aware of and can review NRC actions affecting worker and public health and safety.

b. Schedule: Not applicable; this will be a continuous commitment.

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

C. <u>LICENSEE ACTIONS</u>: No licensee action is required.

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

E. <u>REFERENCES</u>:

President's Commission Report: Items A.4.c.iii, E.2
President's Response dated December 7, 1979, Proposal E.1.a

CHAPTER V
NRC POLICY, ORGANIZATION, AND MANAGEMENT

INTRODUCTION

This chapter discusses two fundamental assertions: (1) NRC has not articulated a substantive safety standard or policy that underlies its regulatory decisions; and (2) present NRC organization and management is inadequate to protect public health and safety. These assertions follow from several basic conclusions of the President's Commission on TMI and the NRC Special Inquiry Group.

The first item in Chapter V serves as the means for the Commission to develop and articulate the substantive safety standard for its nuclear regulatory decision-making. The remaining items consider primarily the various organizational, management, and licensing process issues. In each of these items the central issue is whether safety and other relevant considerations necessitate or justify substantive or procedural reform. Although no item explicitly considers questions about agency and industry attitudes toward safety, it is recognized that these questions must be resolved in the day-to-day actions of NRC and licensees, rather than as a result of completing a discrete task item.

Individual items in this chapter contain areas for study. Subsequent Commission decisions can be expected to refine the scope of many of the items. Completion of the work described in the items will suggest alternatives and directions for possible NRC reform. Actual reform will depend on future Commission decisions and commitments.

NOTE: The decisions required in this chapter will be made by the Commission. The Commission staff will review each item and prepare the necessary decision papers for future action by the Commission.

V. NRC POLICY, ORGANIZATION AND MANAGEMENT

A. OJBECTIVE: Further delineation of substantive safety policy by NRC and strengthened organization and management within the agency. The Commissioners propose to address the substance of these recommendations as indicated in the items below. The timing for each item depends upon the Commissioners' decisions; therefore, no time schedule is set forth.

B. COMMISSION ACTIONS

1. Develop NRC policy statement on safety.

a. Description: The Commission will issue an explicit statement of safety policy that includes the considerations with respect to safety-cost tradeoffs and that proposes a standard for "how safe is safe enough" to be considered by Congress, the President, and the general public.

b. Schedule: To be determined by the Commission.

c. Resources: To be determined (lead: OGC/OPE)

2. Study elimination of nonsafety responsibilities.

a. Description: The Commission will review nonsafety and nonsafeguard regulatory review responsibilities, including antitrust, NEPA, and exports. The Commission will examine whether removal of these responsibilities would leave gaps in Federal regulation, and whether they may be transferred to other agencies.

b. Schedule: To be determined by the Commission.

c. Resources: Dependent upon Commission decision.

3. Strengthen role of Advisory Committee on Reactor Safeguards

a. Description: The Commission will 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. Schedule: To be determined by the Commission.

c. Resources: Dependent on Commission decision (ACRS FY80 - 10 my, if President's Commission recommendations were adopted by the Commission).

4. Study need for additional advisory committees.

a. Description: A determination will be made as to 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. Schedule: To be determined by the Commission.

c. Resources: OPE - 0.2 my.

5. Improve public and intervenor participation in hearing process.

a. Description: The Commission will assess alternative methods to enchance 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 the Office of Public Counsel recommended by the NRC Special Inquiry Group or concepts used by some Public Service Commissions). If desirable, the Commission will propose the needed legislation.

b. Schedule: To be determined by the Commission.

c. Resources: OGE/OELD FY80 - less than 1 my each.

6. Study construction-during-adjudication rules.

a. Description: The rulemaking will be completed on whether construction should be permitted while challenges to a construction permit authorized by a licensing board are under administrative adjudication. (See also item 17 of this chapter concerning the role of the Commission in adjudication.)

b. Schedule: To be determined by the Commission.

c. Resources: OGC FY80 - less than 1 my.

7. Study the need for TMI-related legisation.

a. Description: The Commission will study the need for legislation with respect to the following:

(1) Clarification of NRC authority to issue a license amendment prior to a hearing when necessary to ensure the health and safety of the public.

(2) Determination of whether NRC should seek an amendment to the Sunshine Act to reduce the Act's requirements for Commission meetings during an emergency.

(3) 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) The continuing desirability of the Price-Anderson Act in two areas: (a) extraordinary nuclear occurrence and (b) limitation on liability.

(5) 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.

(6) The need for new or modified NRC authority to address the establishment of a chartered national operating company or consortium.

b. Schedule: To be determined by the Commission.

c. Resources: OGC - 1 to 2 my to address the establishment of a chartered national operating company or consortium.

8. Study the need to establish an independent Nuclear Safety Board.

a. Description: The Commission will study the need to establish a Nuclear Safety Board that would independently investigate nuclear accidents and important incidents and would monitor and evaluate the quality of the NRC regulatory process.

b. Schedule: To be determined by the Commission.

c. Resources: OGC - 1 to 3 my (dependent on refinement of the task on the basis of a specific Commission decision).

9. Study the reform of the licensing process.

a. Description: The Commission will study alternatives to reform the licensing process. One reform would abolish the present two-step process for initial licensing and would substitute a one-step process with increased public involvement prior to the hearing. It would also involve continued NRC jurisdiction after issuance of the single permit to verify that plant construction conforms with plans and permit specifications. The Commission will study the standardization of nuclear power plants. The Commission will consider suspending review and proceedings for applications for construction permits and limited work authorization until the reform issues are resolved.

b. Schedule: To be determined by the Commission.

c. Resources: OGC - 1 to 3 my for licensing process reform (dependent on specific Commission decision for scope of the task).

10. Study NRC top management structure and process.

a. Description: The Commission is in the process of hiring an outside management consulting firm to 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 11 and 12 of this chapter).

b. Schedule: To be determined by the Commission.

c. Resources: ADM FY80 - 0.1 my, FY81 - 0.1 my; Comm. FY80 - $300,000 (reference SECY-80-27, attachment 2, p. 6).

11. 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 10 and 12 of this chapter), including (1) an evaluation of the consolidation of all NRC resources and activities for monitoring operating reactors in a single office; (2) the reorganization of NRR to elevate human factors in criteria development and systems evaluation to a level of prominence equivalent to that of the safety equipment; (3) the reorganization of IE to increase inspection and enforcement effectiveness; (4) the establishment of an integrated program for modifying regulatory requirements based on systematic identification and assessment of safety issues; and (5) the use of technical consultants to increase staff capability in discrete technical areas.

b. Schedule: To be determined by the Commission.

c. Resources: EDO and Comm. FY80 - $200,000 to $500,000 contractor.

12. Revise delegations of authority to staff.

a. Description: The Commission will improve the NRC 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 10 and 11 of this chapter). The Commission has delegated substantial rulemaking authority to SD. Procedures are being developed to effect this delegation of authority.

b. Schedule: To be determined by the Commission.

c. Resources: The resources are dependent on decisions taken early in 1980.

13. 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 authorities of the Chairman as chief executive officer, the Commission as head of the agency, and the Executive Director for Operations (EDO) as chief staff officer.

b. Schedule: To be determined by the Commission.

c. Resources: OGC FY80 - 0.3 my.

14. Authority to delegate emergency response functions to a single Commissioner.

a. Description: The Commission will seek authority to delegate specific management responsibilities to an individual Commissioner in the event of defined emergencies. (See also item III.A.3.1, in which NRC is to develop its role in responding to nuclear emergencies.)

b. Schedule: To be determined by the Commission.

c. Resources: OGC/OELD FY80 - 0.3 my each.

15. Achieve single location - long-term.

a. Description: The Commission will break the present impasse hindering the location of NRC and its major headquarters staff components in a single location (a single building or an adjacent group of buildings). The accomplishment of this objective is essential to, among other purposes, minimize adverse disruption of NRC headquarters upon installation of the NRC terminal of the nuclear data link and of headquarters computer and simulator equipment. (See item III.A.3.4 and item 16 of this chapter.)

b. Schedule: To be determined by the Commission.

c. 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 item III.A.1.5). ADM FY80 - 4 my, FY81 - 4 my, FY82 - 4 my.

16. Achieve single location - interim.

a. Description: The distance between NRC headquarters offices will be reduced by the consolidation of NRC offices in the Matomic building (1717 H Street, N.W.) and in some of its present Bethesda locations. This move will house the NRC program offices in one building. The agencies leaving 1717 H Street will occupy either space vacated as a result of the NRC movement from suburban areas or other space yet to be determined.

b. Schedule: The interim consolidation should be completed within the next 18 months. The rate of consolidation depends on NRC space requirements and coordination with GSA, as well as with the affected agencies presently occupying space in the Matomic building.

c. Resources: ADM FY80 - 6 my and $1,200,000, FY 81 - 5 my and $2,100,000, FY82 - 3 my and $700,000.

17. Reexamine Commission role in adjudication.

a. Description: The Commission's role in adjudications will be reviewed 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. Schedule: To be determined by the Commission.

c. Resources: OGE/OELD/OPE FY80 - 1.8 my.

B. REFERENCES:*

President's Commission Report: Recommendations A.1.c, A.1.d, A.3, A.4, A.4.c(i), A.9.d, A.10.a, A.10.c, A.10.d, A.10.e, A.10.f
President's response dated December 7, 1979, Proposals A.1.c, A.3, A.6.a, A.6.d, D.1.a, G.1.e

Other: NUREG-75/071 (1975) (item 5)
NUREG-0585, Recommendations 1.5, 11, 12
NUREG-0616, Recommendations 3.2.1 and 3.3.1
NUREG-0646
SECY-80-27, Attachment 2

*The items in this chapter for which particular references are pertinent are shown in parentheses.

Letters from Chairman Ahearne to Honorable J. T. McIntyre, Jr., January 7, 1980, and February 6, 1980, NRC Reorganization Plan (items 2-3, 12-14)

Commission's draft licensing reform bill and staff memoranda; Commission comments on pending administrative reform bills, sections on intervenor funding (item 5)

Memo from Samuel J. Chilk, Secretary, NRC, to Lee V. Gossick, EDO, dated April 5, 1978, Subject: "Request for Study of the Generic Issues of Construction During Adjudication" (items 6, 17)

NUREG/CR-1250, Vol. I, pp. 91, 92, 99, 110, 115-121, 134, 140-144, 146, 151-152; Vol. II, Part 1, pp. 24-25, 105, 136, 138, Part 2, p. 342, 612, Part 3, p. 986

Letter from Chairman, ACRS, to Chairman, NRC, dated January 15, 1980, Subject: "Recommendations of President's Commission on ACRS Role"

Letter from Chairman, ACRS, to Chairman, NRC, dated March 12, 1980, Subject: "ACRS Comments on Recommendations of NRC Special Inquiry Group Regarding ACRS activities"

Letter from Chairman, ACRS, to Chairman, NRC, dated December 17, 1979, Subject: "A Review of NRC Regulatory Processes and Functions"

Letter from Chairman, ACRS, to Chairman, NRC, dated May 16, 1979, Subject: "Report on Quantitative Safety Goals"

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

APPENDIX A

NEAR-TERM OPERATING LICENSE REQUIREMENTS IN THE TMI ACTION PLAN

Near-term operating license (NTOL) requirements are defined as those actions in the TMI Action Plan that are required to be implemented prior to granting a new operating license because they are needed, are sufficiently characterized and studied at this time, and are known to have significant safety improvement potential. A list of NTOL requirements preliminarily approved by the Commission on February 7, 1980, is given in Table A.1. The list was approved as necessary but not sufficient for granting full-power operating licenses. Additional study has been under way by the Commission and ACRS, as described below. What follows is a description of the development of the NTOL list and a description of the effect of its implementation on other NRC regulatory activities.

It was required from the inception of the TMI Action Plan that primary emphasis be placed on developing and implementing the necessary changes in requirements for operating reactors and changes in NRC practices and procedures to diminish the risk of present operations. By and large, the actions of this sort described in the first draft of the TMI Action Plan were already being implemented as a result of the short-term recommendations of the TMI-2 Lessons Learned Task Force (NUREG-0578, July 1979) and the requirements of the Bulletins and Orders Task Force. The first draft of the Action Plan also contained requirements that were to be applied in licensing reviews of new plants that would be ready to load fuel within the near future; i.e., the so-called near-term operating license facilities. Four new plants fell into the category of being ready to load fuel in 1980 (Sequoyah, North Anna 2, Diablo Canyon, Salem 2).

The NTOL list has been refined several times since the first draft of the Action Plan. Throughout the process, the list has contained all the new requirements for operating reactors plus a few more. Also, in some instances, the requirements for the near-term operating licenses have implementation deadlines that are more stringent in some cases than the comparable requirements for operating plants.

This was done when there was a significant advantage to have the new procedure or equipment in place during fuel loading or power-ascension testing. As a general rule, however, implementation schedules for near-term operating license requirements were established with the intent of providing adequate safety improvement without incurring significant additional schedule and construction delays.

