

ENCLOSURE 1

NRC FORM 173 (2-78)		U.S. NUCLEAR REGULATORY COMMISSION		ORDER NUMBER 20-81-215
<b>STANDARD ORDER FOR DOE WORK</b>				DATE March 23, 1981
				ISSUED TO: (DOE Office) Albuquerque Operations Office Department of Energy
PERFORMING ORGANIZATION AND LOCATION LOS ALAMOS SCIENTIFIC LABORATORY LOS ALAMOS, NEW MEXICO				ACCOUNTING CITATION APPROPRIATION SYMBOL 31X0200.201
FIN TITLE ENGINEERING EVALUATION ASSISTANCE FOR NONPOWER REACTORS				B&R NUMBER 20-19-04-08
				FIN NUMBER A-7254 -1
				WORK PERIOD - THIS ORDER
				FIXED <input type="checkbox"/> ESTIMATED <input checked="" type="checkbox"/>
				FROM: 5/1/81 TO: 9/30/81
<b>OBLIGATION AVAILABILITY PROVIDED BY:</b>				
A. THIS ORDER				\$100,000
B. TOTAL OF ORDERS PLACED PRIOR TO THIS DATE WITH THE PERFORMING ORGANIZATION UNDER THE SAME "APPROPRIATION SYMBOL" AND THE FIRST FOUR DIGITS OF THE "B&R NUMBER" CITED ABOVE				\$ 947,000
C. TOTAL ORDERS TO DATE (TOTAL A & B)				\$ 1,047,000
D. AMOUNT INCLUDED IN "C" APPLICABLE TO THE "FIN NUMBER" CITED IN THIS ORDER.				\$100,000
FINANCIAL FLEXIBILITY:				
<input checked="" type="checkbox"/> FUNDS WILL NOT BE REPROGRAMMED BETWEEN FINIS. LINE D CONSTITUTES A LIMITATION ON OBLIGATIONS AUTHORIZED.				
<input type="checkbox"/> FUNDS MAY BE REPROGRAMMED NOT TO EXCEED ± 10% OF FIN LEVEL UP TO \$50K. LINE C CONSTITUTES A LIMITATION ON OBLIGATIONS AUTHORIZED.				
STANDARD TERMS AND CONDITIONS PROVIDED DOE ARE CONSIDERED PART OF THIS ORDER UNLESS OTHERWISE NOTED.				
ATTACHMENTS: THE FOLLOWING ATTACHMENTS ARE HEREBY MADE A PART OF THIS ORDER: <input checked="" type="checkbox"/> STATEMENT OF WORK <input type="checkbox"/> ADDITIONAL TERMS AND CONDITIONS <input type="checkbox"/> OTHER			SECURITY: <input checked="" type="checkbox"/> WORK ON THIS ORDER IS NOT CLASSIFIED. <input type="checkbox"/> WORK ON THIS ORDER INVOLVES CLASSIFIED INFORMATION. NRC FORM 187 IS ATTACHED.	
REMARKS:  THIS ORDER PROVIDES INITIATION OF FUNDING FOR THIS PROJECT, PROVIDES WORK REQUIREMENTS, AND REQUESTS A PROPOSAL BASED ON THE ATTACHED STATEMENT OF WORK.  AFTER SIGNATURE, PLEASE SEND TO THE NRC OFFICE OF THE CONTROLLER, ATTN: D. DANDOIS AND PROVIDE A COPY TO THE OFFICE OF NUCLEAR REACTOR REGULATION, ATTN: D. CORLEY				
ISSUING AUTHORITY			ACCEPTING ORGANIZATION	
SIGNATURE Bernard L. Grenier			SIGNATURE	
TITLE Technical Assistance Program Manager			TITLE	
NRC FORM 173 (2-78)			DATE	

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ENCLOSURE 2

PROPOSAL CONTENT

The minimum items required in all proposals are:

1. Performing organization's name and location.
2. FIN Title, FIN Number, and B&R Number (NRC's) (as on statement of work).
3. Performing organization's key personnel, program manager, or principal investigator, their resumes and FTS phone numbers.
4. Background (definition of the problem including the objective(s) to be attained).
5. Work to be performed (Provide a concise description of tasks to be performed and expected results for the period of performance. Note technical data requirements, potential problems, and other technical information needed to fully explain the effort. Highlight changes from prior authorized SOW's, if any, identify changes in performance, schedule or costs).
6. Identify major subcontracts, including consultants.
7. Costs estimated to be incurred by DOE contractors, subcontractors, and consultants. List by fiscal year to completion:
  - a. Manyears of Technical Support (MTS)
  - b. Costs:
    - (1) Direct Salaries (Labor) for MTS
    - (2) Material and Services (excluding ADP)
    - (3) Total ADP Support
    - (4) Subcontracts
    - (5) Capital Equipment
    - (6) Direct Travel Expense (Foreign travel must be shown separately)
    - (7) General and Administrative Expenses (Include indirect labor cost)
  - c. Total Estimated Cost:

8. Forecasts:

- a. Milestone Chart for accomplishing the work.
- b. Planned monthly rate of costs by fiscal year. This may be provided with the first report of an authorized program if not known at time of proposal submittal. At the beginning of each subsequent year, reports should include the planned monthly rate of costs for the ensuing year.

9. Conflict of Interest:

In order to assist the Commission in its evaluation, the DOE Contracting Officer shall describe any significant contractual and organizational relationships of the DOE, its contractor, their employees, or expected subcontractors or consultants on this proposal, with industries regulated by the NRC (e.g. utilities, etc.) and suppliers thereof (e.g. architect engineers and reactor manufacturers, etc.) that might give rise to an apparent to actual conflict of interest.

10. Reporting Requirements (as in statement of work).

ENCLOSURE 3

STATEMENT OF WORK

Title: ENGINEERING EVALUATION ASSISTANCE FOR NONPOWER REACTOR  
RENEWAL REVIEWS

FIN NO.: A-7254

B&R No.: 20-19-04-08

Technical Monitor: Harold Bernard (FTS 492-8357)  
Cognizant Branch Chief: James R. Miller (FTS 492-7014)

PROGRAM BACKGROUND

For the past six years the Los Alamos National Laboratory has been providing technical assistance to NRR and NMSS in a number of programs connected with the licensing of commercial power reactors, nonpower reactors, and fuel reprocessing and fabrication facilities. This assistance has included safety reviews, review of physical security, emergency planning, some aspects of environmental problems, and other special problems as required.

The basis for licensing U.S. nonpower reactors (NPR) evolves from the Atomic Energy Act of 1954 and the Energy Reorganization Act of 1974. These acts provide the U.S. Nuclear Regulatory Commission (NRC) with the authority to set the rules and requirements that an applicant must meet to be licensed. Specifically, when an NPR licensee applies for license renewal, he must modify his existing Safety Analysis Report (SAR) by addressing any changes that have been made to the facility that could affect the public health and safety during the requested renewal period.

A completed review of the modified SAR is conducted by the NRC to ensure that the nonpower reactor licensee meets all applicable rules and regulations. In relicensing, the SAR will include information that thoroughly describes the facility, its operations, and all changes made during the previous license period. The SAR will contain the design basis and operating limits on reactor operation; a safety analysis of the structure, components, and systems showing they will be able to perform their intended functions; updated information on meteorology, seismic, and other natural and man-caused phenomena; and analyses of design basis events (DBE) and their consequences.

At the present time 26 nonpower reactors are under review for license renewal by the NRC. The NRC requires technical assistance from Los Alamos in performing these reviews.

PROGRAM OBJECTIVE

The objective of this work order is to obtain assistance in the review and evaluation of the specified sections of the Safety Analysis Reports (SARs) for each of the 26 nonpower reactors and provide a Safety Evaluation Report.

REVIEW CRITERIA

Review and evaluation of the SARs for each of the nonpower reactors in accordance with the sections of the Standard Review Plan (SRP) which are identified in Attachment A.

