



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

April 9, 1996

APPLICANT: Westinghouse Electric Corporation
FACILITY: AP600
SUBJECT: SUMMARY OF MARCH 19, 1996, SENIOR MANAGEMENT MEETING ON THE AP600

52-003

On March 19, 1996, representatives of the Nuclear Regulatory Commission (NRC) and Westinghouse met to discuss the schedule and design certification issues for the AP600 design. Attachment 1 is a list of attendees. Attachment 2 is a copy of the slides presented by Westinghouse. Attachment 3 is a copy of the slides presented by the staff.

Mr. Russell opened the meeting, stating that the staff was looking at policy issues that were specific to the AP600 application. A Commission paper addressing these policy issues needed to be developed shortly. Throughout the meeting, potential policy issues were discussed. One issue concerned maintaining a balance between prevention and mitigation in the design, and that this balance may need to be struck using non-safety-related systems. Dialogue needed to continue regarding the amount of credit that could be given for using non-safety-related systems. Some of the staff believe it appropriate to use containment sprays to augment mitigation capability, although it is possible that using fan coolers may resolve the staff's concerns. Another related issue involved the implications of increasing inventory from outside water sources, such as from containment sprays. Another potential policy issue concerned using the NUREG-1465 source term (developed using operating plant information and considered applicable to evolutionary plants) for the evaluation of the adequacy of a passive plant, such as the AP600. The staff still has concerns with the timing and duration of release into the containment and the deposition rates assumed for the AP600.

Mr. Bruschi stated that Westinghouse wished to continue to work on the schedule for the final design approval (FDA) for the AP600, and that we need to delineate the issues that need to be resolved to better understand the review schedule. The staff stated that it intended to issue the supplement to the draft safety evaluation report by the end of April 1996. The staff then discussed the range of dates for completing the AP600 review. The dates presented in the staff's slides were estimates that had not yet received management review and approval. The staff stated that the time periods presented were the minimum required to complete the review based on the number and types of issues remaining to be resolved, and the expected submittal dates of information from Westinghouse. Issues affecting the schedule included the lack of dedicated NRC resources, timeliness of Westinghouse submittals, and the unique nature of the design. Because personnel had been reassigned following Westinghouse's earlier deceleration of the review, the staff may not be able to review documentation as soon as it is submitted by the applicant. In addition, the staff reminded Westinghouse that review of the initial test program; inspections, tests, analyses, and acceptance criteria; and the

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technical specifications will not be able to be completed until close to the end of the review. The staff expects these items to be difficult reviews because of the unique nature of the design.

Westinghouse provided a timeline of Westinghouse's estimate of the schedule. The estimates of the staff efforts shown in their timeline represent Westinghouse estimates, and have not been agreed to by the staff.

The issue of thermal-hydraulic uncertainty was discussed. Westinghouse provided a summary of the revised issue resolution plan presented to the staff during a meeting on February 29, 1996. Westinghouse expressed concern that feedback had not yet been received from this meeting. Westinghouse committed to document the revised plan to ensure there was no misunderstanding concerning the details of the approach. Westinghouse also agreed to address how uncertainties associated with long term cooling analyses will be addressed in the revised plan.

The status of the review of the passive autocatalytic recombiners was then discussed. Westinghouse felt that the environmental design basis was a key remaining issue. The staff indicated that it was reviewing the January 1996 submittal, and would be providing Westinghouse with comments by the end of the month.

Westinghouse then discussed in-vessel retention of the core during a severe accident. Applying the risk-oriented accident analysis methodology (ROAAM), Westinghouse concluded that there would be no need to consider ex-vessel phenomena because vessel failure was "physically unreasonable." The staff indicated that adoption of this methodology could involve a policy issue. A meeting was scheduled on March 20 and 21, 1996, during which the staff expected to develop a better understanding of the methodology, and how Westinghouse intended to apply it. The staff was concerned that the submittals on this methodology only indicated that Westinghouse intended to apply ROAAM to address in-vessel retention issues; however, it was the staff's understanding that Westinghouse was also considering applying ROAAM to other issues. Westinghouse committed to provide the staff with a formal submittal on how it intended to use ROAAM on the AP600 design. The staff further expressed concern that review of this methodology could affect the overall review schedule.

The staff then discussed accident management strategies in terms of how a combined license (COL) applicant would apply information provided by Westinghouse. Westinghouse was asked how it intended to integrate technical information (including emergency response guidelines, severe accident mitigation design alternatives, procedures, and operator actions) into a complete package for the COL applicant to use to develop accident management strategies. This would be the subject of further discussion.

Westinghouse then discussed the approach that they intend to take on revising the AP600 technical specifications. The staff is waiting for Westinghouse to submit documentation of their approach for developing the technical specifications. The staff indicated that the deputy Branch Chief for the Technical

April 9, 1996

Specifications Branch will be on a 3 month rotational assignment. Depending on the date of submittal of Westinghouse's technical specification approach, this has the potential to affect the review schedule. The staff expressed concern that permitting hot shutdown as the safe shutdown end-state for LCO 3.0.3 conditions may be a potential policy issue. After submittal of the Westinghouse technical specification approach, the staff would then determine whether any potential policy issue existed.

At the conclusion of the meeting, it was tentatively agreed to meet again on May 8, 1996, when the policy issues are better defined.

original signed by:

Thomas J. Kenyon, Project Manager
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Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Docket No. 52-003

Attachments: As stated

cc w/attachments:
See next page

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TKenyon

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GBagchi, 0-7 H15
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DATE	04/5/96	04/9/96						

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Westinghouse Electric Corporation

Docket No. 52-003

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AP600 SENIOR MANAGEMENT MEETING
MARCH 19, 1996

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TED QUAY	NRC/NRR/PDST
CARL BERLINGER	NRC/NRR/DSSA
BRIAN SHERON	NRC/NRR/DE
DENNIS CRUTCHFIELD	NRC/NRR/DRPM
GARY HOLAHAN	NRC/NRR/DSSA
CHARLES THOMPSON	DOE
TIM COLLINS	NRC/NRR/SRXB
ANGELA CHU	NRC/NRR/TSB
ROBERT JONES	NRC/NRR/SRXB
RALPH ARCHITZEL	NRC/NRR/PDST
JOHN KUDRICK	NRC/NRR/SCSB
JOHN MONNINGER	NRC/NRR/SCSB
DIANE JACKSON	NRC/NRR/PDST
NICK SALTOS	NRC/NRR/SPSB
BILL HUFFMAN	NRC/NRR/PDST
JOE SEBROSKY	NRC/NRR/PDST
GOUTAM BAGCHI	NRC/NRR/DE
ED RODWELL	EPRI
BRUCE MONTY	WESTINGHOUSE
DONALD LINGREN	WESTINGHOUSE
JIM SCOBEL	WESTINGHOUSE
DEBRA OHKAWA	WESTINGHOUSE
JOHN BUTLER	WESTINGHOUSE
L. E. HOCHREITER	WESTINGHOUSE
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R. M. VIJUK	WESTINGHOUSE
H. J. BRUSCHI	WESTINGHOUSE
WILLIAM RUSSELL	NRC/NRR

Westinghouse Electric Corporation

W/NRC SENIOR MANAGEMENT MEETING

AP600 Design Certification Schedule

John Butler

March 19, 1996

Rockville, MD

AP600 Design Certification Schedule

- Schedule development actions from February 23, 1996 meeting:
 - NRC - Identify schedule milestones for issuing SDSER
 - W/NRC - Develop template for completing the overall review
 - W/NRC - Develop detailed schedule within 45 days following SDSER