The first major effort to systematically review and refine the NTOL list occurred shortly after issuance of Draft 1 of the TMI Action Plan. The Steering Group, in consultation with the Task Managers, discussed additions and refinements of the specific actions recommended in Draft 1 for near-term operating license applicants. A revised list of actions was then discussed, further refined and approved by the NRC Program Office Directors. This list of approximately 50 actions was then forwarded to the Commission on January 5, 1980.

On January 10, 1980 the Action Plan Steering Group met with the Advisory Committee on Reactor Safeguards (ACRS) to discuss Draft 1 of the Plan. A copy of the proposed NTOL requirements was also provided to the Committee, although the focus of the meeting was on the entire plan, not the NTOL list. A primary concern expressed by ACRS at that time was the lack of priority assignments within Draft 1 of the Action Plan and the likelihood that without better delineation of priorities, NRC and the utilities could not focus on the most important actions.

In its review of the January 5 version of the NTOL list, the Commission also expressed a need to gain a reactor operator's perspective on the safety implications of the proposed requirements. In order to get operator and industry assessments of the impact on safety of implementing the near-term operating license actions, several site visit teams were created by the Steering Group to conduct onsite meetings with operating personnel and utility management. These teams were composed of IE Regional Branch Chiefs, the licensing project manager for the first four NTOL plants and the four operating plants that were visited, the resident inspectors, and various senior NRC managers and directors. Meetings were held at the four near-term operating license facilities and the four operating facilities. The operating facilities were included to ensure that operational experience would be reflected in the overall safety assessment. During the site visits, the NRC team met separately with the licensed operators or license candidates, as well as with site and corporate managers. The primary objective was to identify actions on the NTOL list which, if implemented, might result in a less safe, rather than more safe operation. As a result of the visits the review teams concluded that no single near-term operating license requirement would, of itself, produce a negative safety or quality impact if implemented. However, in the aggregate, if all the requirements were imposed on the utility engineering and technical support staffs, they might be unduly diverted from necessary and ongoing routine safety-related tasks and overall safety might be diminished. As a result of discussions with operators and managers the review teams recommended that four actions be removed from the January 5 version of the list and rescheduled for future action (Memorandum to R. J. Mattson, dated February 1, 1980).

While the refinements of the NTOL list were under way, the NRC Special Inquiry Group (SIG) issued its report on Three Mile Island on January 24, 1980. The SIG recommendations were reviewed by the Steering Group, task managers and NRC Offices for appropriate incorporation into the Action Plan and, if appropriate, the list of near-term operating license requirements. This review identified a number of suggestions that were considered for addition to the NTOL list. Two of these suggestions were approved for the final list (Control Room Design Review - Item I.D.1, and Power Ascension Test Schedule - Item IV.F.1).

Based on information received from the site visits, ACRS meetings, and SIG recommendations, it was clear that a close review of the January 5 NTOL list was appropriate to ensure that requirements were not being levied that did not have a high safety payoff. Additionally, the Steering Group had completed a detailed estimation of priorities of all the actions in the Plan that could be used to evaluate the relative importance of specific requirements. A comprehensive review by the Steering Group identified twelve items in Draft 2 of the Action Plan that, after closer evaluation, were not considered to be essential for near-term operating licenses and were deleted from the NTOL list. These items will continue to be developed in the context of the Action Plan for future action. Typical reasons for removing actions from the NTOL list were: the primary concern in the action was already being addressed by another interim requirement and the specific action could be addressed better in a more comprehensive manner in the long term; requirements were not well defined and could place a heavy resource demand on near-term operating license facilities with uncertain benefits; implementation before fuel loading or full-power operation was not critical and the item could be implemented on the same schedule as operating reactors.

The list (Table A.1) is organized as follows to focus attention on refinements and necessary decisions:

		Number of Actions
1.	Requirements not previously issued to operating reactors	12
2.	Requirements previously issued to operating reactors	23
3.	NRC actions recommended before resumption of licensing (No licensee action required)	7
4.	New requirements based on SIG recommendations	2
	Total	44

The Directors of NRR, IE, SD, and RES reviewed the list with the Steering Group on February 5, 1980 and concurred in the revised requirements. The Commission met on February 7, 1980 and approved the list as being necessary to implement but did not approve the list as being sufficient for issuing new operating licenses. The EDO directed the responsible NRC program offices to implement their portions of the requirements by memo of February 19, 1980. Each of the requirements is to be specifically addressed in the Safety Evaluation Reports for the affected plants. Three near-term operating license applicants have received restricted operating licenses (fuel loading and low-power testing) pursuant to the NTOL list (Salem 2, Sequoyah, and North Anna 2).

In a February 19, 1980 memorandum to the ACRS, Chairman Ahearne requested that the ACRS specifically consider the NTOL list in its March meeting and provide the Commission with ACRS views on whether the list was necessary and sufficient for authorizing operating licenses. The ACRS provided comments to the Commission on March 11, 1980 regarding thirteen specific areas of the Action Plan and noting that, subject to these comments, the NTOL items identified in Draft 3 of the Action Plan provide a satisfactory basis for resumption of licensing. The staff reviewed the ACRS comments and provided a point-by-point response to the Commission on April 1, 1980, describing how the Action Plan would be modified to account for ACRS comments. Meetings were also held with the ACRS subcommittee on TMI on April 1 and 2, 1980, and with the full ACRS on April 10, 1980, to discuss the Action Plan in general, including modifications made by the staff in response to the ACRS letter of March 11. The April 17, 1980 letter from the ACRS provided specific comments on some elements of the Action Plan, plus a general agreement by the Committee that the plan was satisfactory for dealing with the issues identified by the accident at TMI-2.

The NTOL list in Table A.1 is a recast of the list of "Requirements for New Operating Licenses" that was submitted as Enclosure 1 to Commission Action Paper SECY-80-230, dated May 2, 1980. The list was recast to correct errors and to reflect Commission guidance. It is currently used by the NRC staff in making licensing decisions regarding pending operating license applicants.

TABLE A.1

NEAR-TERM OPERATING LICENSE REQUIREMENTS

PART 1 - REQUIREMENTS NOT PREVIOUSLY ISSUED*,**

REQUIREMENT	WHEN APPLICABLE***
(1) I.A.1.3 Shift Manning	
(a) SRO and RO in control room.	FL
(b) Restrictions on use of overtime.	FL
(2) I.A.3.1 Revised Scope and Criteria for Licensing Examinations	
Prepare applicants for new examinations.	FL

*On September 27, 1979 and November 9, 1979, all pending operating license applicants were issued a letter containing a set of requirements resulting from staff investigations of the TMI-2 accident and approved by the Commission. The new requirements listed in this Part 1 are in addition to the previously issued requirements which are listed in Part 2, below. Of the 12 items in this Part 1, three have been previously approved for application to operating plants (2, 9, and 10) but have not been issued formally to operating license applicants. Five of the 12 are applicable to operating reactors and are to be issued by NRR in May 1980 on the basis of preliminary approval by the Commission on February 7, 1980 (1, 2, 4, 11, and 12).

**On March 28, 1980, all power reactor applicants and licensees were issued a letter that set forth the revised criteria to be used by the staff in evaluating reactor operator training and licensing that can be implemented under the current regulations and to establish an effective date for their implementation. The content of this letter is reflected in individual sections of the Action Plan. With respect to the March 28, 1980 letter, NTOL applicants, with exception of two items (increased scope of examinations and training in use of installed plant systems to control or mitigate an accident in which the core is severely damaged), will be required to meet the same implementation date as operating reactors. For these two items, NTOL applicants will implement as specified in Part 1 of this list for Items I.A.3.1 and II.B.4.

***FL = Before fuel loading
FP = Before full-power operation

TABLE A.1 (continued)

REQUIREMENT	WHEN APPLICABLE
(3) I.B.1.2 Evaluation of Organization and Management Improvements of Near-Term Operating License Applicants Interoffice NRC review of licensee management to determine organizational and managerial capabilities, using internal NRC draft criteria pending development of formal criteria. Includes requirement for onsite safety engineering group to provide supplemental engineering review and support.	FL
- No immediate action required by OL applicant pending completion of NRC review of licensee management.	
(4) I.C.5 Procedures for Feedback of Operating Experience to Plant Staff Procedures that assure feedback of operating experiences to operators and other personnel.	FL
(5) I.C.7 NSSS Vendor Review of Procedures NSSS vendor review of licensee procedures.	
(a) Emergency Procedures	FP
(b) Low-Power Testing Procedures	FL
(c) Power Ascension Procedures	FP

TABLE A.1 (continued)

REQUIREMENT	WHEN APPLICABLE
(6) I.C.8 Pilot Monitoring of Selected Emergency Procedures for Near-Term Operating License Applicants	
NRC conduct in-depth review of development and use of selected emergency procedures on NTOL plants.	FP
(7) I.G Training During Preoperational and Low-Power Testing	
Conduct "hands on" training in selected plant evolutions and off-normal events for shift personnel.	
- Define training plan	FL
- Conduct training	FP
(8) II.B.4 Training for Mitigating Core Damage	
(a) Establish training program for all operating personnel in the mitigation of severe core damage using existing equipment.	FL
(b) Complete initial training.	FP
(9) II.E.1.1 Auxiliary Feedwater System Reliability Evaluation	
Perform simplified reliability analysis of AFW system and modify as necessary.	FP
(10) II.K.1 IE Bulletins on Measures to Mitigate Small Break LOCAs and Loss of Feedwater Accidents	
Implement, as applicable, TMI-2 related IE bulletins.	
- Bulletins were issued to ORs.	FL

TABLE A.1 (continued)

(11) II.K.3 Final Recommendations of B&O Task Force Implement Bulletin and Orders Task Force recommendations on a schedule to be determined by NRR on a case-by-case basis.	As required by NRR
(12) III.D.3.4 Control Room Habitability Confirm compliance with existing Regulatory Guides and Standard Review Plan or establish schedule for necessary modifications to achieve compliance.	FP

PART 2 - REQUIREMENTS ALREADY ISSUED*

REQUIREMENT	WHEN APPLICABLE*,**
(1) I.A.1.1 Shift Technical Advisor (STA) Provide technical advisors with engineering expertise on each shift.	
- STA on duty	FL
- STA training complete	1/1/81
- See NUREG-0578, Section 2.2.1b and September 27, 1979 and November 9, 1979 letters to all pending OL applicants for criteria.	

*On September 27, 1979, all pending operating license applicants received a letter which defined a set of requirements resulting from NRC staff investigations of the TMI accident and approved by the Commission. On November 9, 1979, a followup letter was sent to all pending operating license applicants further clarifying the requirements of the September 27, 1979 letter. Enclosures 6 and 8 of the September 27, 1979 letter provided implementation schedules for the short term requirements. The schedules have been refined here to reflect a difference between fuel load and full power dates.

**FL = Before fuel loading
FP = Before full-power operation

TABLE A.1 (continued)

REQUIREMENT	WHEN APPLICABLE
(2) I.A.1.2 Shift Supervisor Administrative Duties	
Minimize administrative duties.	FL
- See subitem 4 of Section 2.2.1a of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(3) I.B.1.2 Evaluation of Organization and Management Improvements of Near-Term Operating License Applicants	
Capability for evaluation of operating experiences at nuclear power plants.	FL
- See NUREG-0578, Section 2.2.1b and September 27, 1979 and November 9, 1979 letters to all pending OL applicants for criteria.	
- See also Task Action Plan Sections I.A.1.1 and I.B.1.1.	
(4) I.C.1 Short-Term Accident Analysis and Procedure Revision	
(a) Small break LOCAs.	FL
(b) Inadequate core cooling.	FL
(c) Transients and accidents.	Same schedule as OR
- See Section 2.1.9 and 2.1.3b of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	

TABLE A.1 (continued)

REQUIREMENT	WHEN APPLICABLE
(5) I.C.2 Shift and Relief Turnover Procedures	
Plant procedures for shift and relief turnover.	FL
- See Section 2.2.1c of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(6) I.C.3 Shift Supervisor Responsibilities	
Plant procedures specifying responsibilities of shift personnel for safe operation of the plant.	FL
- See Items 1, 2, and 3 of Staff Position of Section 2.2.1a to NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(7) I.C.4 Control Room Access	
Plant procedures for limiting access to the control room.	
- See Section 2.2.2a of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	FL
(8) II.B.1 Reactor Coolant System Vent	
Provide design of remotely operable high-point reactor coolant system vents.	FP
- Installation complete.	1/1/81
- See Enclosure 4 to September 27, 1979 and November 9, 1979 letter to OL applicants for criteria.	
(9) II.B.2 Plant Shielding	
Provide design of additional shielding required to provide access to vital areas and protect safety equipment.	FP

TABLE A.1 (continued)