WORK REQUIREMENTS

For each of the nonpower reactors listed in Attachment B, Review and evaluate the Safety Analysis Report in accordance with specified sections of the Standard Review Plan identified in Attachment A. Perform the following subtasks for each Task listed in Attachment B:

	Projected Completion Time from Submittal or Completed Application (0) Weeks
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- |  |    |
|--|----|
| a. Review and evaluate the SAR in accordance with the Standard Review Plan and draft questions to licensee.                | 3  |
| b. Conduct site visit to become familiar with the facility and discuss questions.  | 4  |
| c. Formalize questions and submit to NRC.  | 6  |
| d. Review responses from licensee and prepare Technical Evaluation Report (TER) for input to the Safety Evaluation Report. | 15 |
| e. Participate in public proceedings as needed.  | NA |

Notes:

- A. We request that Los Alamos establish a target schedule. This schedule will be altered in writing by the Director, Division of Licensing, for each NPR review as more information becomes available. Below is an estimate of the review time required for a typical facility.
- B. It is estimated that each case history will require approximately fifteen weeks of elapsed time as shown below. For a case with hearings, the time will be approximately 30 weeks (See chart at end). A test reactor case study would also require longer review time.



- C. By cascading case studies to take advantage of mailing time and applicant response time (i.e., 4-5 weeks lapse time during each case study for Los Alamos) five or six case studies can be completed annually. Attachment C is an example of how the reviews can be scheduled concurrently.
- D. The disciplines that are required and the estimated staff time required to review five or six case studies annually are shown in the following table.

<u>Staff required for NPR Cases</u>	<u>Staff years for 7-10 cases per year</u>
Structural	1/2 - 1
Radiation Protection ) Radiation Confinement ) Ventilation Systems )	1 1/2 - 2
Accident Analysis	1/4 - 1 1/4
Instrumentation	1/4 - 3/4
Neutronics	1/4 - 3/4
Management	<u>1/4</u>

3-6 use 5 staff years

- E. We anticipate that some plants will require less time than shown above and some more complex facilities significantly more time. As the table indicates approximately 5 staff years are required for 7-10 cases per year or approximately one man year per case.

It is not anticipated that second round questions will be required for these reviews, therefore, no time has been allowed for the preparation of second round questions. If second round questions are required, the average time allowed should accommodate this effort.

- F. In addition a case listing in order of priority is attached. The Director, Division of Licensing, retains the right to change this listing as priorities change.

All technical positions shall be resolved in the question phases or reported as open items in the SER.

LEVEL OF EFFORT AND PERIOD OF PERFORMANCE (Staff Years)

The level of effort is estimated at 13 staff years, from FY 81-FY 83.

FY 81	FY 82	FY 83
2*	6	5

\*Prorated on basis of fiscal year remaining plus needs to initiate effort

REPORTING REQUIREMENTS

1. Upon completion of each Task identified in Attachment B, provide the Cognizant NRR Branch Chief with draft questions and draft SER sections.
2. A monthly business letter report shall be submitted by the 15th of the month to the Director, Division of Licensing, with copies to the Cognizant Branch Chief, James R. Miller, DL; Robert L. Tedesco, DL; and B. L. Grenier, NRR. These reports will contain:
  - (a) A listing of any efforts completed during the period; milestones reached, or if missed, an explanation provided;
  - (b) The amount of funds expended for manpower and computer services during the period and cumulative to date for each task;
  - (c) Any problems or delays encountered or anticipated;
  - (d) A summary of the progress to date;
  - (e) Plans for the next reporting period.

Note: Cost information for each test reactor must be gathered by the NRC as legal requirement to properly assess licensing fees.

MEETINGS AND TRAVEL

It is estimated that one trip for one person will be required to each reactor reviewed, and one trip will be required for one or two persons to Bethesda, Maryland, for a review of the Safety Evaluation Report for each reactor.