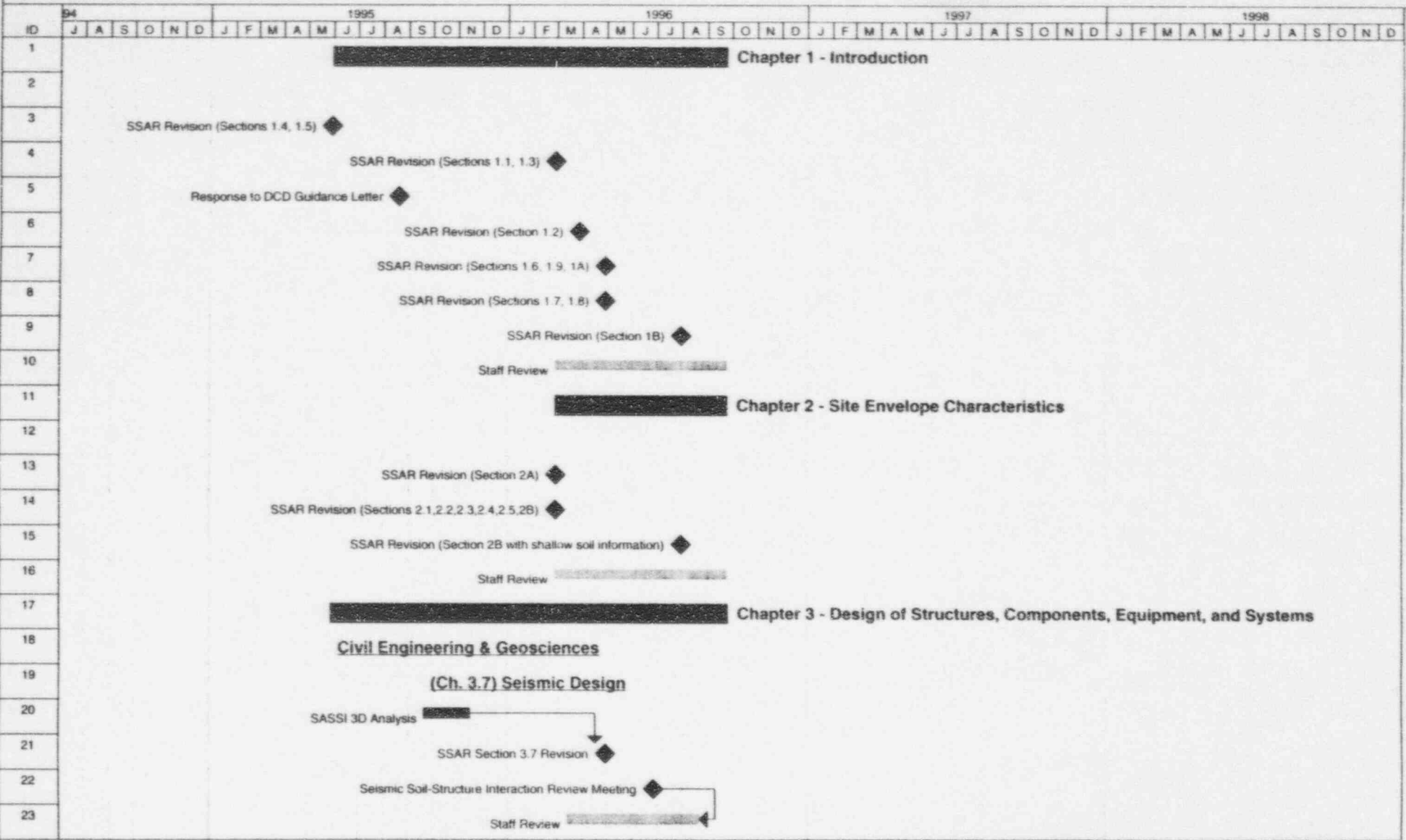
- Westinghouse target milestones provided in a March 8, 1996 letter
 - Identifies target dates for key deliverables and interactions
 - Highlights areas requiring increased attention to maintain progress

AP600 Design Certification Schedule

Review areas needing focused attention to maintain schedule:

1. Thermal Hydraulic Uncertainty / MAAP4 Benchmarking
2. Chapter 21 - Code Review
3. Chapter 15/6.2.1 - Accident Analyses
4. Chapter 19 - PRA and Severe Accidents
5. RTNSS
6. Chapter 3 - Design of Structures, Components, Equipment and Systems
7. Chapter 18 - Human Factors Engineering
8. Chapter 14 - Initial Test Program
9. ACRS Interaction
10. ITAAC

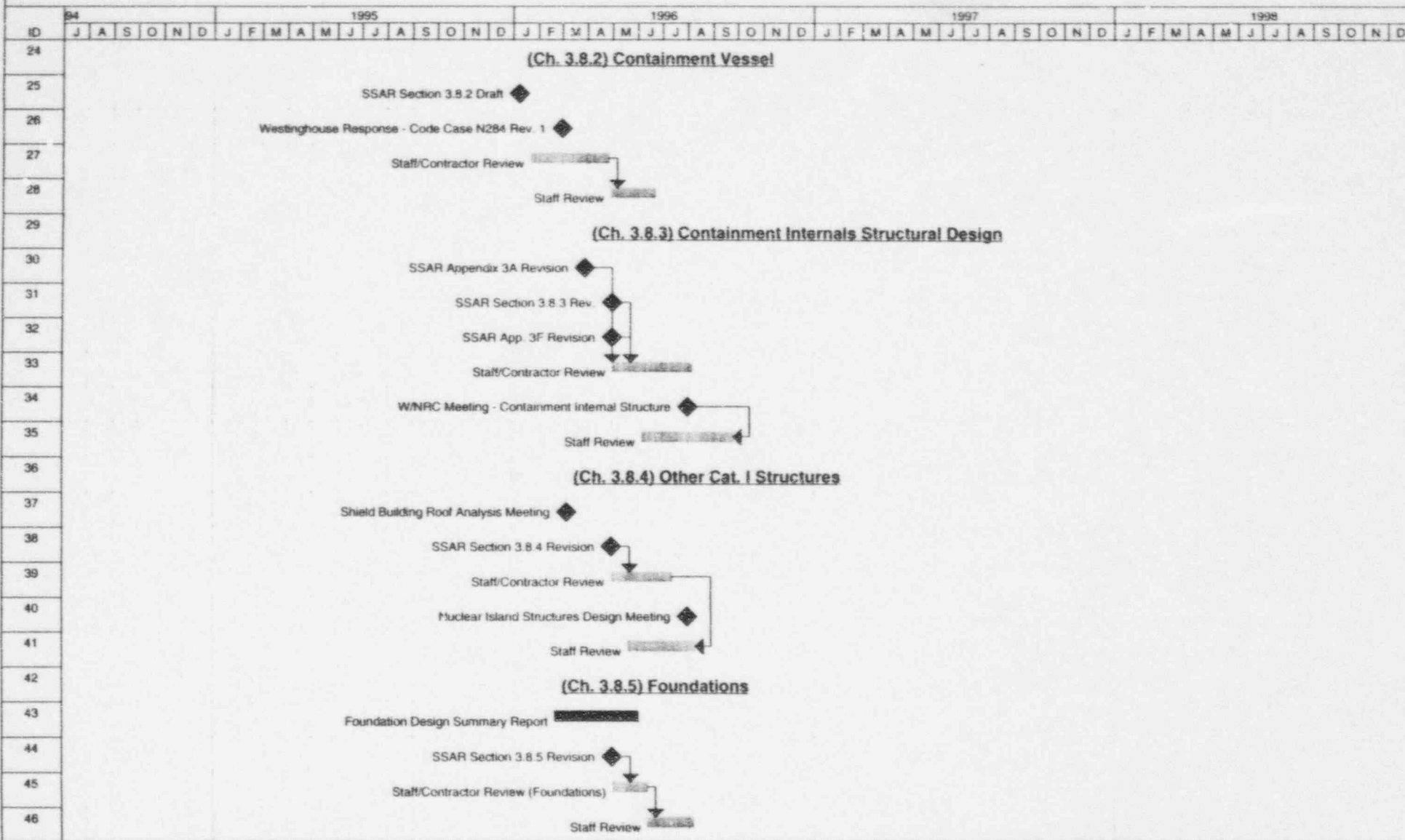
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task
 Progress
 Summary
 NRC Task
 Milestone