REQUIREMENT	WHEN APPLICABLE
(9) (continued)	
- Plant modifications complete.	1/1/81
- See Section 2.1.6b of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(10) II.B.3 Postaccident Sampling	
Provide interim procedures and final system design for sampling and analyzing reactor coolant and containment atmosphere.	FP
- Plant modifications complete.	1/1/81
- See Section 2.1.8a of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(11) II.D.1 Relief and Safety Valve Test Requirements	
Commit to performance testing of RCS relief and safety valves under the full range of normal and accident conditions.	FL
Test program complete	7/1/81
- See Section 2.1.2 of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(12) II.D.3 Relief and Safety Valve Position Indication	
Install direct indication of relief and safety valve position.	FL
- See Section 2.1.3a of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	

TABLE A.1 (continued)

REQUIREMENT	WHEN APPLICABLE
(13) II.E.1.2 Auxiliary Feedwater Initiation and Indication	
Install control grade automatic start of AFW and control grade flow indicators.	FL
Complete implementation of safety grade equipment.	1/1/81
- See Section 2.1.7a and b of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(14) II.E.3.1 Emergency Power for Pressurizer Heaters	
Install capability to supply some pressurizer heaters and controls from emergency power supply and implement necessary training and procedures.	FP
- See Section 2.1.1 of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
- This item complements II.G.	
(15) II.E.4.1 Containment Dedicated Penetrations	
Provide design of redundant dedicated containment penetrations for external hydrogen recombiner, if applicable.	FL
Complete installation.	1/1/81
Review procedures and bases for recombiner use.	FL
- See Section 2.1.5a and 2.1.5c of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	

TABLE A.1 (continued)

REQUIREMENT	WHEN APPLICABLE
(16) II.E.4.2 Containment Isolation Dependability	
Install diverse containment isolation signals.	FP
- See Section 2.1.4 of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(17) II.F.1 Additional Accident Monitoring Instrumentation	
(a) Interim Procedures for Quantifying High Level Accidental Radioactivity Releases	FL
(b) Containment Pressure Monitor	1/1/81
(c) Containment Water Level Monitor	1/1/81
(d) Containment Hydrogen Monitor	1/1/81
(e) Containment High Range Radiation Monitors	1/1/81
(f) High Range Noble Gas Effluent Monitors	1/1/81
- See Section 2.1.8b of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(18) II.F.2 Inadequate Core Cooling Instruments	
(a) Procedure development for use of existing instrumentation.	FL
(b) Install subcooling meter.	FL
(c) Submit analysis of capability to detect inadequate core cooling and vessel level indicator design, if new instrumentation desirable.	FL
(d) Install vessel level indicator, if required.	1/1/81
- See Section 2.1.3b of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	

TABLE A.1 (continued)

REQUIREMENT	WHEN APPLICABLE
(19) II.G Emergency Power for Pressurizer Equipment Modify power supplies for the pressurizer relief valves, block valves, and level indicators to be from emergency power sources. - See Section 2.1.1 of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria. - This item complements II.E.3.1.	FL
(20) III.A.1.1 Upgrade Emergency Preparedness Implement provisions of SECY 79-450. - See Enclosures 7 and 8 of September 27, 1979 letter to OL applicants for requirements. - See all Item III.A.1.2 below.	Phased implementation. - As specified in Enclosure 8 of September 27, 1979 letter to OL applicants
(21) III.A.1.2 Upgrade Emergency Support Facilities	
(a) Establish onsite technical support center and provide plans, procedures, staffing, communications, and radiation monitoring equipment.	FL
Upgrade technical support center. - See Section 2.2.2b of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	1/1/81
(b) Establish an operational support center. - See Section 2.2.2c of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	FL

TABLE A.1 (continued)

REQUIREMENT	WHEN APPLICABLE
(21) (continued)	
(c) Establish an emergency operations center as a base for coordinating onsite and offsite activities and interface with State, local, and Federal agencies.	FL
Upgrade emergency operations center.	1/1/81
- See Item 3 of Enclosures 7 and 8 to September 27, 1979 letter to pending OL applicants for description.	
- Items (a), (b), and (c) above complement III.A.1.1 of Action Plan.	
(22) III.D.1.1 Radiation Sources Outside Containment	
Evaluate leakage from systems outside containment likely to present radiological hazards in the event of an accident and reduce leakage to the extent practical.	FP
- See Section 2.1.6a of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	
(23) III.D.3.3 Inplant Radiation Monitoring (Partial)	
Provide instrumentation to determine in plant airborne radioiodine concentrations.	FL
- See Section 2.1.8c of NUREG-0578 and letters of September 27, 1979 and November 9, 1979 to pending OL applicants for criteria.	

TABLE A.1 (continued)

PART 3 - NRC ACTIONS RECOMMENDED FOR COMPLETION BEFORE RESUMPTION OF LICENSING

REQUIREMENT	WHEN APPLICABLE
(1) I.B.2.2 Resident Inspector NRC Resident Inspector at each site for new OL.	FL
(2) II.B.7 Containment Inerting Reach decision on need for interim hydrogen control requirements for small containments and apply, as appropriate, to near-term plants.	FP
(3) II.B.8 Degraded Core - Rulemaking Issue notice of intent to conduct rulemaking on requirements for design features for accident involving severely damaged cores.	FP
(4) III.A.3.1 Role of NRC in Emergency Preparedness More detailed definition of role of NRC in emergencies.	FP
(5) III.A.3.3 Communications in Emergencies Install direct dedicated telephone lines between plant and NRC.	FL
(6) III.B.2 Implementation of NRC and FEMA Responsibilities Approve overall state of emergency preparedness, including integration of emergency preparedness onsite and offsite pursuant to the Memorandum of Understanding with FEMA.	FL
(7) III.D.2.4 Offsite Dose Measurements NRC establish TLD surveillance network around site.	FP

APPENDIX B

RELATIVE PRIORITIES OF ACTION ITEMS

Several methods were used during the development of the Action Plan to assess the relative priorities of the individual action items. The methods progressed from a coarse ranking system based on the personal judgment of only a few senior NRC staff members in Draft 1 to a more objective point system for assignment of priorities, including factors other than safety significance, by a larger spectrum of NRC staff. In addition, the views of industry representatives and operators at nuclear power plants were taken into account in its final ordering priorities. The various steps in this progression of establishment of task priorities are summarized in the following paragraphs.

Initially, individual tasks in Draft 1 of the Action Plan were categorized with respect to potential safety improvement (high, medium, or low). This categorization was based on a consensus of professional judgment by the members of a steering group within the Office of Nuclear Reactor Regulation (NRR took the lead in the preparation of Draft 1) with broad knowledge of reactor safety and technical knowledge of the individual tasks. Most of the senior members of this group had worked extensively on TMI investigations and recovery operations and all had access to the results of the various investigations. The judgments of this group amounted to qualitative comparisons of the risk-reduction potential of the various actions in the plan.

Following the Commission's review of Draft 1 of the Action Plan in early December 1979, the Executive Director for Operations was assigned lead responsibility for its further development and coordination. The Steering Group concept was maintained under the EDO, but the membership of the Steering Group was changed and the base of staff expertise and involvement in the plan was broadened to include a six-member Technical Support Group and a group of twenty Task Managers who were responsible for discrete portions of the plan. The individual Task Managers were asked to consider the categorization of potential safety significance that had been assigned by the previous NRR Steering Group and to advise the new EDO Steering Group of necessary changes. The EDO Steering Group was made up of one representative from the Offices of Nuclear Reactor Regulation, Inspection and Enforcement, Standards Development, Nuclear Regulatory Research, Executive Legal Director, Management and Program Analysis, and Controller.

In parallel with the Task Managers' review of the safety significance categories, the EDO Steering Group developed a numerical scoring system to establish the relative priority of each task of Draft 1 of the Action Plan. This scoring system assigned points for safety significance, resources necessary to accomplish the task (both NRC and industry resources), present status of tasks, and the timing of improvements. It was designed to give highest weight to the tasks with greatest potential for improved safety in the shortest time at lowest cost to industry and government. The dominant weighting factor was safety significance. This scoring system was reviewed, revised and approved by the Commission in its meeting on December 21, 1979. The scoring system is described in Table B.1. The feedback from the Task Managers on the safety significance of the individual actions was considered and used by the Steering and Technical Support Group in assigning points to all of the actions in the plan.

In addition to the priority-ranking system described above, the Commission followed another priority scheme of more universal characteristics in the development of actions and action plans related to the accident at Three Mile Island. Through the activities of the Bulletins and Orders Task Force and the Lessons Learned Task Force, NRC first concentrated its activities and placed highest priority on improving the safety of currently operating plants. Then in December 1979, the Commission requested the staff to recommend a list of requirements, based on Draft 1 of the Action Plan, that should be implemented on those plants that had completed construction and that were to be considered for operating licenses in the near term. Thus, the Commission's second priority (after the operating plants) was the near-term operating licenses applicants. As a key part of the development of this so-called near-term operating license (NTOL) requirements list, the potential safety significance and proposed schedule for implementation of each proposed requirement was reviewed and approved by both the EDO Steering Group and the NRC Office Directors. The first proposed

NTOL requirements list was forwarded by the EDO to the Commission for review on January 5, 1980.

The reviews of the safety significance and the priority of individual tasks within the TMI Action Plan had been entirely a staff effort to this point. However, during a Commission meeting on January 9, 1980, the Commission directed the EDO Steering Group to obtain an operators' assessment of the impact of the January 5, 1980 list of NTOL requirements on plant safety. As a result, site visits were conducted by the NRC staff in late January at eight plants (four near-term operating license facilities and four operating reactor facilities), as described in Appendix A. During these site visits, the views of both the utility management and the power plant operators were obtained.

In parallel with these activities, Draft 2 of the Action Plan was being developed and was issued on January 23, 1980. It contained a priority grouping for each task based on the scoring system previously approved by the Commission and used in the manner described above. However, due to overlapping time frames, the results of the site visits were not incorporated into Draft 2 of the Action Plan.

The results of the site visits were, however, factored into a revision of the January 5, 1980, list of near-term operating license requirements. The net effect of the site visits was to delay the application of some new requirements that were of lower priority or were duplications of other actions already taken to improve safety since the accident at TMI. The results of the site visits, staff review of the NRC Special Inquiry Group Report, and the near-term operating license list were prepared by the EDO Steering Group, approved by the NRC Office Directors and forwarded to the Commission on February 6, 1980. This list of near-term operating license requirements was subsequently approved by the Commission on February 7, 1980 as being necessary for new operating licenses. On February 11, the ACRS wrote to the Commission and questioned whether the list was prepared with enough attention to priorities. The NRC Chairman requested ACRS views on the necessity and sufficiency of the list in his letter of February 19.

On February 6, 1980, the Steering Group met with the Atomic Industrial Forum (AIF) Policy Committee on the followup to the TMI accident to discuss Draft 2 of the Action Plan, with particular emphasis on the near-term operating license requirements, and to discuss the results of the site visits. AIF had invited the Steering Group to this meeting to discuss the merits and priorities of the matters contained in the list of near-term operating license requirements. The information gained by the Steering Group at the meeting was generally supportive of the conclusions of the site visits. At this meeting the Steering Group suggested that it would be useful to have the technical views of the policy committee on the relative priorities of the balance of the licensing requirements contained in Draft 2 of the Action Plan (i.e., excluding those items on the near-term operating license requirements list). Subsequently, the TMI Policy Committee of AIF formed a special Working Group on Action Plan Priorities to develop such views. They held meetings with NRC Action Plan Task Managers during the week of February 11 to discuss the intended scope of the individual tasks and to improve the industry's understanding of the required actions so that resource and priority implications could be more clearly drawn. Subsequently, a February 22, 1980 AIF report on the TMI Action Plan priorities and resources was sent to the staff (letter from Bryon Lee to Harold Denton).

In parallel with the industry effort described above, the Commission held a series of four meetings with the Steering Group to discuss Draft 2 of the Action Plan, including consideration of the relative importance and schedules for accomplishment of the individual action items.

Draft 3 of the Action Plan incorporated specific Commission comments from its review of Draft 2, the results of the site visits, the results of staff review of the Special Inquiry Group Report, the comments of the Atomic Industrial Forum concerning priorities and resources, and comments of the ACRS. The EDO Steering Group reassessed its task priorities between Draft 2 and Draft 3 and made some changes, generally to reflect revisions in the scope of the tasks. Because of the wide review that had been given Draft 2 and the general improvements that had resulted in the plan, the task priorities in Draft 3 of the Action Plan represented a broad spectrum of views with respect to safety significance. The ACRS concluded in its letter of April 17, 1980 that the Action Plan is a generally well-balanced document that established reasonable priorities and satisfactorily dealt with the issues identified by the accident at TMI.