NRC - FURNISHED MATERIALS

Renewal application, including Safety Analysis Report for each facility.

## REVIEW CRITERIA

### SECTIONS OF STANDARD REVIEW PLAN

#### 1. INTRODUCTION

This section should evaluate briefly the principal aspects of the overall application, including the type of license requested, a brief description of the proposed location of the facility, the type of reactor and its designer, the type of containment or reactor building and its designer, and the core power level.

##### 1.1 General Facility Description

This section should include an evaluation of the principal characteristics of the site and a concise description of the facility.

#### 2. SITE CHARACTERISTICS

This section of the SER should provide an evaluation of the geological, seismological, hydrological, and meteorological characteristics of the site and vicinity, in conjunction with present and projected population distribution and land use and site activities and controls. The purpose is to show the adequacy of the site characteristics from a safety viewpoint.

#### 3. REACTOR

In this section of the SER there should be an evaluation of the capability of the reactor to perform its safety functions throughout its design lifetime under all normal operational modes; including both transient and steady state, and accident conditions. This section should also include an evaluation of the analyses concerning Design Basis Accidents.

#### 4. FUNCTIONAL DESIGN OF REACTIVITY CONTROL SYSTEMS

Provide an evaluation of the control rod drive system, which includes the essential ancillary equipment and hydraulic systems, to assure that it is designed and installed to provide the required functional performance and that it is properly isolated from other equipment. Additionally, provide an evaluation of the bases for assessing the combined functional performance of all the reactivity control systems to mitigate the consequences of anticipated transients and postulated accidents.



## 5. REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS

This section of the SER should provide information regarding the reactor coolant system and systems connected to it. Evaluations, together with the necessary supporting material, should be presented to show that the reactor coolant system is adequate to accomplish its intended objective and to maintain its integrity under conditions imposed by all foreseeable reactor behavior, either normal or accident conditions.

## 6. ENGINEERED SAFETY FEATURES

Engineered safety features may be provided to mitigate the consequences of postulated accidents in spite of the fact that these accidents are very unlikely. The section of the SER should be an evaluation of the adequacy of the engineered safety features provided in the facility.

## 7. INSTRUMENTATION AND CONTROLS

The reactor instrumentation senses the various reactor parameters and transmits appropriate signals to the regulating systems during normal operation, and to the reactor trip and engineered safety features during abnormal and accident conditions. The section should evaluate those instruments and associated equipment which constitute the reactor safety system (as defined in ANSI/ANS Std. 15.15-1978, "Criteria for the Reactor Safety Systems of Research Reactors").

### 7.1 Introduction

Describe and evaluate instrumentation, control, and supporting systems that are safety related, including alarm, communication, and display instrumentation. Describe the design bases (including considerations of instrument errors), criteria, regulatory guides, standards, and other documents that will be implemented in the design of these systems.

### 7.2 Reactor Trip System

This section should evaluate the elements of the reactor trip system. It should include the design basis information required by Section 4 of ANSI/ANS Std. 15.15-1978 and an analysis demonstrating that the design criteria of Section 5 of ANSI/ANS Std. 15.15-1978 have been satisfied. The evaluation of the analysis should discuss the need for and method of changing to more restrictive trip setpoints during abnormal operating conditions.

### 7.3 Engineering Safety Feature Systems

For research and test reactors having engineered safety features, provide a description, design basis information, and an evaluation of the analysis showing satisfaction of design criteria, similar to those required in the previous section, for each engineered safety feature system.

### 7.4 Safety-Related Display Instrumentation

This section should include an evaluation of the instrumentation systems (including control rod position indicators) that provide information to enable the reactor operator to perform required safety functions.