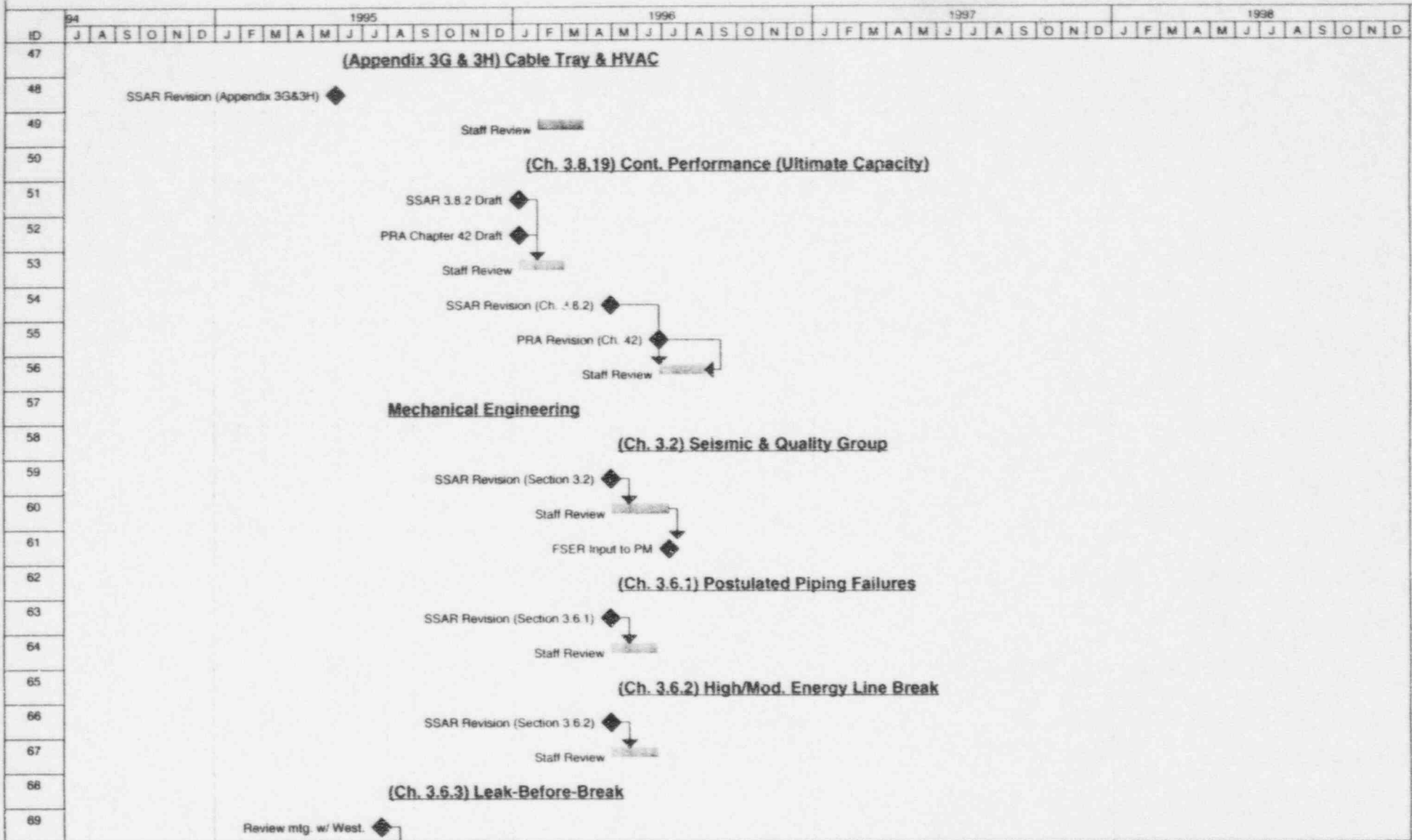
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 NRC Task Milestone