Following issuance of Draft 3, the NRC Office Directors were requested by the EDO to provide comments and concurrence in the Action Plan in their respective areas of responsibility. These comments, including resource allocation and schedule changes, were incorporated into Draft 4 of the Action Plan, and a few remaining items of disagreement between the Office Directors and the EDO Steering Group were identified. On April 16, 1980, a list of these remaining items was given to the appropriate Office Directors, with a request for final resolution and concurrence in the Action Plan. This final version of the Action Plan represents the resolution of these issues. Table B.2, Priorities of TMI Action Plan Tasks, summarizes the NRC staff and industry estimates of the priority of the various tasks. (Table B.3 provides a detailed breakdown of the scoring used for each action item according to the system in Table B.1.)

Tasks identified in Table B.2 are arranged in NRC priority order (highest priority is listed first) for each decision grouping, except for Decision Group D. The decision groups reflect the status of Commission decision on each task. The groups are defined, in brief, as follows (see Table B.2 for full definitions):

A = action item already approved
B = action item approval dependent upon approval of Action Plan
C = separate Commission decision required subsequent to approval of the plan
D = part of ongoing or future work according to routine NRC operating plan or budgetary process

Also included in Table B.2 is a staff evaluation of the responsiveness of individual tasks to the ACRS recommendations and comments from their letters since the accident at TMI. The near-term operating license requirements and implementation dates from Table 1 are also displayed for ease of comparison of priority ranking and implementation schedule.

AIF and NRC priority evaluation systems are compared in the following discussion, which summarizes both systems and identifies similarities and differences:

1. <u>Summary of AIF System</u> (as described on page 5 of the AIF Report of February 22, 1980, and amplified in Appendix B of that Report)

The factors considered in evaluation of each action item were (1) the number and importance of accident sequences affected; (2) the likelihood that the action as specified can be implemented and will succeed in gaining significant risk reduction; (3) assessment of hazards or counterproductive effects that implementation of the action might introduce; and (4) the time for implementation of the item, assuming good quality assurance.

The "impact" is assessed in terms of the costs.

Each item is evaluated in the context of other related safety actions taken over the years, including those already implemented or committed since TMI-2.

A qualitative categorization of the implementation priority (I, II or III) is made by weighing the various value and impact attributes for each item. The items are then ranked in order of importance within each of the three priority categories. The ranking within a category implies that sequences or end dates of implementation of lower-ranked items can be stretched out as necessary to optimize the quality of implementation of higher-ranked items.

2. <u>Summary of NRC System</u>

The factors considered in evaluation of each item were (1) safety significance, (2) type of improvement envisaged, hardware or human, (3) resources necessary to accomplish the task (both NRC and industry resources), (4) status of task (ongoing or to be initiated), and (5) timing of improvement (see Table B.1).

A point score was assigned to each item based on the weighting factors assigned to the categories. This score was used for comparison with the other items in the action plan.

Each item was assigned to a priority group based on its point value with some subjective judgment applied by the Steering Group at the boundaries between priority group.

3. Comments on Similarities and Differences in the AIF and NRC Priority Systems

It appears that the principal factor determining priority is the same in each system.

- AIF - "Incremental reduction in public risk"
- NRC - "Safety significance"

Both systems rely on "substantial engineering judgment" to arrive at decisions.

The AIF description of Priority Groups I and II appears to be consistent with NRC plans for use of its scoring system.

The AIF description of Priority Group III is not consistent with NRC plans for use of its scoring system in that an item will not necessarily be removed from the plan simply because it carries a low-priority value.

TABLE B.1 TMI ACTION PLAN PRIORITY RANKING SYSTEM

		Rank
I.	Safety Significance	
	High	100
	Medium	50
	Low	0
II.	Type of Improvement	
	Improves the human element	20
	Fixes the hardware	10
III.	Utilization of Resources	
	A. Project is ongoing, and resources would be wasted if stopped	20
	Project has not yet been initiated	10
	B. Staff resource requirement: Total - $50K = 1 my	
	Small (< 2 my)	20
	Medium (> 2 < 10 my)	10
	Large (≥ 10 my)	0
	C. Industry resource requirement: Total per unit over 40-yr life - 1 my = $50K	
	Small (< $1.0M)	20
	Large (> $1.0M)	0
IV.	Timing of Improvement (i.e., how quickly will the expected benefit begin to be realized after initiation of task)	
	Short-term (within one year)	30
	Near-term (within two years)	20
	Long-term (within three years)	10
	Extended beyond three years	0

TABLE B.2 - COMPARATIVE PRIORITIES OF TASK ACTIONS

Key to Symbols

Decision Group:

A = Items or criteria already approved by the Commission in the course of business apart from the Action Plan.

B = Items for which the scope and criteria are sufficiently well-defined in the plan that additional study is not required. Commission approval of the plan means, for these items, implementation in the manner described in the plan, consistent with a policy to solicit and consider public comments on these and any other TMI-related requirements developed in accord with the plan. This policy may impact the estimated implementation deadlines presently shown for these Decision Group B items in the plan and in Table 1.

C = Items which require further definition of scope, need, and criteria. Commission approval of the plan means, for these items, approval to commit the necessary staff resources, consistent with other resource priorities, to develop the information needed to bring the item separately to the Commission for a decision on the schedule shown in the plan.

D = Items that are related to, but not directly derived from, the TMI-2 accident and are more properly characterized as part of the agency's normal operating plan. Some Decision Group D items are ongoing. Decision Group D items are included in the plan for completeness but are to be scheduled and assigned resources along with the other normal functions of the agency in its routine operating plan and budgetary process. Licensee implementation details for Decision Group D items are not included in this Action Plan.

Key to NTOL Column

FL - action must be complete for near-term operating license facilities before fuel loading.

FP - action must be complete for near-term operating license facilities before full-power operation.

FL & FP - part of action for near-term operating license facilities must be complete before fuel loading and part before full-power operation.

FL & 1/1/81 - part of the action must be complete for near-term operating license facilities before fuel loading and part by January 1, 1981.

The other items are not applicable to near-term operating applicants. They are either internal NRC actions or longer range license requirements that have not been issued yet.

Key to AIF Column

I - high priority
II - low priority
III - task should be removed from Action Plan
( ) - scopes of tasks assigned priorities by AIF are not comparable with the scopes of NRC tasks.

Key to ACRS Column

date - letter from ACRS forwarding recommendation(s) or comment(s) for which the NRC staff feels the identified task adequately responds to the ACRS concern.

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
Decision Group A						
I.A.2.1	Immediate Upgrading of Operator and Senior Operator Training and Qualifications	210	I, II, III (Parts)	5/16/79	-	5/1/80 to 12/1/80
II.D.3	Relief and Safety Valve Position Indication	210	-	-	FL	1/1/80
II.F.1	Additional Accident Monitoring Instrumentation	210	-	4/7/79, 5/16/79, 8/13/79	-	7/1/80 to 1/1/81
II.F.2	Identification of and Recovery From Conditions Leading to Inadequate Core Cooling	210	-	4/7/79, 5/16/79	FL	1/1/80 and 1/1/81
I.A.1.3	Shift Manning	200	(II)	-	FL	8/1/80 to 7/1/82
I.B.1.2	Evaluation of Organization and Management Improvements of NTOL Applicants	200	-	12/13/79, 3/11/80	FL	-
I.C.5	Procedures for Feedback of Operating Experience	200	I	12/13/79	FL	1/1/81
I.C.7	NSSS Vendor Review of Procedures	200	II (Part)	8/14/79, 3/11/80	FL & FP	-
II.B.4	Training for Mitigating Core Damage	200	I	-	FL & FP	1/1/81 and 4/1/81
II.E.1.2	Auxiliary Feedwater System Automatic Initiation and Flow Indication	200	-	-	FL	6/1/80 and 1/1/81
II.E.3.1	Reliability of Power Supplies for Natural Circulation	200	-	5/16/79	FP	1/1/80

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
II.E.4.2	Containment Isolation Dependability	200	-	8/14/79	FP	1/1/80 to 11/1/80
II.K.1	IE Bulletins on Measures to Mitigate Small Break LOCAs and Loss of Feedwater Accidents	200	I	3/11/80	FL	3/31/80 and see Table C.1
II.K.2	Commission Orders on B&W Plants	200	-	-	-	1/1/81 and see Table C.1
III.A.3.1	NRC Role in Responding to Nuclear Emergencies	200	-	5/16/79, 3/11/80	FP	2/80 (complete)
III.B.1	Transfer of Responsibilities to FEMA	200	-	5/16/79	FL	NA
I.A.1.1	Shift Technical Advisor	190	-	8/13/79, 12/13/79	FL	1/1/80
I.B.2.2	Resident Inspector at Operating Reactors	190	-	-	FL	10/1/80
I.D.1	Control Room Design Reviews	190	II	12/13/79	FL	-
I.E.1	Office for Analysis and Evaluation of Operation Data	190	-	5/16/79	-	7/80
I.E.2	Program Office Operational Data Activities	190	-	5/16/79	-	6/80
II.D.1	Testing Requirements	190	-	-	FL and 7/1/81	1/1/80 and 7/1/80
II.E.1.1	Auxiliary Feedwater System Evaluation	190	I	-	FP	6/1/80 and 1/1/82
II.E.4.1	Dedicated Penetrations	190	-	3/11/80	FL	1/1/80 and 1/1/81
II.E.4.4	Purging	190	I	5/16/79	-	1/1/80, staged

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
I.E.3	Operational Safety Data Analysis	180	-	5/16/79	-	Ongoing
II.E.2.2	Research on Small-Break LOCAs and Anomalous Transients	180	-	4/7/79, 4/18/79, 5/16/79, and 8/14/79	-	NA
II.G.1	Power Supplies for Pressurizer Relief Valves, Block Valves, and Level Indications	180	-	5/16/79	FL	1/1/80
III.A.1.2	Upgrade Licensee Emergency Support Facilities	180	-	5/16/79	FL and 1/1/81	1/1/80 to 1/1/81
III.B.2	Implementation of NRC's and FEMA's Responsibilities	180	-	5/16/79	-	NA
II.C.1	Interim Reliability Evaluation Program (IREP)	180	(I)	5/16/79, 8/14/79, 12/13/79, and 3/11/80	-	7/80 to 3/81
II.C.3	Systems Interaction	180	-	8/14/79, 12/13/79	-	Plant specific
I.C.1	Short-term Accident Analysis and Procedures Revision	170	-	5/16/79, 8/14/79, 12/13/79, and 3/11/80	FL and FP	1/1/80
II.B.6	Risk Reduction for Operating Reactors at Sites with High Population Densities	170	-	12/13/79, 5/16/79	-	Selected sites - 10/1/80
II.H.1	Maintain Safety of TMI-2 and Minimize Environmental Impact	170	-	-	-	NA
III.A.1.1	Upgrade Emergency Preparedness	170	-	5/16/79	FL and 1/1/81	Phased 1/1/80 - 1/1/85
I.A.1.2	Shift Supervisor Administrative Duties	160	-	-	FL	1/1/80

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
I.C.2	Shift and Relief Turnover Procedures	160	-	Implicitly	FL	1/1/80
I.C.3	Shift Supervisor Responsibilities	160	-	-	FL	1/1/80
I.C.4	Control Room Access	160	-	-	FL	1/1/80
II.H.2	Obtain Technical Data on the Conditions Inside the TMI-2 Containment Structure	160	-	-	-	NA
II.H.3	Evaluate and Feedback Information Obtained from TMI	160	-	5/16/79	-	NA
I.D.5	Improved Control Room Instrumentation Research	160	-	12/13/79	-	NA
II.B.3	Post-accident Sampling	150	-	12/13/79, 3/11/80	FP and 1/1/81	1/1/80 to 1/1/81
IV.A.1	Seek Legislative Authority	150	-	-	-	NA
I.A.3.1	Revise Scope and Criteria for Licensing Exams	140	I, III (Parts)	-	FL	3/28/80 to 11/1/80
I.C.8	Pilot Monitoring of Selected Emergency Procedures for NTOL Applicants	140	III	3/11/80	FP	-
I.E.8	Human Error Rate Analysis	140	-	5/16/79	-	NA
II.B.1	Reactor Coolant System Vents	140	-	4/7/79	FP and 1/1/81	1/1/80 and 1/1/81
II.B.2	Plant Shielding to Provide Access to Vital Areas and Protect Safety Equipment for Post-Accident Operation	140	-	12/13/79	FP and 1/1/81	1/1/80 and 1/1/81
II.E.5	Design Sensitivity of B&W Reactors	140	-	-	-	4/1/81

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
II.E.5.2	B&W Reactor Transient Response Task Force	140	-	-	NA	NA
III.A.3.3	Communications, Item (1)	140	III	5/16/79	FL	3/1/80
III.D.1.1	Primary Coolant Sources Outside the Containment	140	-	-	FP	1/1/80
I.G.1	Training Requirements	130	II	12/11/79	FL and FP	-
II.B.5	Research on Phenomena Associated with Core Degradation and Fuel Melting	130	-	3/21/79, 12/13/79, 3/11/79	-	NA
I.A.2.3	Administration of Training Programs	130	-	-	-	8/1/80
II.D.2	Research on Relief and Safety Valve Test Requirements	120	-	-	-	NA
III.D.3.4	Control Room Habitability	120	II	3/11/80	FP and 3/1/81	1/1/81 and 1/1/83
I.D.6	Technology Transfer Conference	110	-	-	-	Complete
II.J.2.2	Increase Emphasis on Independent Measurement in the Construction Inspection Program	110	-	-	-	NA
II.J.2.1	Reorient Construction Inspection Program	100	-	-	-	NA
III.D.3.3	Inplant Monitoring, Item (1)	100	II	-	FL	1/1/80-1/1/81
IV.F.1	Increased IE Scrutiny of Power Ascension Test Program	100	-	-	FL - until completion	-