## 8. AUXILIARY SYSTEMS

This section should provide an evaluation of the auxiliary systems included in this facility. Those systems that are essential for the safe shutdown of the reactor or the protection of the health and safety of the public should be identified and where applicable, an evaluation of each system and the design bases for the system and for critical components. A safety evaluation demonstrating how the system satisfies the design bases, the testing and inspection to be performed to verify system capability and reliability, and the required instrumentation and controls should be provided. There may be aspects of the auxiliary systems that have little or no relationship to protection of the public against exposure to radiation. In such cases, enough information should be provided to allow understanding of the auxiliary system design and function with emphasis on those aspects of design and operation that might affect the reactor and its safety features or contribute to the control of radioactivity.

For the fire protection system, it should be demonstrated that the requirements of ANSI/ANS Std. 15.17, "Fire Protection for Research Reactors," have been satisfied.

## 9. RADIOACTIVE WASTE MANAGEMENT

This section should evaluate:

1. The capabilities of the plant to control, collect, handle, process, store, and dispose of liquid, gaseous, and solid wastes that may contain radioactive materials, and
2. The proposed radioactive waste (radwaste) treatment systems that have the capability to meet the requirements of 10 CFR Parts 20 and 50 and the recommendations of appropriate regulatory guides concerning system design, control and monitoring of releases, and maintaining releases of radioactive materials at the "as low as is reasonably achievable" level in accordance with Appendix I to 10 CFR Part 50.

#### 10. RADIATION PROTECTION

This section of the SER should evaluate the methods for radiation protection and of estimated occupational radiation exposures to operating and construction personnel during normal operation and anticipated operational occurrences (including refueling; purging; fuel handling and storage; radioactive material handling, processing, use, storage, and disposal; maintenance; routine operational surveillance; inservice inspection; and calibration). It should provide an evaluation on facility and equipment design, the planning and procedures programs, and the techniques and practices employed by the applicant in meeting the standards for protection against radiation of 10 CFR Part 20 and in ANSI/ANS Std. 15.11-1977, "Radiological Control for Research Reactors."

#### 11. OPERATOR QUALIFICATION

This section of the SER should evaluate the preparations and plans for operation of the facility. Its purpose is to provide assurance that the applicant will establish and maintain a staff of adequate size and technical competence and that operating plans to be followed by the licensee are adequate to protect public health and safety.

#### 12. EMERGENCY PLANNING

This section of the SER should evaluate the applicant's plans for coping with emergencies pursuant to paragraphs (a)(10) and (b)(6)(v) of §50.34 of 10 CFR Part 50. The items to be discussed are set forth in Appendix E, "Emergency Plans for Production and Utilization Facilities," to 10 CFR Part 50. Additional guidance, including a discussion of emergency plan format and requirements, can be found in ANSI/ANS Std. 15.16-1978, "Emergency Planning for Research Reactors."

#### 13. REVIEW AND AUDIT

The SER should evaluate plans for conducting reviews and audits of operating activities that are important to safety. Procedures for reviewing changes, tests, and experiments proposed in accordance with §50.59 of 10 CFR Part 50 should be evaluated, as well as procedures for after-the-fact review and evaluation of unplanned events. Provisions for performing independent reviews of operating activities should be evaluated. The procedures and organization employed to audit operating activities, compliance with administrative controls, and the quality assurance program should be evaluated.

The guidance in ANS Std. 15.18, "Administrative Controls for Research Reactors," should prove helpful in evaluating procedures.

14. REPORTS AND RECORDS

This section of the SER should evaluate the system for maintaining records of all facility activities and preparing, submitting, and filing reports in accordance with the guidance found in ANS Std. 15.3, "Records and Reports for Research Reactors."

15. ACCIDENT ANALYSES

Provide an evaluation of the accident analyses. The evaluation of the safety of a research reactor should include analyses of the response of the reactor to postulated disturbances in process variables and to postulated malfunctions, failures of equipment, or operator errors. Such safety analyses provide a significant contribution to the selection of limiting conditions for operation, limiting safety system settings, and design specifications for components and systems from the standpoint of public health and safety.