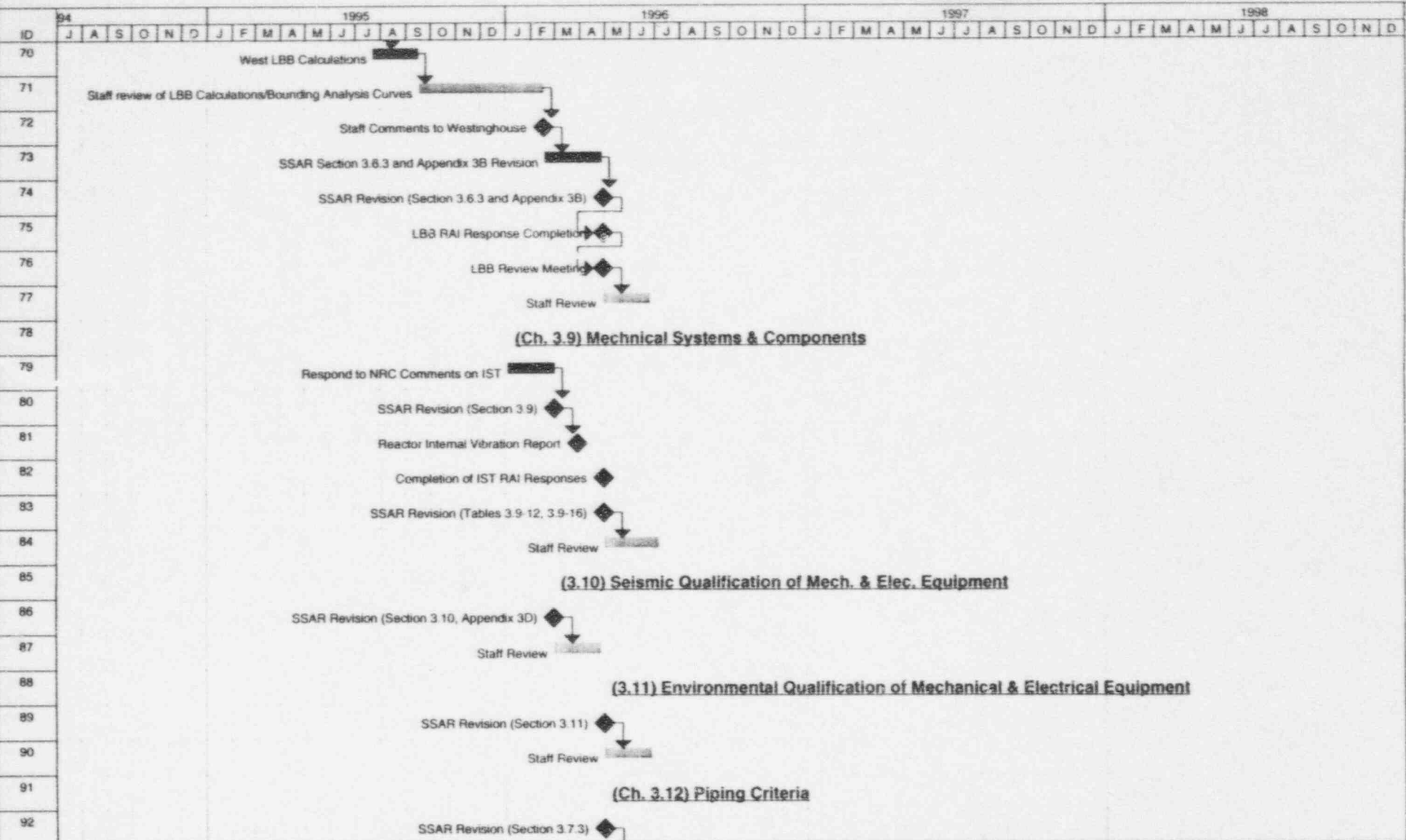
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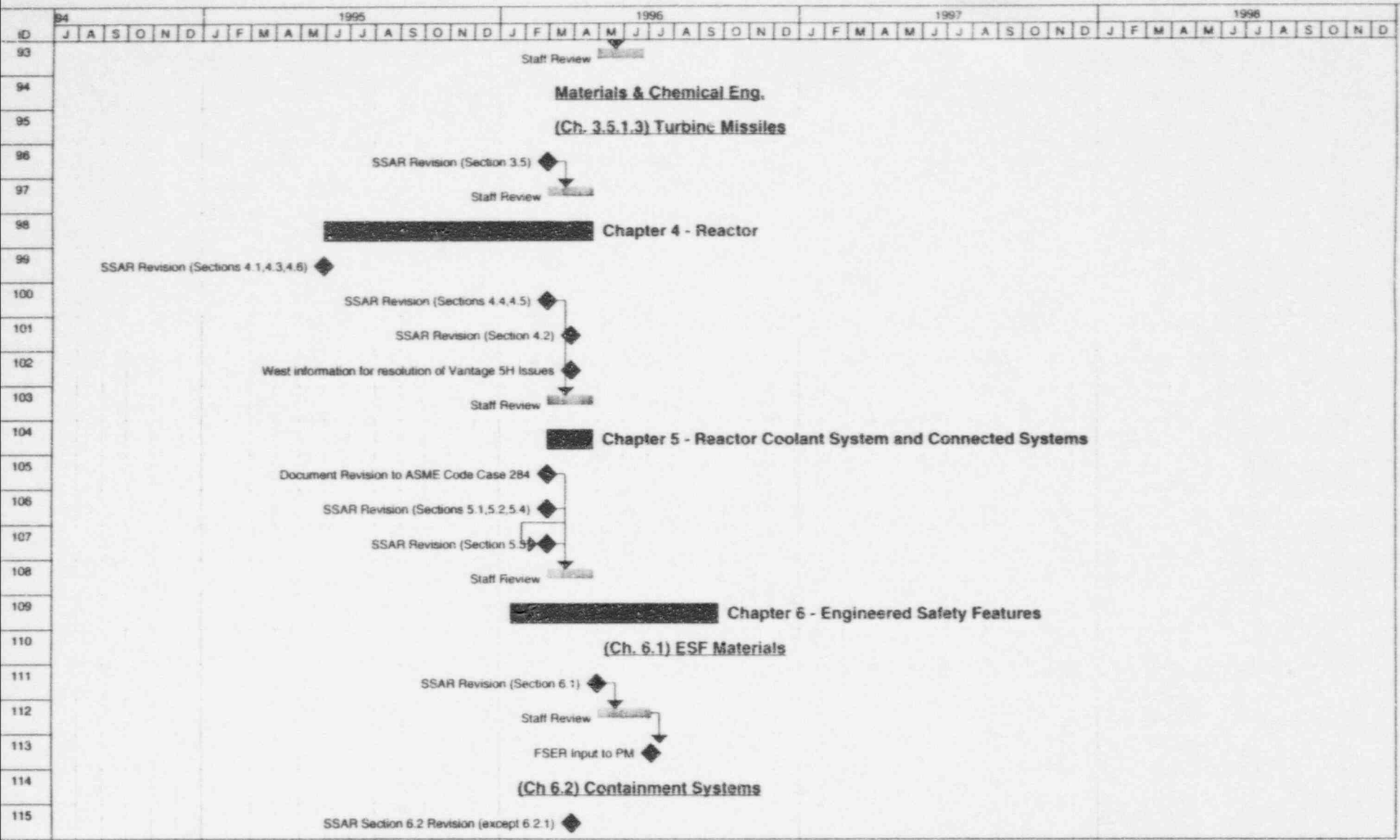
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Project: AP600 Design Certification Date: 3/17/96	W Task NRC Task	Progress Milestone	Summary