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
IV.H	NRC Participation in the Radiation Policy Council	100	-	-	NA	NA
II.H.4	Determine Impact of TMI on Socioeconomic and Real Property Values	90	-	-	-	NA
III.D.2.4	Offsite Dose Measurements, Item (1)	90	III	-	FP	NA
<u>Decision Group B</u>						
I.A.4.1	Initial Simulator Improvement	200	II	-	-	1/1/82
I.E.4	Coordination of Licensee, Industry, and Regulatory Programs	200	II	5/16/79	-	6/80
I.A.2.5	Plant Drills	190	III	-	-	7/1/81
I.D.1	Control Room Design Reviews	190	II	12/13/79	-	1/1/82 to 1/1/83
I.D.2	Plant Safety Parameter Display Console	180	II	12/13/79	-	1/1/82
I.D.4	Control Room Design Standard	180	-	12/13/79	-	NA
II.E.3.2	Systems Reliability	180	-	8/14/79, 12/13/79	-	NA
II.K.3	Final Recommendations of B&O Task Force	180	-	3/11/80	See Table C.3	See Table C.3
I.A.4.2	Long-term Training Simulator Upgrade	170	II	-	-	NA
II.E.2.1	Reliance on ECCS	170	II	-	-	Beyond 1/1/82
II.F.3	Instruments for Monitoring Accident Conditions (Regulatory Guide 1.97)	170	II	4/18/79	-	6/82

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
I.E.7	Foreign Sources	160	-	5/16/79	-	NA
II.E.4.3	Integrity Check	150	III	-	-	NA
III.A.3.2	Improve Operations Centers	140	-	5/16/79	-	-
I.G.2	Scope of Test Program	140	-	-	-	NA
I.A.2.2	Training and Qualifications of Operations Personnel	130	II	2/13/80	-	1/1/82
I.A.2.3	Administration of Training Programs	130	-	-	-	NA
III.D.3.1	Radiation Protection Plans	130	III	-	-	9/1/81
II.F.5	Classification of Electrical, Instrumentation, and Control Equipment	130	-	4/17/80	-	NA
I.C.6	Procedures for Verification of Correct Performance of Operating Activities	120	-	-	-	1/1/81
I.F.1	Expanded Quality Assurance List	120	-	8/14/79, 12/17/79	-	NA
III.D.2.1	Radiological Monitoring of Effluents	120	III	-	-	NA
III.D.1.3	Ventilation System and Radioiodine Adsorber Criteria	110	III	-	-	NA
II.C.4	Reliability Engineering	100	I	10/12/79, 12/13/79	-	Beyond 1982
III.D.3.3	Inplant Radiation Monitoring, Item (2)	100	II	-	-	6/1/82
I.A.2.4	NRR Participation in Inspector Training	90	-	-	-	NA

TABLE B.2 (continued)

Priority List and Title	NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
III.D.2.5 Offsite Dose Calculation Manual	80	III	-	-	9/1/82
III.D.1.2 Radioactive Gas Management	70	-	10/9/79	-	NA
III.D.2.2 Radioiodine, C-14, and Tritium Pathway Dose Analysis	50	-	-	-	NA
<u>Decision Group C</u>					
I.A.2.6 Long-term Upgrading of Training and Qualifications	190	-	-	-	2/1/82
I.E.6 Reporting Requirements	190	I	5/16/79	-	NA
II.J.3.1 Organization and Staffing to Oversee Design and Construction	180	III	-	-	
IV.E.5 Assess Currently Operating Reactors	180	-	10/11/79	-	NA
I.B.1.1 Organization and Management Long-term Improvements	170	III	12/13/79	-	5/1/81
I.C.9 Long-term Program Plan for Upgrading of Procedures	170	III	8/14/79	-	NA
I.B.1.3 Loss of Safety Function	160	III	8/13/79	-	NA
II.B.7 Analysis of Hydrogen Control	160	II	3/21/79, 12/13/79 8/13/79	FP	NA
II.J.4.1 Revise Deficiency Reporting Requirements	160	-	4/17/80	-	NA
I.D.3 Safety System Status Monitoring	150	II	12/13/79, 5/16/79	-	NA
II.E.2.3 Uncertainties in Performance Predictions	150	II	4/7/79, 8/14/79	-	Beyond 1982

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
II.C.2	Continuation of IREP	150	I	8/14/79, 12/13/79 4/17/80	-	1983
III.A.3.3	Communications Backup, Item (2)	140	(III)	5/16/79	-	NA
III.D.1.1	Primary Coolant Sources Outside the Containment Structure	140	-	-	-	NA
I.A.2.7	Accreditation of Training Institutions	130	-	-	-	NA
I.A.3.4	Licensing of Additional Operations Personnel	130	-	-	-	NA
II.E.3.3	Coordinated Study of Shutdown Heat Removal Requirements	130	-	3/11/80, 4/17/80	-	NA
IV.C.1	Extend Lessons Learned From TMI to Other NRC Programs	130	-	-	-	NA
II.A.2	Site Evaluation of Existing Facilities	120	-	2/14/80	-	NA
II.B.8	Rulemaking Proceeding	120	-	12/17/179	FP	NA
IV.D.1	NRC Staff Training	120	-	5/16/79, 12/13/79	-	NA
III.D.3.4	Control Room Habitability	120	II	3/11/80	-	NA
III.A.3.6	Interaction of NRC with Other Agencies	110	-	5/16/79	-	NA
IV.E.2	Plan for Early Resolution of Safety Issues	110	-	12/17/79	-	NA
II.A.1	Siting Policy Reformulation	110	-	12/17/79, 2/14/80	-	NA
II.J.3.2	Issue Regulatory Guide	100	-	-	-	NA
III.A.1.3	Maintain Supplies of Thyroid Blocking Agent (Potassium Iodide)	100	II	-	-	3/1/81

TABLE B.2 (continued)

Priority List and Title	NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
III.A.2.1 Amend 10 CFR 50 and 10 CFR 50, Appendix E	100	-	5/16/79	-	NA
III.A.3.4 Nuclear Data Link	100	-	-	-	NA
III.D.2.3 Liquid Pathway Radiological Control	100	III	-	-	NA
IV.E.4 Resolve Generic Issues by Rulemaking	100	-	-	-	NA
III.D.2.4 Offsite Dose Measurements, Item (2)	90	III	-	-	NA
III.C.1 Have Information Available for the News Media and the Public	90	-	-	-	12/80
IV.E.3 Plan for Resolving Issues at CP Stage	90	-	-	-	NA
III.C.2 The Office of Public Affairs will Develop Agency Policy and Provide Training for Interfacing with the News Media and Other Interested Parties	80	-	-	-	NA
I.A.3.2 Operator Licensing Program Changes	70	-	-	-	NA
III.D.1.4 Radwaste System Design Features to Aid in Accident Recovery and Decontamination	70	-	-	-	NA
IV.F.2 Evaluate the Impacts of Financial Disincentives to the Safety of Nuclear Power Plants	70	-	-	-	NA
III.A.2.2 Development of Guidance and Criteria	60	-	5/16/79	-	NA

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
Decision Group D						
I.A.1.4	Long-Term Upgrading	-	-	-	-	-
I.A.2.5	Plant Drills	-	-	-	-	-
I.A.3.3	Requirements for Operator Fitness	-	-	-	-	-
I.A.3.5	Establish Statement of Understanding With INPO and DOE	-	-	-	-	-
I.A.4.3	Feasibility Study of Procurement of NRC Training Simulator	-	-	-	-	-
I.A.4.4	Feasibility Study of NRC Engineering Computer	-	-	-	-	-
I.B.2.1	Revise IE Inspection Program	-	-	-	-	-
I.B.2.3	Regional Evaluations	-	-	-	-	-
I.B.2.4	Overview of Licensee Performance	-	-	-	-	-
I.E.5	Nuclear Plant Reliability Data System	-	-	5/16/79	-	-
I.F.2	Develop More Detailed Criteria	-	-	8/14/79, 12/17/79	-	-
II.E.1.3	Update Standard Review Plan and Develop Regulatory Guide	-	-	-	-	-
II.E.3.4	Alternate Concepts Research	-	-	4/18/79	-	-
II.E.3.5	Regulatory Guide	-	-	-	-	-
II.E.6.1	Test Adequacy Study	-	-	-	-	-

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
II.F.4	Study of Control and Protection Action Design Requirements	-	-	-	-	-
II.J.1.1	Establish a Priority System for Conducting Vendor Inspections	-	-	-	-	-
II.J.1.2	Modify Existing Vendor Inspection Program	-	-	-	-	-
II.J.1.3	Increase Regulatory Control over Present Nonlicensees	-	-	4/17/80	-	-
II.J.1.4	Assign Resident Inspectors to Reactor Vendors and Architect-Engineers	-	-	-	-	-
II.J.2.3	Assign Resident Inspectors to all Construction Sites	-	-	-	-	-
III.A.3.5	Training, Drills, and Tests	-	-	5/16/79	-	-
III.D.2.6	Independent Radiological Measurements	-	-	-	-	-
III.D.3.2	Health Physics Improvements	-	III	-	-	-
III.D.3.3	Inplant Radiation Monitoring, Item (3) & (4)	-	-	-	-	-
III.D.3.5	Radiation Worker Exposure Data Base	-	III	-	-	-
IV.A.2	Revise Enforcement Policy	-	-	-	-	-
IV.B.1	Revise Practices for Issuance of Instructions and Information to Licensees	-	-	5/16/79	-	-
IV.E.1	Expand Research on Quantification of Safety Decision-Making	-	-	5/16/79, 12/13/79	-	-

TABLE B.2 (continued)

Priority List and Title		NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
IV.G.1	Develop a Public Agenda for Rulemaking	-	-	12/13/79	-	-
IV.G.2	Periodic and Systematic Reevaluation of Existing Rules	-	-	12/13/79	-	-
IV.G.3	Improve Rulemaking Procedures	-	-	12/17/79	-	-
IV.G.4	Study Alternatives for Improved Rulemaking Process	-	-	12/13/79	-	-
V.	NRC Policy, Organization, and Management					
	1. Develop NRC Policy Statement on Safety	-	-	5/16/79	-	-
	2. Study Elimination of Nonsafety Responsibilities	-	-	-	-	-
	3. Strengthen Role of ACRS	-	-	1/15/80, 3/12/80	-	-
	4. Study Need for Additional Advisory Committees	-	-	-	-	-
	5. Improve Public and Intervenor Participation in Hearing Process	-	-	-	-	-
	6. Study Construction-During-Adjudication Rules	-	-	-	-	-
	7. Study Need for TMI-Related Legislation	-	-	-	-	-
	8. Study the Need to Establish an Independent Nuclear Safety Board	-	-	-	-	-
	9. Study the Reform of the Licensing Process	-	-	-	-	-

TABLE B.2 (continued)

Priority List and Title	NRC Points	AIF Priority	ACRS	NTOL	Implementation Dates
10. Study NRC Top Management Structure and Process	-	-	-	-	-
11. Reexamine Organization and Functions of NRC Offices	-	-	-	-	-
12. Revise Delegations of Authority to Staff	-	-	1/15/80	-	-
13. Clarify and Strengthen the Respective Roles of Chairman, Commission, and EDO	-	-	-	-	-
14. Authority to Delegate Emergency Response Functions to a Single Commissioner	-	-	-	-	-
15. Achieve Single Location - Long-term	-	-	-	-	-
16. Achieve Single Location - Interim	-	-	-	-	-
17. Reexamine Commission Role in Adjudication	-	-	-	-	-