## PRIORITY LISTING OF NONPOWER REACTOR REVIEWS

### FY-81 Reviews

- Task 1 UCLA (Finish and confirm staff review)
- 2 Worcester Polytechnic (Entire Review)
- 3 NBS (Entire review - including Power Increase)
- 4 University of Virginia (Entire Review)
- 5 University of Florida (Entire Review)
- 6 AFRRRI (Confirm staff review and Finish)
- 7 Washington State (Entire Review)
- 8 University of Maryland (Finish and confirm staff review)

### FY-82 Reviews (all Entire Reviews)

- Task 9 Texas A&M
- 10 Iowa State
- 11 VPI (including Power Increase)
- 12 Union Carbide
- 13 CETR (assumes Lifting of Show Cause)
- 14 GENTR
- 15 Cornell TRIGA
- 16 Cornell Critical Facility
- 17 B&W
- 18 University of Missouri (Rolla)
- 19 University of Texas

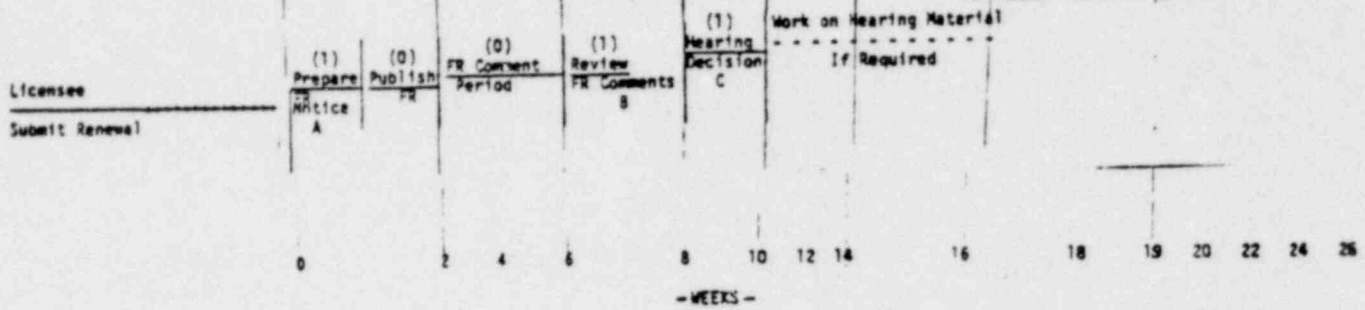
### FY-83 Reviews

- Task 20 University of Illinois
- 21 Michigan State
- 22 Rensselaer
- 23 University of Kansas
- 24 University of Oklahoma
- 25 SUNY
- 26 Veterans Administration

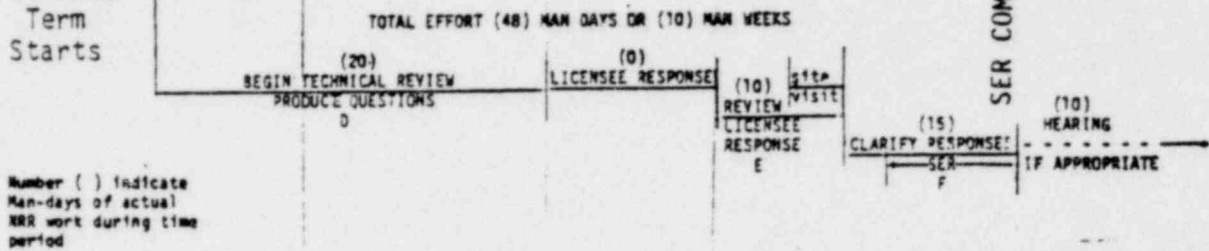


# TIME INTERVALS

## CASE WITH HEARINGS GENERIC SCHEDULE - MORE DIFFICULT CASE (I.E. POWER INCREASE AND RENEWAL SMALLER REACTOR $\leq 200$ )