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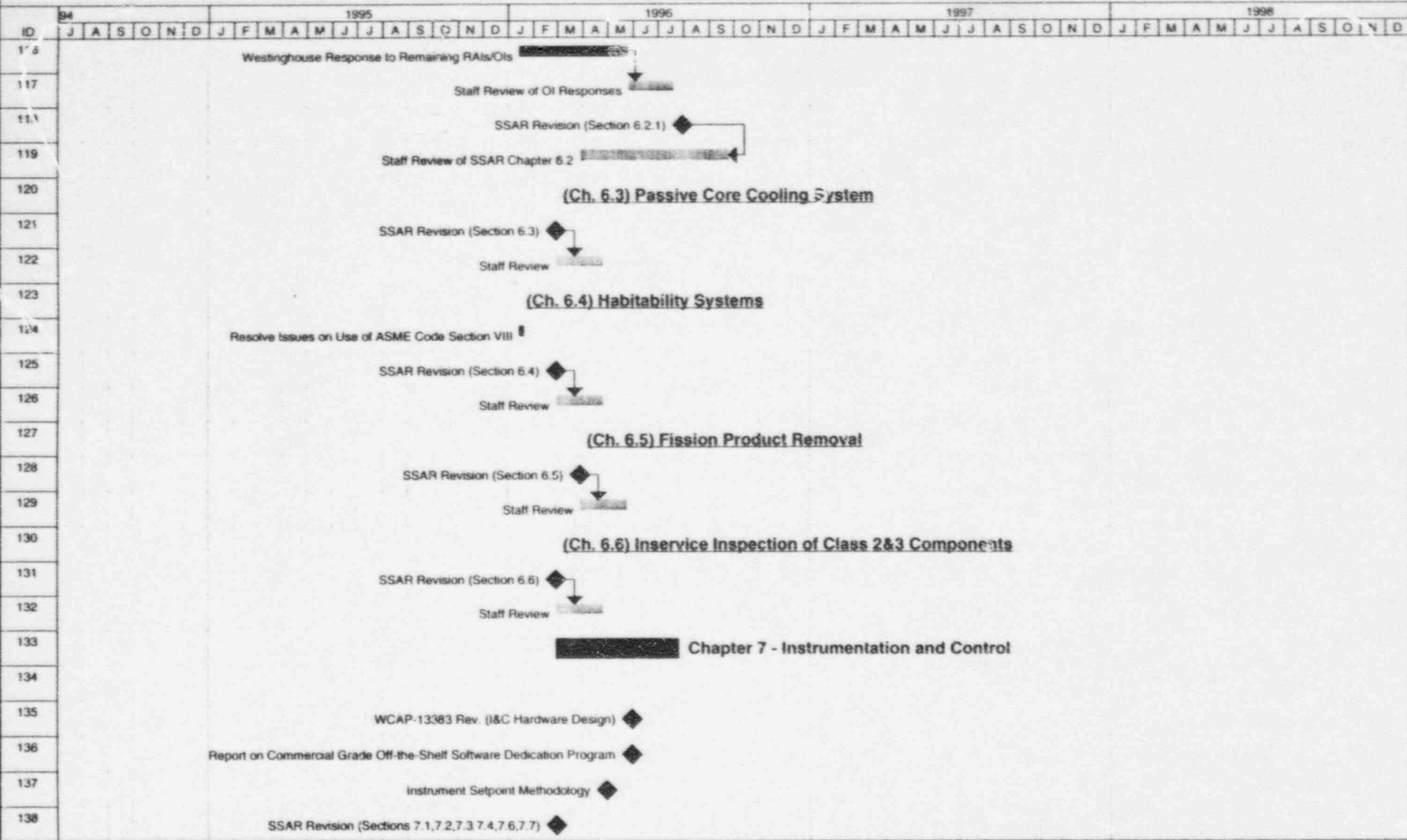
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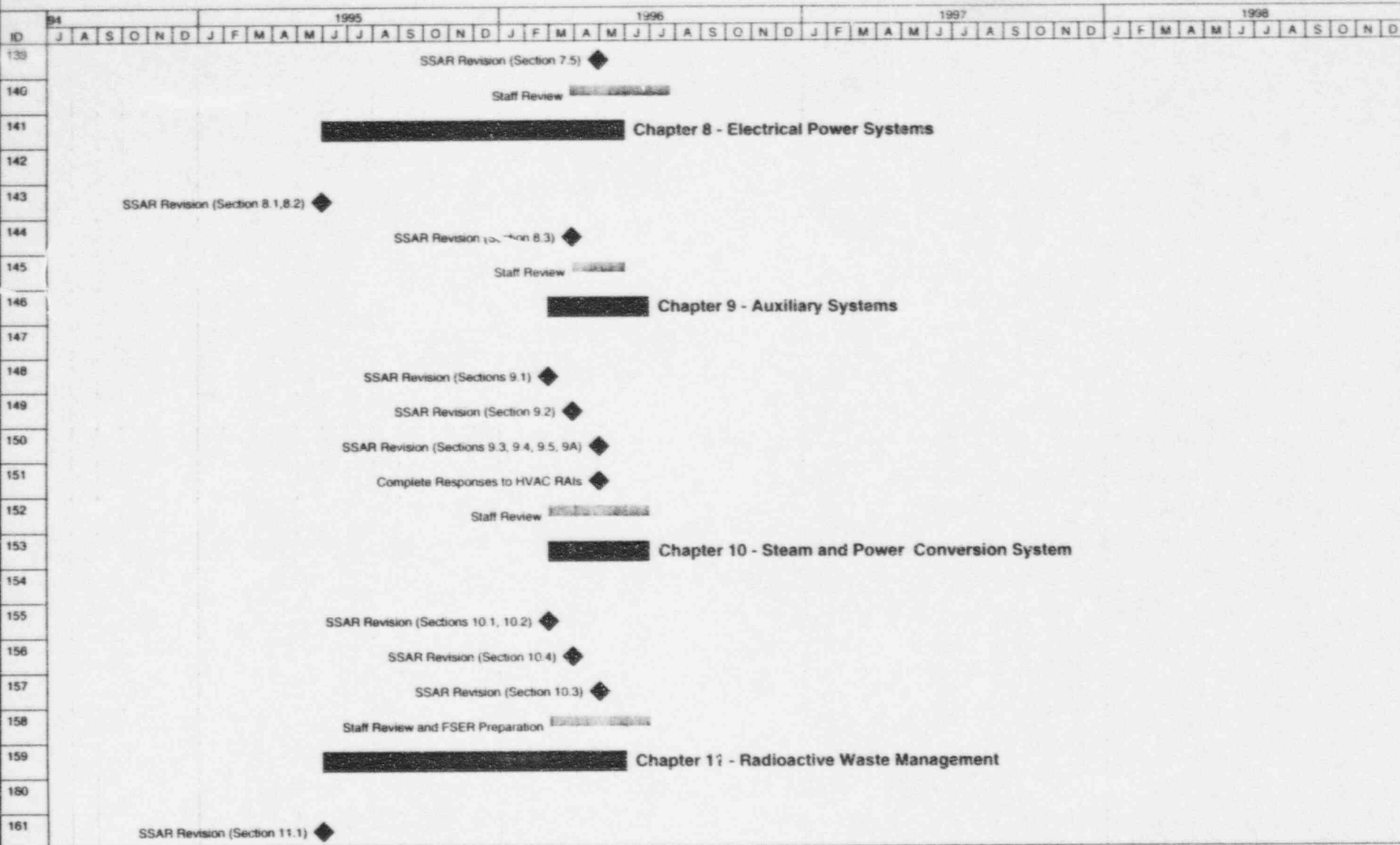
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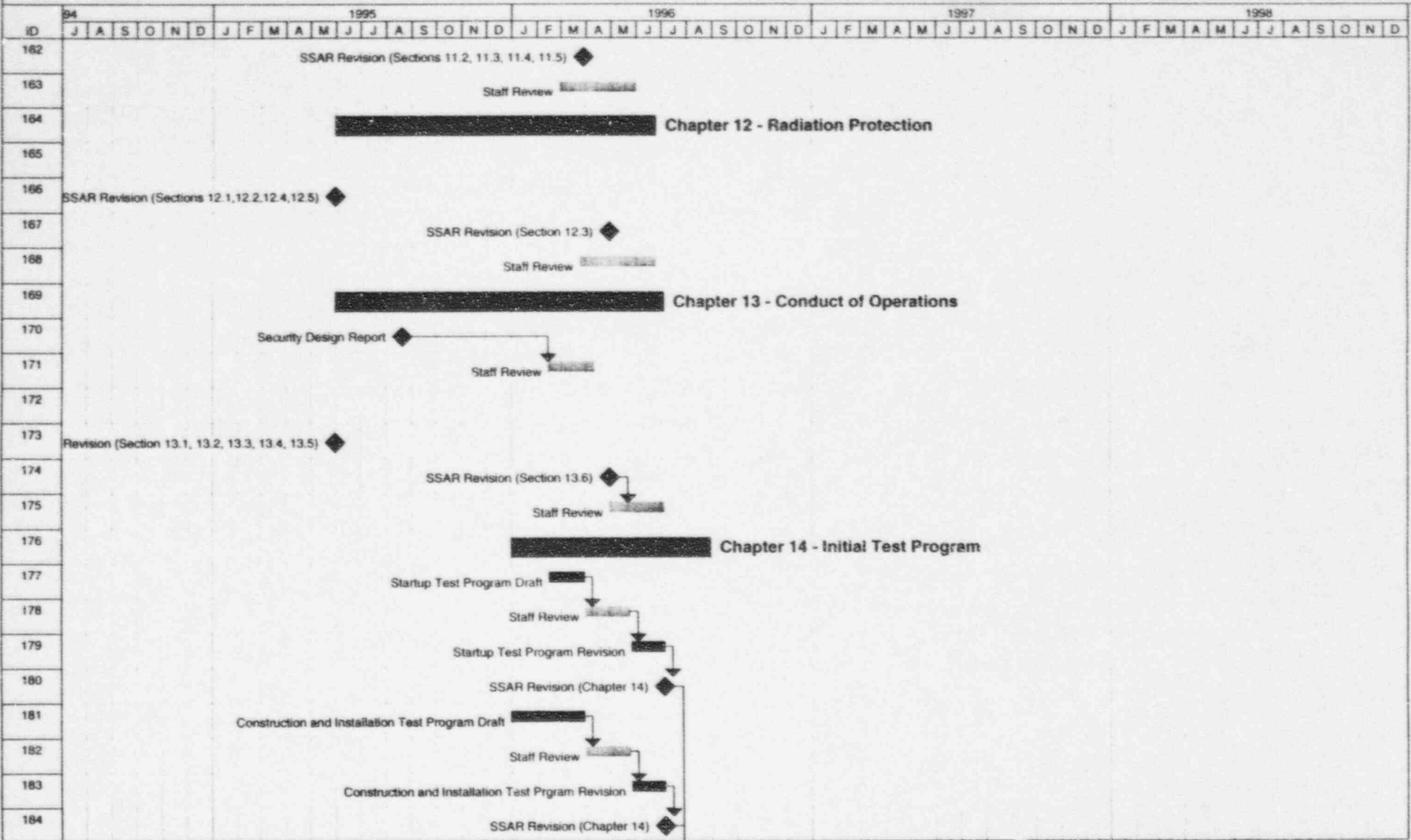