TABLE B.3 ACTION PLAN

PRIORITY RANKING BY THE TMI ACTION PLAN STEERING GROUP

Action Item	Safety	Man-Machine	Resources			Timing	Total
			Use	NRC	Industry		
I.A.1.1	100	20	20	20	0	30	190
I.A.1.2	50	20	20	20	20	30	160
I.A.1.3	100	20	10	20	20	30	200
I.A.1.4	0	20	10	20	20	0	(70)
I.A.2.1	100	20	20	20	20	30	210
I.A.2.2	50	20	10	10	20	20	130
I.A.2.3	50	20	10	10	20	20	130
I.A.2.4	0	20	10	20	20	20	90
I.A.2.5	100	20	10	20	20	20	190
I.A.2.6	100	20	20	10	20	20	190
I.A.2.7	50	20	20	10	20	10	130
I.A.3.1	5	20	10	10	20	30	140
I.A.3.2	0	20	10	0	20	20	70
I.A.3.3	50	20	20	20	20	10	(140)
I.A.3.4	50	20	10	20	20	10	130
I.A.3.5	0	20	10	20	20	30	(100)
I.A.4.1	100	20	10	20	20	30	200
I.A.4.2	100	20	20	0	20	10	170
I.A.4.3	0	20	10	0	20	0	(50)
I.A.4.4	100	20	10	0	20	0	(150)
I.B.1.1	100	20	20	10	0	20	170
I.B.1.2	100	20	10	20	20	30	200
I.B.1.3	50	20	20	20	20	30	160
I.B.2.1	50	20	10	10	20	30	(140)
I.B.2.2	100	20	20	0	20	30	190
I.B.2.3	50	20	10	20	20	30	(150)

TABLE B.3 (Continued)

Action Item	Safety	Man-Machine	Resources Use	Resources NRC	Resources Industry	Timing	Total
I.B.2.4	50	20	10	10	20	20	(130)
I.C.1	100	20	20	0	0	30	170
I.C.2	50	20	20	20	20	30	160
I.C.3	50	20	20	20	20	30	160
I.C.4	50	20	20	20	20	30	160
I.C.5	100	20	10	20	20	30	200
I.C.6	50	20	10	20	0	20	120
I.C.7	100	20	10	20	20	30	200
I.C.8	50	20	10	10	20	30	140
I.C.9	100	20	10	0	20	20	170
I.D.1	100	20	20	10	20	20	190
I.D.2	100	20	10	20	20	10	180
I.D.3	100	20	10	20	0	0	150
I.D.4	100	20	20	20	20	0	180
I.D.5	100	20	20	0	0	20	160
I.D.6	0	20	20	20	20	30	110
I.E.1	100	20	20	0	20	30	190
I.E.2	100	20	20	0	20	30	190
I.E.3	100	20	10	0	20	30	180
I.E.4	100	20	10	20	20	30	200
I.E.5	50	10	20	10	0	30	(120)
I.E.6	100	20	20	10	20	20	190
I.E.7	50	20	20	20	20	30	160
I.E.8	50	20	20	10	20	20	140
I.F.1	50	10	10	10	20	20	120
I.F.2	50	10	10	10	20	20	(120)
I.G.1	50	20	10	20	0	30	130

TABLE B.3 (Continued)

Action Item	Safety	Man-Machine	Resources			Timing	Total
			Use	NRC	Industry		
I.G.2	50	10	10	20	20	30	140
II.A.1	50	10	20	0	20	10	110
II.A.2	50	10	10	10	20	20	120
II.B.1	50	10	20	20	20	20	140
II.B.2	50	10	20	10	20	30	140
II.B.3	50	10	20	20	20	30	150
II.B.4	100	20	10	20	20	30	200
II.B.5	100	10	20	0	0	0	130
II.B.6	100	10	20	10	0	30	170
II.B.7	100	10	10	10	0	30	160
II.B.8	100	10	10	0	0	0	120
II.C.1	100	10	20	0	20	30	180
II.C.2	100	10	10	20	0	10	150
II.C.3	100	10	20	10	20	20	180
II.C.4	50	10	10	0	0	30	100
II.D.1	100	10	20	10	20	30	190
II.D.2	50	10	20	0	20	20	120
II.D.3	100	10	20	20	20	30	210
II.E.1.1	100	10	20	10	20	30	190
II.E.1.2	100	10	20	20	20	30	200
II.E.1.3	0	10	20	20	20	20	(90)
II.E.2.1	100	10	10	10	20	20	170
II.E.2.2	100	20	20	0	20	20	180
II.E.2.3	50	10	20	20	20	30	150
II.E.3.1	100	10	20	20	20	30	200
II.E.3.2	100	10	20	10	20	20	180
II.E.3.3	50	10	10	20	20	20	130

TABLE B.3 (Continued)

Action Item	Safety	Man-Machine	Resources Use	Resources NRC	Resources Industry	Timing	Total
II.E.3.4	100	10	20	10	0	10	(150)
II.E.3.5	0	10	20	20	20	20	(90)
II.E.4.1	100	10	20	10	20	30	190
II.E.4.2	100	10	20	20	20	30	200
II.E.4.3	50	20	10	20	20	30	150
II.E.4.4	100	10	20	10	20	30	190
II.E.5.1	50	10	20	20	20	20	140
II.E.5.2	50	10	20	20	20	20	140
II.E.6	0	10	10	20	20	10	(70)
II.F.1	100	20	20	20	20	30	210
II.F.2	100	20	20	20	20	30	210
II.F.3	100	20	20	10	0	20	170
II.F.4	0	10	10	20	20	0	60
II.F.5	50	10	10	20	20	20	130
II.G.1	100	10	20	20	0	30	180
II.H.1	100	20	20	0	0	30	170
II.H.2	100	10	20	0	0	30	160
II.H.3	100	10	20	0	0	30	160
II.H.4	0	10	20	10	20	30	90
II.J.1.1	0	10	10	10	20	30	(80)
II.J.1.2	0	10	10	10	20	30	(80)
II.J.1.3	0	20	10	10	20	20	(80)
II.J.1.4	0	20	10	10	20	20	(80)
II.J.2.1	0	10	20	20	20	30	100
II.J.2.2	50	10	20	0	20	10	110
II.J.2.3	50	20	10	0	20	10	(110)
II.J.3.1	100	10	10	20	20	20	180

TABLE B.3 (Continued)

Action Item	Safety	Man-Machine	Resources Use	Resources NRC	Resources Industry	Timing	Total
II.J.3.2	0	20	20	20	20	20	100
II.J.4	50	20	20	20	20	30	160
II.K.1	100	20	20	10	20	30	200
II.K.2	100	20	20	10	20	30	200
II.K.3	100	10	10	10	20	30	180
III.A.1.1	100	20	20	0	0	30	170
III.A.1.2	100	20	20	10	0	30	180
III.A.1.3	0	20	10	20	20	30	100
III.A.2.1	0	20	20	10	20	30	100
III.A.2.2	0	20	10	10	0	10	60
III.A.3.1	100	20	20	10	20	30	200
III.A.3.2	50	20	20	10	20	20	140
III.A.3.3	50	20	20	0	20	30	140
III.A.3.4	50	20	20	0	0	10	100
III.A.3.5	50	20	20	0	20	30	(140)
III.A.3.6	0	20	20	20	20	30	110
III.B.1	100	20	20	10	20	30	200
III.B.2	100	20	10	0	20	30	180
III.C.1	0	20	10	10	20	30	90
III.C.2	0	20	10	20	20	10	80
III.D.1.1	50	10	20	10	20	30	140
III.D.1.2	0	10	10	10	20	20	70
III.D.1.3	50	10	10	10	0	30	110
III.D.1.4	0	10	10	20	20	10	70
III.D.2.1	50	10	10	20	20	10	120
III.D.2.2	0	10	10	0	20	10	50
III.D.2.3	50	10	10	0	20	10	100

TABLE B.3 (Continued)

Action Item	Safety	Man-Machine	Resources: Use	Resources: NRC	Resources: Industry	Timing	Total
III.D.2.4	0	20	20	0	20	30	90
III.D.2.5	0	20	10	10	20	20	80
III.D.2.6	0	10	10	20	20	20	(80)
III.D.3.1	50	20	20	0	20	20	130
III.D.3.2	0	10	20	0	20	30	(80)
III.D.3.3	50	10	20	0	0	20	100
III.D.3.4	50	10	10	10	20	20	120
III.D.3.5	0	10	10	10	20	0	(50)
IV.A.1	50	20	20	20	20	20	150
IV.A.2	50	20	20	20	20	20	(150)
IV.B	50	20	10	20	20	30	(150)
IV.C	50	20	10	10	20	20	130
IV.D	50	20	10	0	20	20	120
IV.E.1	0	20	10	10	20	20	(80)
IV.E.2	0	20	20	20	20	30	110
IV.E.3	0	10	10	20	20	30	90
IV.E.4	50	10	20	20	20	30	150
IV.E.5	100	10	20	10	20	20	180
IV.F.1	0	20	10	20	20	30	100
IV.F.2	0	20	10	10	20	10	70
IV.G.1	0	20	20	0	20	30	(90)
IV.G.2	0	20	10	0	20	10	(60)
IV.G.3	0	20	10	0	20	20	(70)
IV.G.4	0	20	10	20	20	20	(90)
IV.H	0	20	20	20	20	20	100
V.1	50	20	10	10	20	30	(140)
V.2	0	20	10	20	20	20	(90)

TABLE B.3 (Continued)

Action Item	Safety	Man-Machine	Resources Use	Resources NRC	Resources Industry	Timing	Total
V.3	0	20	20	20	20	20	(100)
V.4	0	20	20	0	20	20	(80)
V.5	0	20	20	0	20	20	(80)
V.6	0	10	10	10	20	20	(70)
V.7	0	20	10	20	20	30	(100)
V.8	0	20	10	20	20	20	(90)
V.9	0	20	10	20	20	20	(90)
V.10	0	20	20	20	10	20	(90)
V.11	0	20	10	10	20	20	(80)
V.12	0	20	20	20	20	20	(100)
V.13	0	20	10	20	20	30	(100)
V.14	0	20	20	20	20	20	(100)
V.15	50	20	20	20	20	0	(130)
V.16	100	20	20	20	20	30	(210)
V.17	0	20	10	20	20	20	(90)

APPENDIX C

RECOMMENDATIONS AND REQUIREMENTS BASED ON IE BULLETINS AND ORDERS AND COMMISSION ORDERS

TABLE C.1 OFFICE OF INSPECTION AND ENFORCEMENT BULLETINS

	Requirement	Source for Operating Reactors	Applicability	Operating Reactor Implementation	Operating License Implementation
1.	Review TMI-2 PNs and detailed chronology of the TMI-2 accident.	79-05&05A (Item 1) 79-06&06A (Item 1) 79-06&06B (Item 1) 79-08 (Item 1)	BWR and PWR	3/31/80	I.A.2.2 I.A.3.1
2.	Review transients similar to TMI-2 that have occurred at other facilities and NRC evaluation of Davis-Besse transient.	79-05&05A (Item 2)	B&W	3/31/80	I.A.2.2 I.A.3.1
3.	Review operating procedures for recognizing, preventing, and mitigating void formation in transients and accidents.	79-05&05A (Item 3) 79-06&06A (Item 2) 79-06&06B (Item 2)	PWR	3/31/80	I.C.1
4.	Review operating procedures and training instructions to ensure that: a. Operators do not override ESF actions unless continued operation is unsafe;	79-05&05A (Item 4.a) 79-05B (Item 2) 79-06A (Item 7.a) 79-06B (Item 6.a) 79-08 (Item 5.a)	PWR and BWR	3/31/80	I.C.1 I.C.7 I.G.1 I.C.8
	b. HPI system operation	NUREG-0645 (App. G) NUREG-0565 (Rec. 104) 69-110 6002-00 (11/1/79 69-110 6003-00 (11/20/79) 69-110 6001-00 (11/1/79)	W, CE B&W ANO-1 Davis-Besse 1 Oconee 1, 2 & 3 Crystal River 3 Rancho Seco 1	3/31/80	I.C.1

TABLE C.1 (continued)

Requirement	Source for Operating Reactors	Applicability	Operating Reactor Implementation	Operating License Implementation
c. RCP operation	NUREG-0623	PWR	Complete	I.C.1 I.A.1.3
d. Operators are instructed not to rely on level indication alone in evaluating plant conditions.	79-05A (Item 4.d) 79-06A (Item 7.d) 79-06B (Item 6.d) 79-08 (Item 5.b)	PWR and BWR	Complete	I.C.1 I.A.3.1 II.F.2
5. Safety-related valve position.	79-05&05A (Item 5)	PWR and BWR	3/31/80	NTOL: Same as ORs, before FL OL: I.C.2 & I.C.6
a. Review all valve positions and positioning requirements and positive controls and all related test and maintenance procedures to assure proper ESF functioning, if required.	79-06A (Item 8) 79-06B (Item 7) 79-008 (Item 6)			
b. Verify that AFW valves are in open position. See Requirement 8 below.	79-05A (Item 5)	B&W	3/31/80	I.C.2 I.C.6
6. Review containment isolation initiation design and procedures. Assure isolation of all lines that do not degrade safety features or cooling capability upon automatic initiation of SI.	79/05A (Item 6) 79-06A (Item 4) 79-06B (Item 3) 79-08 (Item 2)	PWR and BWR	3/31/80	II.E.4.2
7. Implement positive position controls on valves that could compromise or defeat AFW flow.	79-05A (Item 7)	B&W	3/31/80	II.E.1.1

TABLE C.1 (continued)