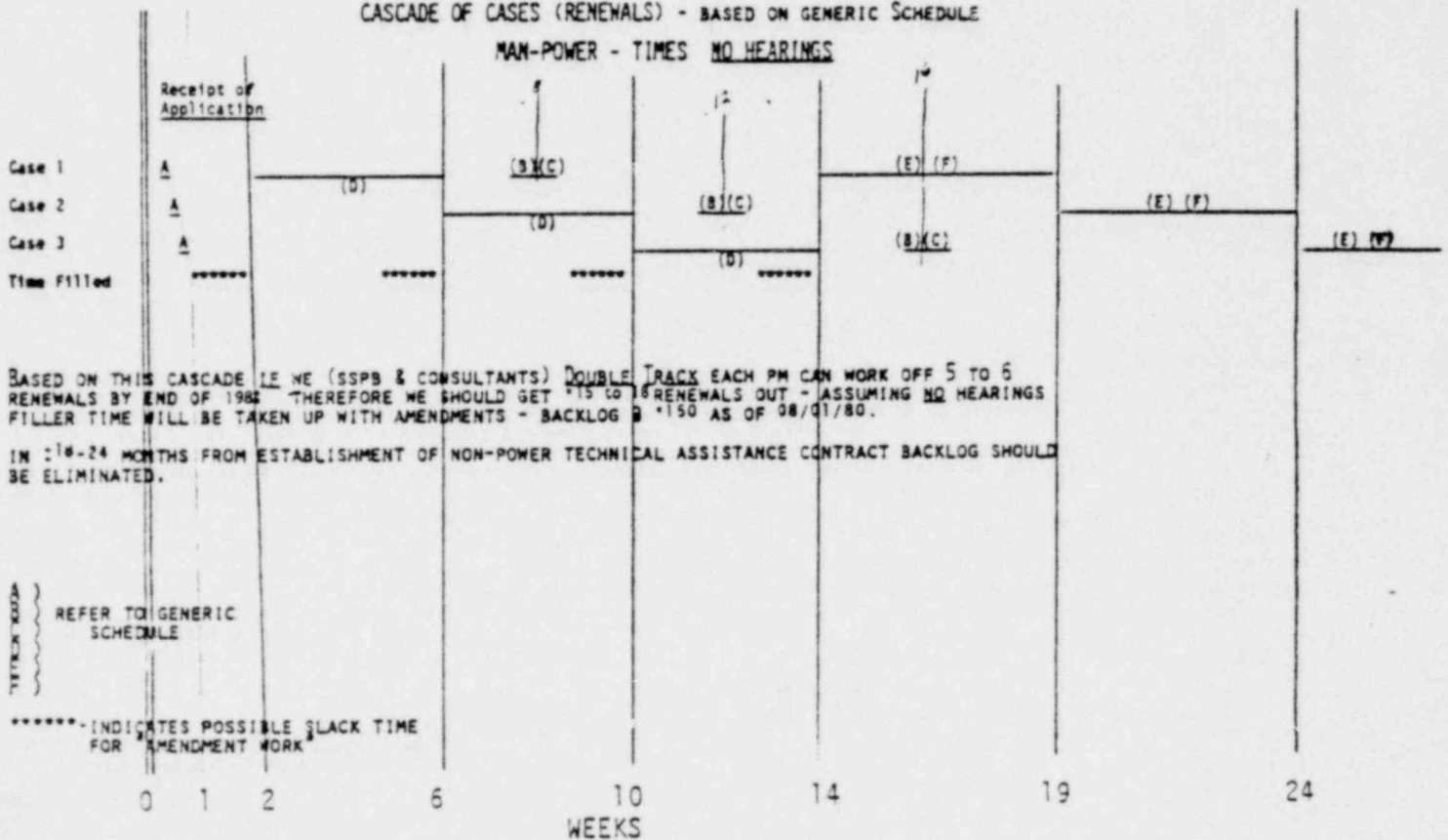
Technical Term Starts



Number ( ) indicate Man-days of actual NRR work during time period

~ 10 weeks ← 20 weeks →

## CASCADE OF CASES (RENEWALS) - BASED ON GENERIC SCHEDULE MAN-POWER - TIMES NO HEARINGS



POOR ORIGINAL

ATTACHMENT C