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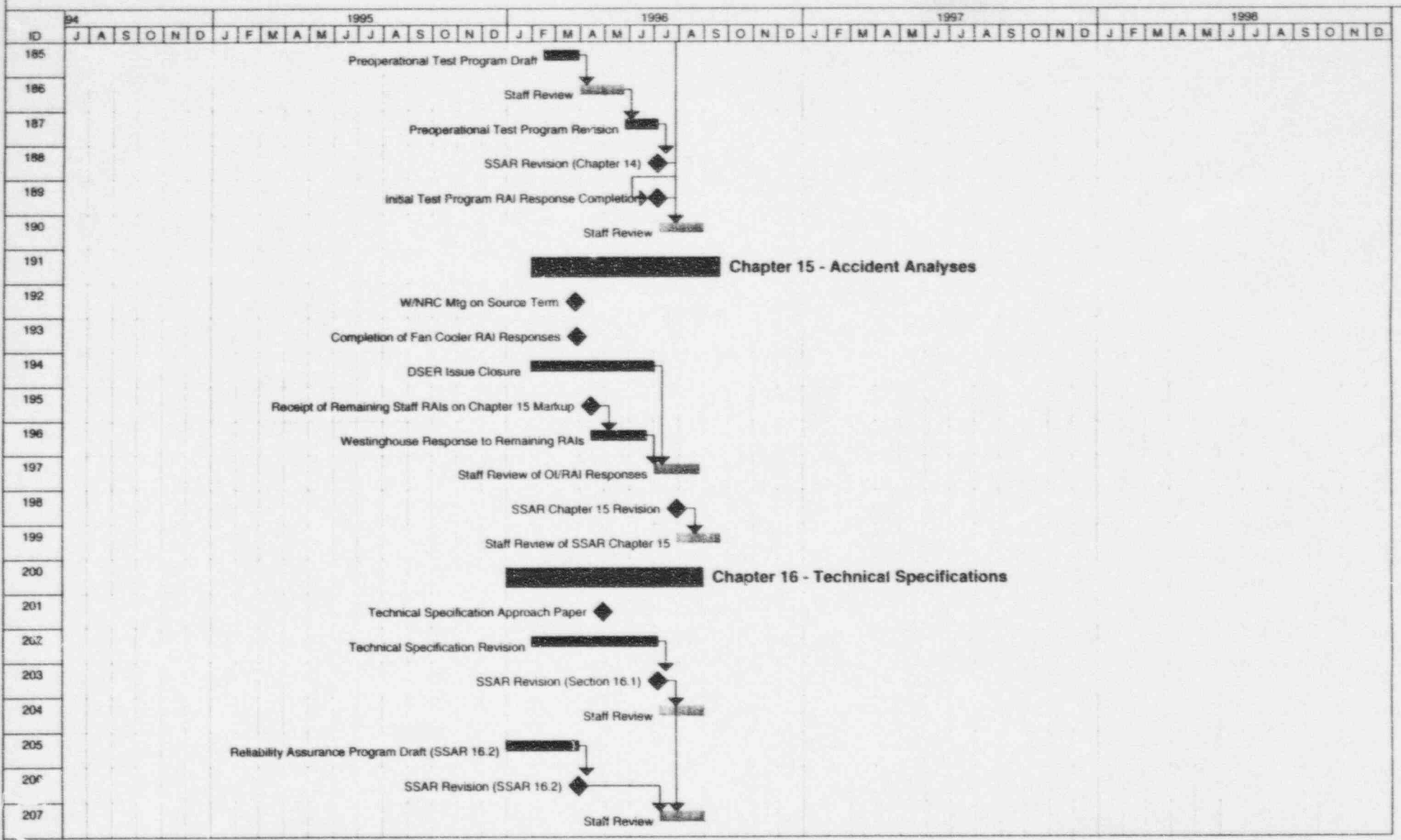
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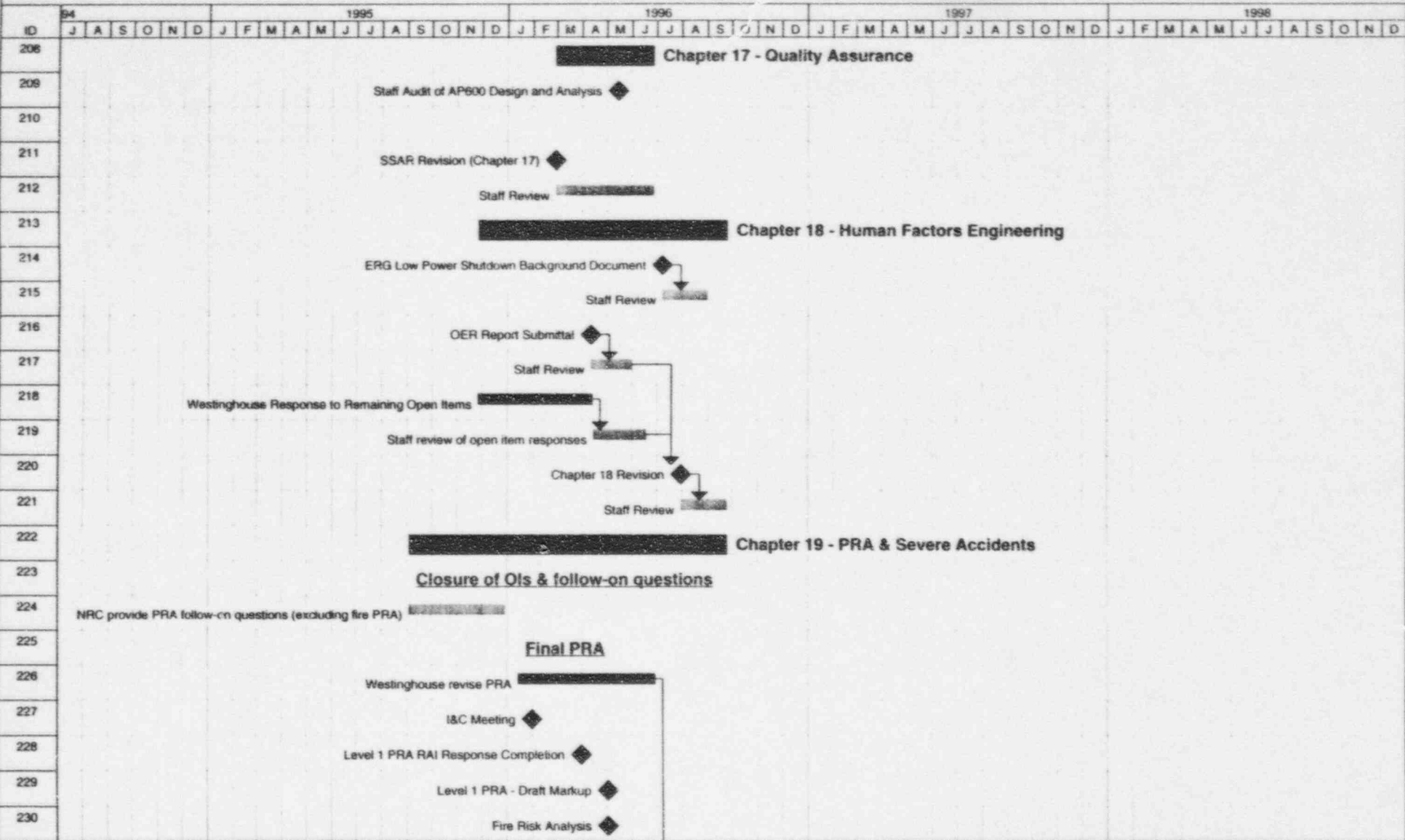
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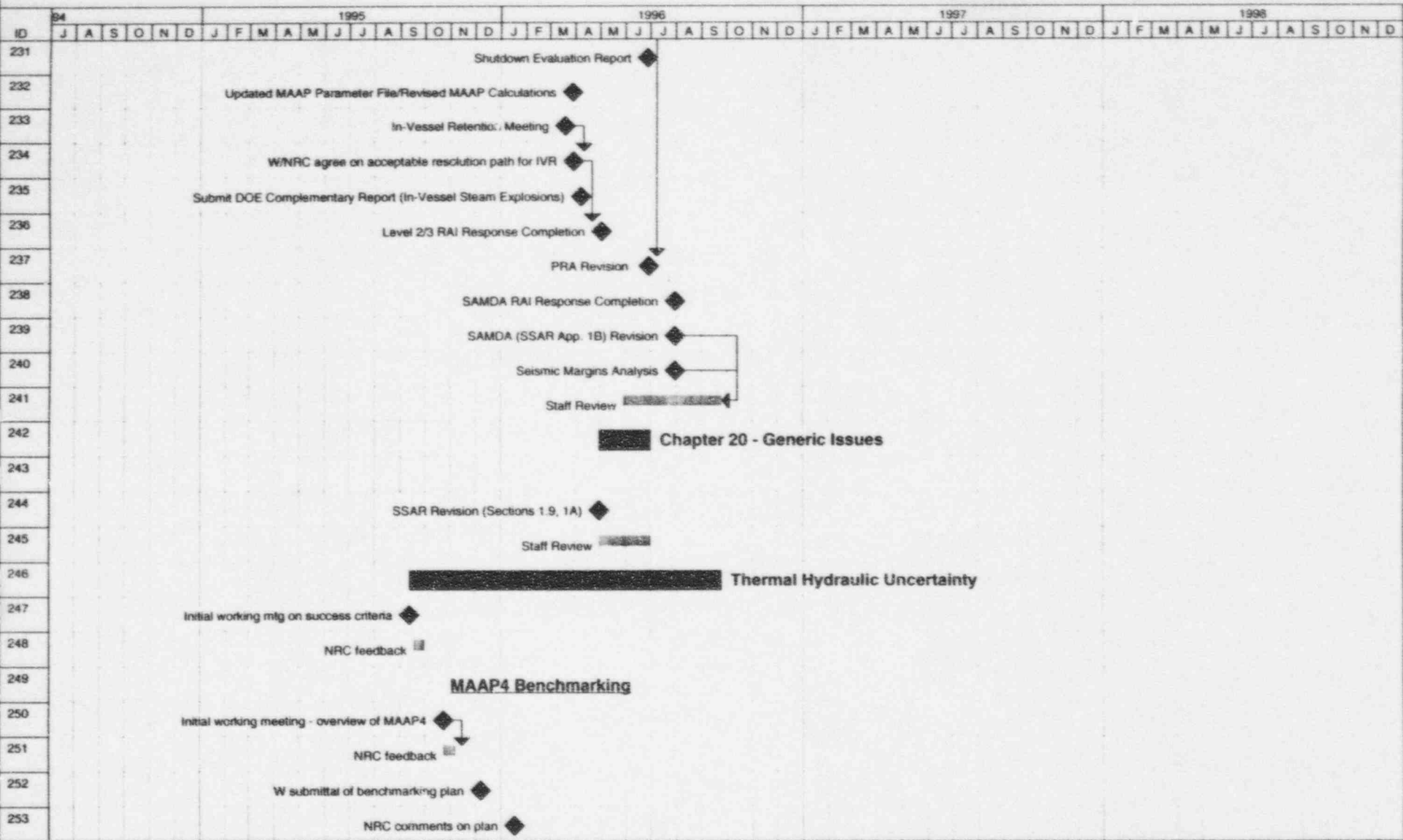