	Requirement	Source for Operating Reactors	Applicability	Operating Reactor Implementation	Operating License Implementation
8.	Immediately implement procedures that assure two independent 100% AFW flow paths, or specify explicitly LCO with reduced AFW capacity.	79-05A (Item 8)	B&W	3/31/80	II.E.1.1
9.	Review procedures to assure that radioactive liquids and gases are not transferred out of containment inadvertently especially upon ESF reset). List all applicable systems and interlocks.	79-05A (Item 9) 79-06A (Item 9) 79-06B (Item 8) 79-08 (Item 7)	PWR and BWR	3/31/80	II.E.4.2
10.	Review and modify (as required) procedures for removing safety-related systems from service (and restoring to service) to assure operability status is known.	79-05A (Item 10) 79-06A (Item 10) 79-06B (Item 9) 79-08 (Item 8)	PWR and BWR	3/31/80	NTOL: Same as ORs & I.C.2, before FL OL: I.C.2 & I.C.6
11.	Make all operating and maintenance personnel aware of the seriousness and consequences of the erroneous actions taken leading up to, and in early phases of, the TMI-2 accident.	79-05A (Item 11) 79-06A (Item 1.a) 79-06B (Item 1.a) 79-08 (Item 1.a)	PWR and BWR	3/31/80	I.A.3.1 I.A.2.2
12.	One hour notification requirement, and continuous communications channel.	79-05B (Item 6) 79-06A (Item 11) 79-06B (Item 10) 79-08 (Item 9)	PWR and BWR	Complete	I.E.6 III.A.3.3

TABLE C.1 (continued)

	Requirement	Source for Operating Reactors	Applicability	Operating Reactor Implementation	Operating License Implementation
13.	Propose Technical Specification changes reflecting implementation of all Bulletin items, as required.	79-05B (Item 7) 79-06A & Rev. 1 (Item 13) 79-06B (Item 12) 79-08 (Item 11)	PWR and BWR	1/1/81	Normal work on all new OLs
14.	Review operating modes and procedures to deal with significant amounts of hydrogen.	79-06A (Item 12) 79-06B (Item 11) 79-08 (Item 10)	W, CE GE	3/31/80	II.B.4 II.B.7 II.E.4.1 II.F.1
15.	For facilities with non-automatic AFW initiation, provide dedicated operator in continuous communication with CR to operate AFW.	79-06A (Item 5) 79-06B (Item 4)	W & CE	Complete	II.E.1.2
16.	Implement (immediately) procedures that identify PRZ PORV "Open" indications and that direct operator to close manually at "RESET" setpoint.	79-06A (Item 6) 79-06B (Item 5)	W & CE	Complete	I.C.1 II.D.3
17.	Trip PZR Level Bistable so that PZR Lo Press. (rather than PZR Lo Press. and PZR Lo Level coincidence) will initiate safety injection. For test, reset Lo Level bistable.	79-06A & Rev. 1 (Item 3)	W	Complete	Same as ORs, before FL
18.	Develop procedures and train operators on methods of establishing and maintaining natural circulation.	79-05B (Item 1)	B&W	Complete	I.C.1 I.G.1

TABLE C.1 (continued)

	Requirement	Source for Operating Reactors	Applicability	Operating Reactor Implementation	Operating License Implementation
19.	Describe design and procedure modifications (based on analysis) to reduce likelihood of automatic PZR PORV actuation in transients.	79-05B (Item 3)	B&W	3/31/80	II.E.5
20.	Provide procedures and training to operators for prompt manual reactor trip for LOFW, TT, MSIV closure, LOOP, LOSG Level, & Lo PZR Level.	79-05B (Item 4)	B&W	3/31/80	Same as ORs, before FL
21.	Provide automatic safety-grade anticipatory reactor trip for LOFW, TT, or significant decrease in SG level.	79-05B (Item 5)	B&W	3/31/80	Same as ORs, before FL
22.	Describe automatic and manual actions for proper functioning of auxiliary heat removal systems when FW system not operable.	79-08 (Item 3)	BWR	3/31/80	Same as ORs, before FL
23.	Describe uses and types of RV level indication for automatic and manual initiation safety systems. Also, describe alternative instrumentation.	79-08 (Item 4)	BWR	3/31/80	Same as ORs and II.F.2, before FL
24.	Perform LOCA analyses for a range of small-break sizes and a range of time lapses between reactor trip and RCP trip.	79-05C (short-term Item 2) 79-06C (short-term Item 2)	PWR	Complete	I.C.1

TABLE C.1 (continued)

	Requirement	Source for Operating Reactors	Applicability	Operating Reactor Implementation	Operating License Implementation
25.	Develop operator action guidelines (based on analyses in Requirement 24 above).	79-05C (short-term Item 3) 79-06C (short-term Item 3)	PWR	Complete	I.C.1
26.	Revise emergency procedures and train RO's and SRO's based on guidelines developed in Requirement 25 above.	79-05C (short-term Item 4) 79-06C (short-term Item 4)	PWR	Complete	I.C.1 I.A.3.1 I.G.1
27.	Provide analyses and develop guidelines and procedures for inadequate core cooling conditions. Also, define RCP restart criteria.	79-05C (short-term Item 5) 79-06C (short-term Item 5)	PWR	Complete	I.C.1 II.F.2
28.	Provide design that will assure automatic RCP trip for all circumstances where required.	NUREG-0623	PWR	1/1/81	See Table C.3, item 5

TABLE C.2 REQUIREMENTS FOR NEW B&W PLANTS DERIVED FROM COMMISSION ORDERS ON OPERATING B&W PLANTS

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation
1.	Upgrade timeliness and reliability of AFW system.	Commission Order	B&W	Complete	II.E.1 II.E.1.2
2.	Procedures and training to initiate and control AFW independent of integrated control system.	Commission Order	B&W	Complete	Same as ORs, before FL
3.	Hard-wired control-grade anticipatory reactor trips.	Commission Order	B&W	Complete	None - see Requirement 10 below
4.	Small-break LOCA analysis, procedures, and operator training.	Commission Order	B&W	Complete	I.A.3.1 I.C.1
5.	Complete TMI-2 simulator training for all operators.	Commission Order	B&W	Complete	I.A.2.6
6.	Reevaluate analysis for dual-level setpoint control.	Commission Order	Davis-Besse 1	Complete	NA
7.	Reevaluate transient of September 24, 1977.	Commission Order	Davis-Besse 1	Complete	NA
8.	Continued upgrading of AFW system.	Commission Order	B&W	1/1/81	II.E.1 II.E.1.2

TABLE C.2 (continued)

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation
9.	Analysis and upgrading of integrated control system.	Commission Order	B&W	1/1/81	Same as ORs, before OL
10.	Hard-wired safety-grade anticipatory reactor trips.	Commission Order	B&W	1/1/81	Same as ORs, before OL
11.	Operator training and drilling.	Commission Order	B&W	1/1/81	I.A.3.1 I.A.2.2 I.A.2.5 I.G.1
12.	Transient analysis and procedures for management of small breaks.	Commission Order	B&W	I.C.1	I.C.1
13.	Thermal-mechanical report -- effect of HPI on vessel integrity for small-break LOCA with no AFW.	Letter, D. Ross to B&W operating plants, 8/21/79	B&W	1/1/81	Same as ORs, before OL
14.	Demonstrate that predicted lift frequency of PORVs and SVs is acceptable.	Letter, D. Ross to B&W operating plants, 8/21/79	B&W	1/1/81	Same as ORs, before OL
15.	Analysis of effects of slug flow on once-through steam generator tubes after primary system voiding.	Letter, D. Ross to B&W operating plants, 8/21/79	B&W	6/1/80	Same as ORs, before OL

TABLE C.2 (continued)

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation
16.	Impact of RCP seal damage following small-break LOCA with loss of offsite power.	Letter, D. Ross to B&W operating plants, 8/21/79	B&W	6/1/80	Same as ORs, before OL
17.	Analysis of potential voiding in RCS during anticipated transients.	Letter, R. Reid to all B&W operating plants 1/9/80	All B&W	1/1/81	I.C.1
18.	Analysis of loss of feedwater and other anticipated transients.	Letter, D. Ross to B&W operating plants, 8/21/79	All B&W	I.C.1	I.C.1
19.	Benchmark analysis of sequential AFW flow to once-through steam generator.	Letter, D. Ross to B&W operating plants, 8/21/79	All B&W	1/1/81	I.C.1
20.	Analysis of system response to small-break LOCA that causes system pressure to exceed PORV setpoint.	Letter, D. Ross to B&W operating plants 8/21/79	All B&W	1/1/81	I.C.1
21.	LOFT 3-1 predictions.	Letter, D. Ross to B&W operating plants, 8/21/79	All B&W	Complete	None

TABLE C.3 FINAL RECOMMENDATIONS OF BULLETINS AND ORDERS TASK FORCE

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation	Near-Term Operating License Requirements
1.	Install automatic PORV isolation system and perform operational test.	NUREG-0565(2.1.2.a) NUREG-0611(3.2.4.e 3.2.4.f) NUREG-0635(3.2.4.a) (3.2.4.b)	PWR	7/1/81 and first refueling and depending on results of item 2, below.	Same as OR	NA
2.	Report on overall safety effect of PORV isolation system.	NUREG-0565 (2.1.2.d) NUREG-0611(3.2.4.g, 3.2.4.i) NUREG-0635(3.2.4.c)	PWRs	1/1/81	Same as OR	NA
3.	Report safety and relief valve failures promptly and challenges annually.	NUREG-0565(2.1.2.c, 2.1.2.e) NUREG-0611(3.2.4.h, 3.2.4.j) NUREG-0626(B.14) NUREG-0635(3.2.4.d)	All	4/1/80	Same as OR	FP
4.	Review and upgrade reliability and redundancy of non-safety equipment for small-break LOCA mitigation.	NUREG-0565(2.3.2.b) NUREG-0611(3.2.2.b) NUREG-0626 (B.12, NUREG-0635(3.2.2.b)	All	None	II.C.1 II.C.2 II.C.3	NA
5.	Continue to study need for C.1.4.c and need for automatic trip of RCPs, then modify procedures or designs as appropriate.	NUREG-0565(2.3.2.a) NUREG-0611(3.2.2.a) NUREG-0635(3.2.2.a) NUREG-0623	PWR	Study - 1/1/81 Modify - 1/1/82	Same as OR	NA

TABLE C.3 (continued)

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation	Near-Term Operating License Requirements
6.	Instrumentation to verify natural circulation.	NUREG-0565(2.6.2.b) NUREG-0611(3.2.3.b) NUREG-0635(3.2.3.b)	PWR	I.C.1 II.F.2 II.F.3	I.C.1 II.F.2 II.F.3	NA
7.	Evaluation of PORV opening probability during overpressure transient.	NUREG-0565(2.1.2.b)	B&W	See Table C.2, item 14	See Table C.2, item 14	NA
8.	Further staff consideration of need for diverse decay heat removal method independent of SGs	NUREG-0565(2.5.2.a) NUREG-0635 (4.2.5., App. VIII) NUREG-0611 (4.2.5, App. VIII)	PWR	II.C.1 II.E.3.3	II.C.1 II.E.3.3	NA
9.	Proportional Integral Derivative controller modification.	NUREG-0611(3.2.4.b)	W	7/1/80	Same as OR	FL
10.	Anticipatory trip modifcation proposed by some licensees to confine range of use to high power levels.	NUREG-0611(3.2.4.c)	W	Plant by plant	Same as OR	FL
11.	Control use of PORV supplied by Control Components Inc. until further review complete.	NUREG-0611(3.2.4.d)	All	Case by case	Same as OR	FL
12.	Confirm existence of anticipatory trip upon turbine trip.	NUREG-0611(3.2.4.a)	W	7/1/80	Same as OR	FL

TABLE C.3 (continued)

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation	Near-Term Operating License Requirements
13.	Separation of HPCI and RCIC system initiation levels. Analysis and implementation.	NUREG-0626(A.1)	GE	Analyses - 10/1/80 Implement - 4/1/81	Same as OR	NA
14.	Isolation of isolation condensers on high radiation.	NUREG-0626(A.2)	GE plants with isolation condenser	1/1/81	NA	NA
15.	Modify break detection logic to prevent spurious isolation of HPCI and RCIC systems.	NUREG-0626(A.3)	GE	1/1/81	Same as OR	NA
16.	Reduction of challenges and failures of relief valves - feasibility study and system modification.	NUREG-0626(A.4)	GE	Study - 1/1/81 Modify - 1/1/82	Same as OR	NA
17.	Report on outage of ECC systems - licensee report and proposed technical specification changes.	NUREG-0626(A.6)	GE	1/1/81	Same as OR	NA
18.	Modification of ADS logic - feasibility study and modification for increased diversity for some event sequences.	NUREG-0626(A.7)	GE	Study - 1/1/81 Modify - 1/1/82	Same as OR	NA

TABLE C.3 (continued)

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation	Near-Term Operating License Requirements
19.	Interlock on recirculation pump loops.	NUREG-0626(A.8)	GE Non-Jet Pump ORs	1/1/81	NA	NA
20.	Loss of service water for Big Rock Point.	NUREG-0626(A.9)	Big Rock Point	1/1/81	NA	NA
21.	Restart of core spray and LPCI systems on low level - design and modification.	NUREG-0626(A.10)	GE	Design - 1/1/81 Modify - 1/1/82	Same as OR	NA
22.	Automatic switchover of RCIC system suction - verify procedures and modify design.	NUREG-0626(B.1)	GE	Verify - 1/1/81 Modify - 1/1/82	Same as OR	NA
23.	Central water level recording.	NUREG-0626(B.2)	GE	I.D.2 III.A.1.2 III.A.3.4	I.D.2 III.A.1.2 III.A.3.4	NA
24.	Confirm adequacy of space cooling for HPCI and RCIC systems.	NUREG-0626(B.3)	GE	1/1/82	Same as OR	NA
25.	Effect of loss of AC power on pump seals.	NUREG-0626(B.4)	GE	1/1/82	Same as OR	NA

TABLE C.3 (continued)

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation	Near-Term Operating License Requirements
26.	Study effect on RHR reliability of its use for fuel pool cooling.	NUREG-0626(B.5)	GE	II.E.2.1	II.E.2.1	NA
27.	Provide common reference level for vessel level instrumentation.	NUREG-0626(B.6)	GE	10/1/80	Same as OR	NA
28.	Study and verify qualification of accumulators on ADS valves.	NUREG-0626(B.7)	GE	1/1/82	Same as OR	NA
29.	Study to demonstrate performance of isolation condensers with non-condensibles.	NUREG-0626(B.13)	GE Isolation Condenser ORs	4/1/81	NA	NA
30.	Revised small-break LOCA methods to show compliance with 10 CFR 50, Appendix K.	NUREG-0565(2.2.2.a) NUREG-0611(3.2.1.a) NUREG-0626(A.12) NUREG-0635(3.2.1.a) (3.2.5.a)	All	Beyond 1982	Same as OR	NA
31.	Plant-specific calculations to show compliance with 10 CFR 50.46.	NUREG-0565(2.2.2.b) NUREG-0611(3.2.1.b) NUREG-0626(A.13, B.10) NUREG-0635(3.2.1.b)	All	Beyond 1982	Same as OR	NA

TABLE C.3 (continued)

Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation	Near-Term Operating License Requirements
32. Provide experimental verification of two-phase natural circulation models.	NUREG-0565(2.6.2.a) NUREG-0611(3.2.3.a) NUREG-0635(3.2.3.a)	PWR (Matter under consideration for Semiscale/LOFT - see II.E.2.2 and for a PWR startup)	NA	NA	NA
33. Evaluate elimination of PORV function.	NUREG-0565(3.5) NUREG-0611(3.2.4.k) NUREG-0635(3.2.4.e)	PWR	II.C.1	II.C.1	NA
34. RELAP-4 model development.	NUREG-0611(3.2.5) NUREG-0635(3.2.5)	PWR (II.E.2.2 covers this staff action)	NA	NA	NA
35. Evaluation of effects of core flood tank injection on small-break LOCAs.	NUREG-0565(2.2.2.c)	B&W	I.C.1	I.C.1	NA
36. Additional staff audit calculations of B&W small-break LOCA analyses.	NUREG-0565(2.4.2.a)	B&W (I.C.1 covers this staff action)	NA	NA	NA
37. Analysis of B&W plant response to isolated small-break LOCA.	NUREG-0565(2.6.2.c)	B&W	I.C.1	I.C.1	NA
38. Analysis of plant response to a small-break LOCA in the pressurizer spray line.	NUREG-0565(2.6.2.d)	B&W	I.C.1	I.C.1	NA

TABLE C.3 (continued)

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation	Near-Term Operating License Requirements
39.	Evaluation of effects of water slugs in piping caused by HPI and CFT flows.	NUREG-0565(2.6.2.e)	B&W	I.C.1	I.C.1	NA
40.	Evaluation of RCP seal damage and leakage during a small-break LOCA.	NUREG-0565(2.6.2.f)	B&W	See Table C-2, item 16	See Table C.2, item 16	NA
41.	Submit predictions for LOFT Test L3-6 with RCPs running.	NUREG-0565(2.6.2.g)	B&W	I.C.1	I.C.1	NA
42.	Submit requested information on the effects of non-condensible gases.	NUREG-0565(2.6.2.h)	B&W	I.C.1	I.C.1	NA
43.	Evaluation of mechanical effects of slug flow on steam generator tubes.	NUREG-0565(2.6.2.i)	B&W	See Table C-2, item 15	See Table C.2, item 15	NA
44.	Evaluation of anticipated transients with single failure to verify no significant fuel failure.	NUREG-0626(A.14)	GE	1/1/81	Same as OR	NA
45.	Evaluate depressurization with other than full ADS.	NUREG-0626(A.15)	GE	1/1/81	Same as OR	NA

TABLE C.3 (continued)

	Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation	Near-Term Operating License Requirements
46.	Response to list of concerns from ACRS consultant.	NUREG-0626(A.17) Letter from D. Ross to GE Operating Plants Dated 10/17/79	GE	7/1/80	Same as OR	NA
47.	Test program for small-break LOCA model verification pretest prediction, test program and model verification.	NUREG-0626(B.9)	GE	I.C.1 II.E.2.2	I.C.1 II.E.2.2	NA
48.	Assess change in safety reliability as result of implementing B&OTF recommendations.	NUREG-0626(B.15)	GE	II.C.1 II.C.2	II.C.1 II.C.2	NA
49.	Review of procedures (NRC).	NUREG-0611(3.4.1) NUREG-0635(3.4.1)	W, CE	I.C.9	I.C.8 I.C.9	NA
50.	Review of procedures (NSSS vendors)	NUREG-0611(3.4.2) NUREG-0635(3.4.2)	W, CE	I.C.9	I.C.7 I.C.9	NA
51.	Symptom-based emergency procedures.	NUREG-0611(3.4.3) NUREG-0626(B.8) NUREG-0635(3.4.3)	W, CE GE	I.C.9	I.C.9	NA
52.	Operator awareness of revised emergency procedures.	NUREG-0626(A.11)	GE	I.B.1.1 I.C.2 I.C.5	I.B.1.1 I.C.2 I.C.5	NA

TABLE C.3 (continued)

Requirement	Source	Applicability	Operating Reactor Implementation	Operating License Implementation	Near-Term Operating License Requirements
53. Two operators in control room.	NUREG-0626(A.16)	GE	I.A.1.3	I.A.1.3	NA
54. Simulator upgrade for small-break LOCAs.	NUREG-0565(2.3.2.c) NUREG-0611(3.3.1.b) NUREG-0626(B.11) NUREG-0635(3.3.1.b)	All	I.A.4.1	I.A.4.1	NA
55. Operator monitoring of control board.	NUREG-0611(3.5.1) NUREG-0635(3.5.1)	W, CE	I.C.1 I.D.2 I.D.3	I.C.1 I.D.2 I.D.3	NA
56. Simulator training requirements.	NUREG-0611(3.3.1.a) NUREG-0635(3.3.1.a)	W, CE	I.A.3.1 I.A.2.6	I.A.3.1 I.A.2.6	NA
57. Identify water sources prior to manual activation of ADS	NUREG-0626(A.5)	GE	10/1/80	I.C.1	NA

APPENDIX D

GLOSSARY

Acronym	Definition
ADS	automatic depressurization system
AEOD	Office for 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
B&OTF	Bulletins and Orders Task Force
CEA	Cambridge Electron Accelerator (Harvard, MIT)
CEA	Commissariat a l'Energie Atomique (France)
CP	construction permit
CY	calendar year
DAS	disturbance analysis system
DOE	Department of Energy
ECCS	emergency core cooling system
EEI	Edison Electric Institute (Task Force on Power Reactor Health Physicists)
EIS	environmental impact statement
EMS	emergency medical services
EOF	Emergency Operations Facility
EPRI	Electric Power Research Institute
EPZ	emergency planning zones

Acronym	Definition
ESF	engineered 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
HPC	health physics center
HPCI	high pressure coolant injection
HPS	Health Physics Society
ICS	integrated control system
IE	(NRC) Office of Inspection and Enforcement
INPO	Institute for Nuclear Power Operations
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
LOOP	loss of offsite power
LOSG	loss of steam generator
LPCI	low pressure coolant injection
LPGS	liquid pathway generic study
LWR	light water reactor
md	manday
mm	manmonth
MOU	Memorandum of Understanding
MSIV	main steam isolation valve
MSLBIC	main steam line break inside containment
mw	manweek
my	manyear

Acronym	Definition
NA (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
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	(NRC) 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	Privacy Act statement
PBE	prompt burst experiments
PBF	Power Burst Facility (INEL)
PCS	power conversion system
PHS	Public Health Service
PORV	power-operated relief valve
PWR	pressurized water reactor
PZR	pressurizer
QA	quality assurance
QC	quality control
RAB	(NRC) Radiological Assessment Branch

Acronym	Definition
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	(NRC) 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
RV	reactor vessel
SAFER	(RES)
Sandia	Sandia Laboratories
SD	(NRC) Office of Standards Development
SG	steam generator
SOP	standard operating procedure
SP	Office of State Programs
SRO	senior reactor operator
SSER	standard safety evaluation report
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
TT	Test Temperature
TWG	Technical Working Group
UK	United Kingdom

APPENDIX E

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 and date of publication 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-75/071, "Policy Issues Raised by Intervenor Requests for Financial Assistance in NRC Proceedings," U.S. Nuclear Regulatory Commission, July 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-75/111 (WASH-1293), "Guide and Checklist for Development and Evaluation of State and Local Government Radiological Emergency Response Plans in Support of Fixed Nuclear Facilities," U.S. Nuclear Regulatory Commission, October 1975.

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

NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," U.S. Nuclear Regulatory Commission, December 1978.

NUREG-0440, "Liquid Pathway Generic Study, Impacts of Accidental Radioactive Releases to Hydrosphere from Floating and Land-Based Nuclear Power Plants," U.S. Nuclear Regulatory Commission, February 1978.

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, January 1980.

NUREG-0572, "Review of Licensee Event Reports (1976-1978)," U.S. Nuclear Regulatory Commission, September 1979.

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

NUREG-0584 (Draft), "Assuring the Availability of Funds for Decommissioning Nuclear Facilities," 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-0610, "Basis for Emergency Action Levels for Nuclear Power Facilities," U.S. Nuclear Regulatory Commission, September 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, January 1980.

NUREG-0616, "Report of Special Review Group, Office of Inspection and Enforcement, on Lessons Learned from Three Mile Island," U.S. Nuclear Regulatory Commission, December 1979.

NUREG-0623, "Generic Assessment of Delayed Reactor Coolant Pump Trip During Small-Break Loss-of-Coolant Accidents in Pressurized Water Reactors," U.S. Nuclear Regulatory Commission, November 1979.

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, January 1980.

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, January 1980.

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-0610, "Basis for Emergency Action Levels for Nuclear Power Facilities," U.S. Nuclear Regulatory Commission, September 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, January 1980.

NUREG-0616, "Report of Special Review Group, Office of Inspection and Enforcement, on Lessons Learned from Three Mile Island," U.S. Nuclear Regulatory Commission, December 1979.

NUREG-0623, "Generic Assessment of Delayed Reactor Coolant Pump Trip During Small-Break Loss-of-Coolant Accidents in Pressurized Water Reactors," U.S. Nuclear Regulatory Commission, November 1979.

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, January 1980.

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, January 1980.

NUREG-0645, "Final Report of Bulletins and Orders Task Force of the Office of Nuclear Reactor Regulation," Vols. 1 and 2, U.S. Nuclear Regulatory Commission, January 1980.

NUREG-0646, "Report from the Advisory Committee on Construction During Adjudication," U.S. Nuclear Regulatory Commission, January 1980.

NUREG-0654 (FEMA-REP-1), "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," U.S. Nuclear Regulatory Commission, January 1980.

NUREG-0667, "Transient Response of Babcock & Wilcox Designed Reactors," U.S. Nuclear Regulatory Commission, to be published (available in draft form).

NUREG/CR-1250, "Three Mile Island, A Report to the Commission and to the Public," Vols. I and II, U.S. Nuclear Regulatory Commission, January 1980 (Vol. I) and May 1980 (Vol. II).

Documents with the following types of designation and other miscellaneous documents are available for inspection and copying for a fee in the NRC Public Document Room at 1717 H St., N.W., Washington, D.C.:

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16. ABSTRACT *(200 words or less)*

The Action Plan provides a comprehensive and integrated plan for all actions judged necessary by the Nuclear Regulatory Commission to correct or improve the regulation and operation of nuclear facilities based on the experience from the accident at the Three Mile Island, Unit 2, nuclear facility and the official studies and investigations of the accident.

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