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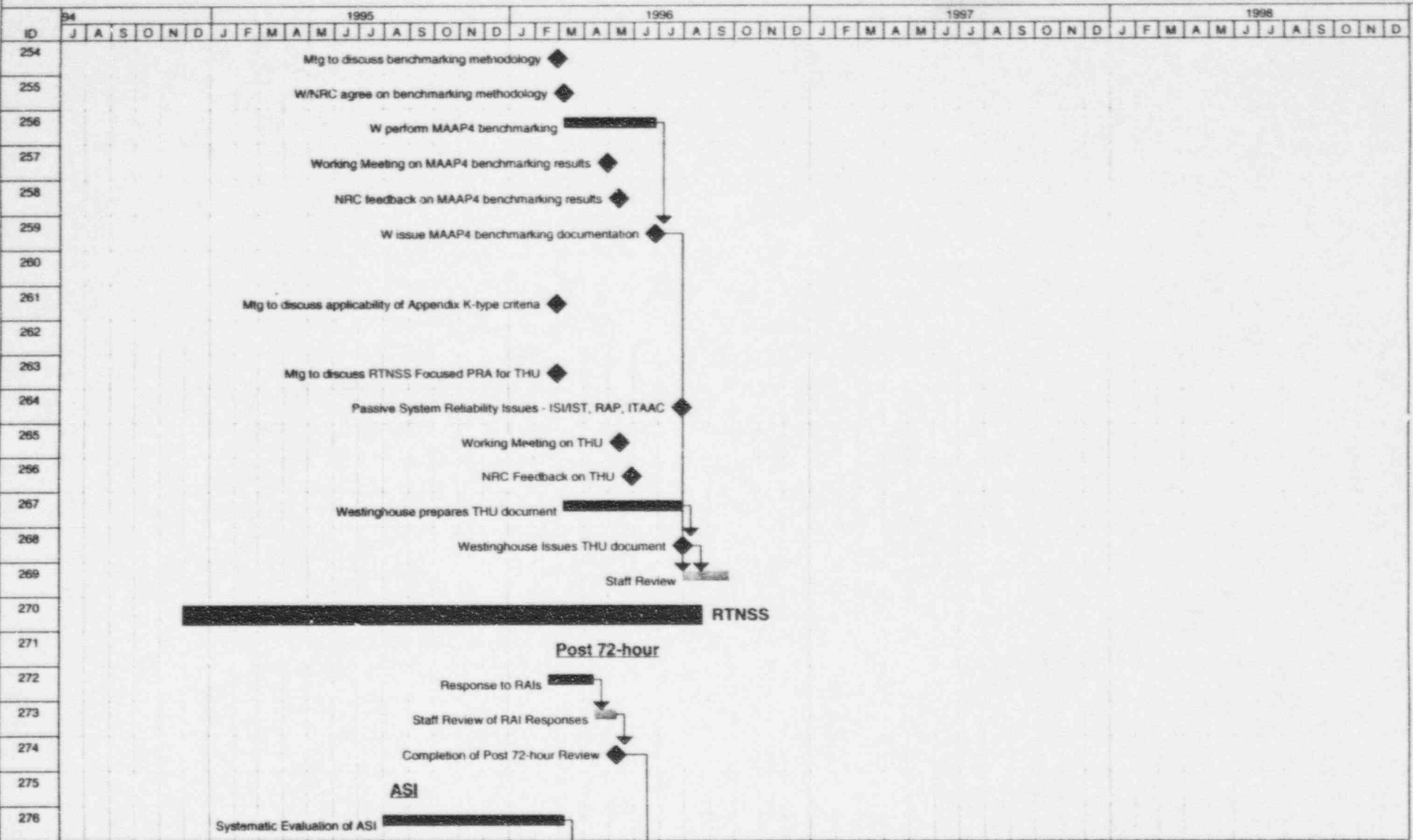
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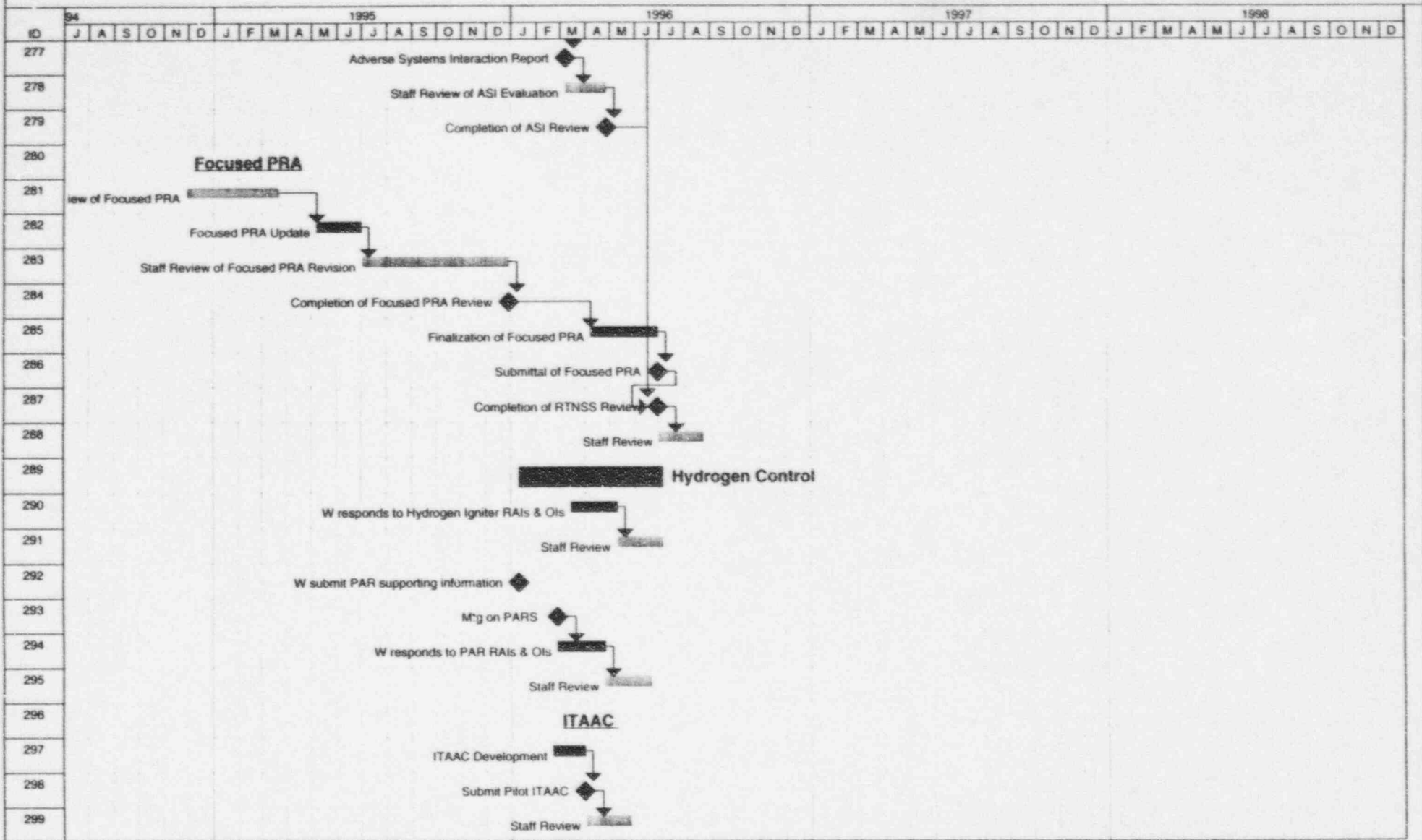
W Task Progress Summary
 NRC Task Milestone

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Project: AP600 Design Certification Date: 3/17/96	W Task	Progress	Summary	
	NRC Task	Milestone		

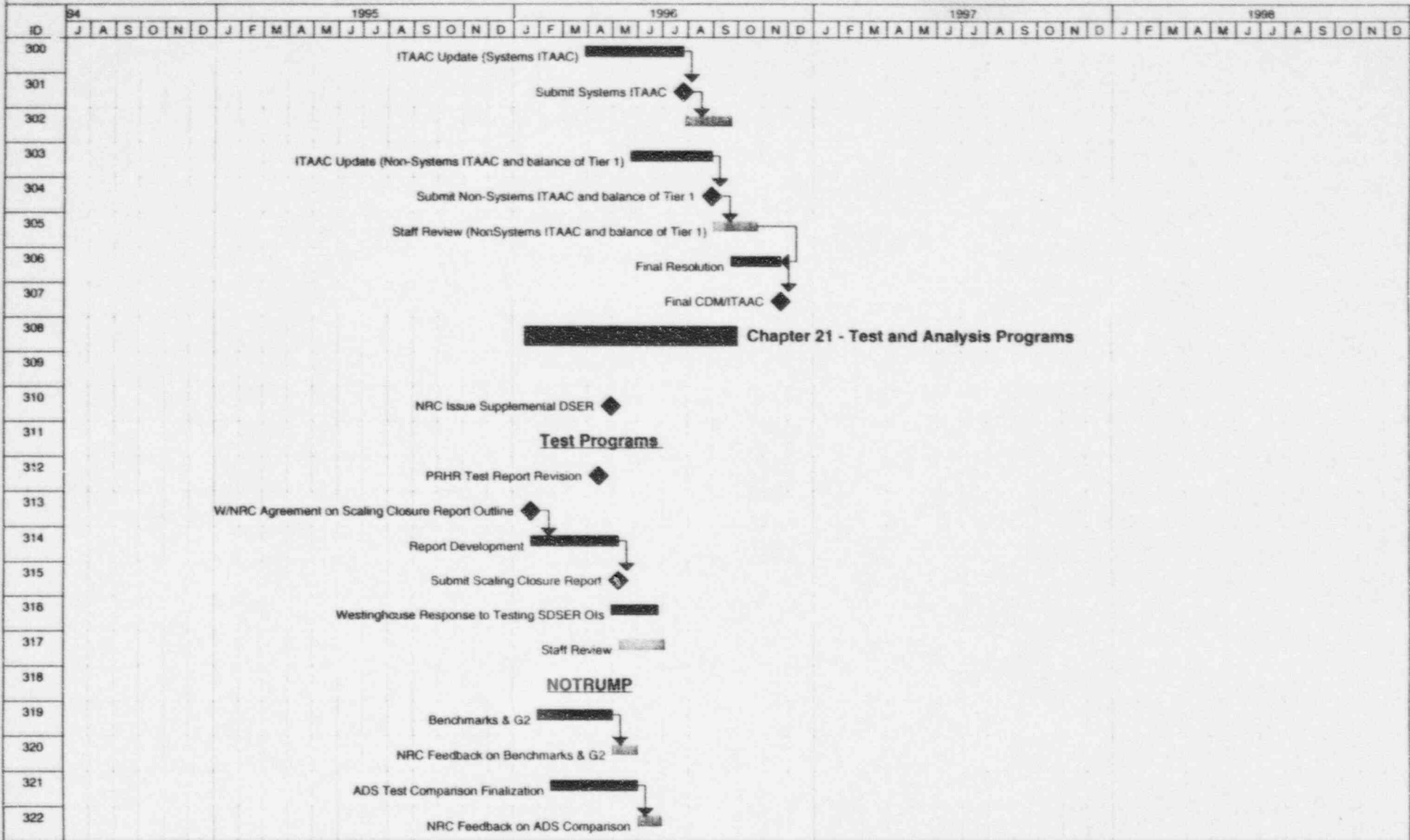
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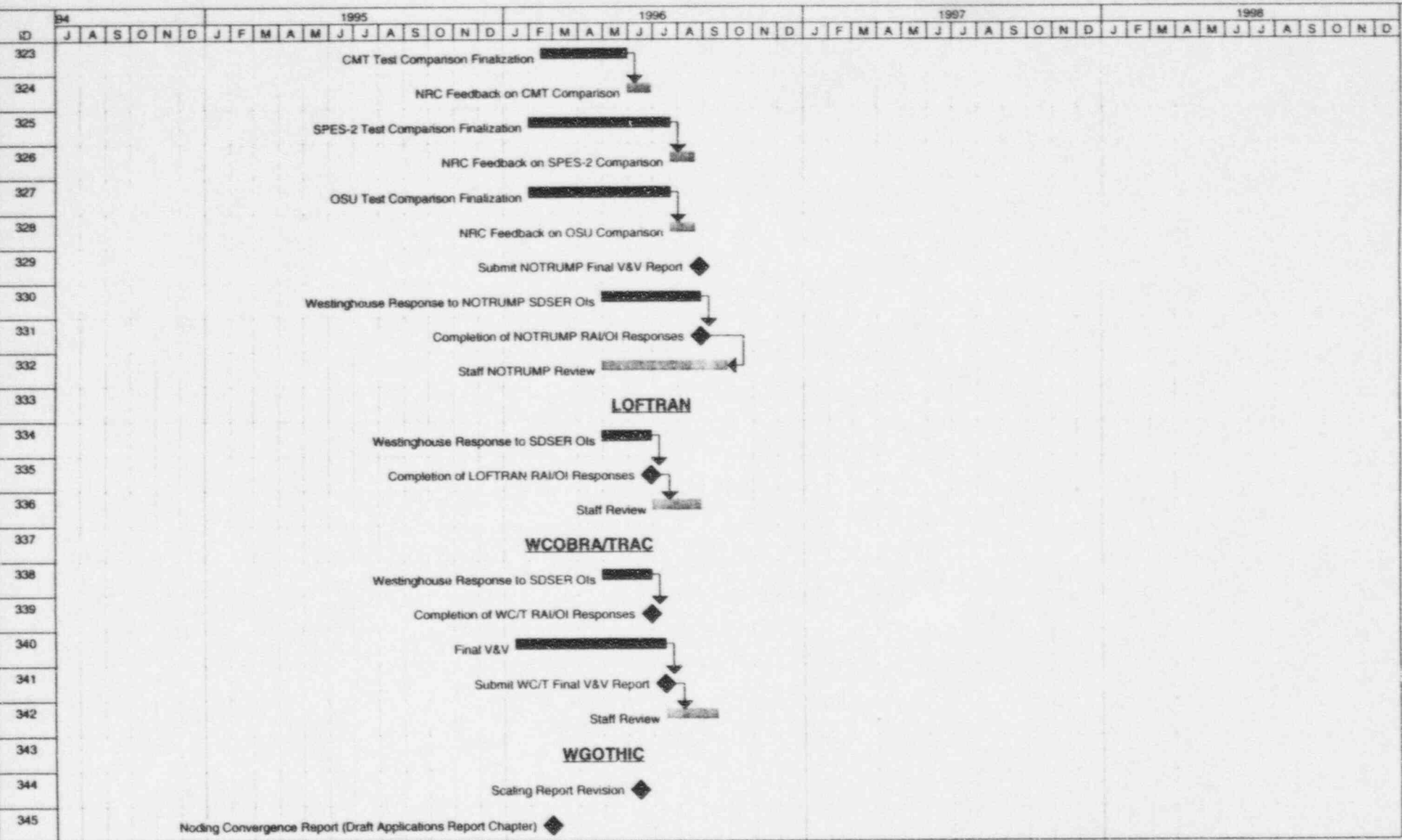
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 NRC Task Milestone

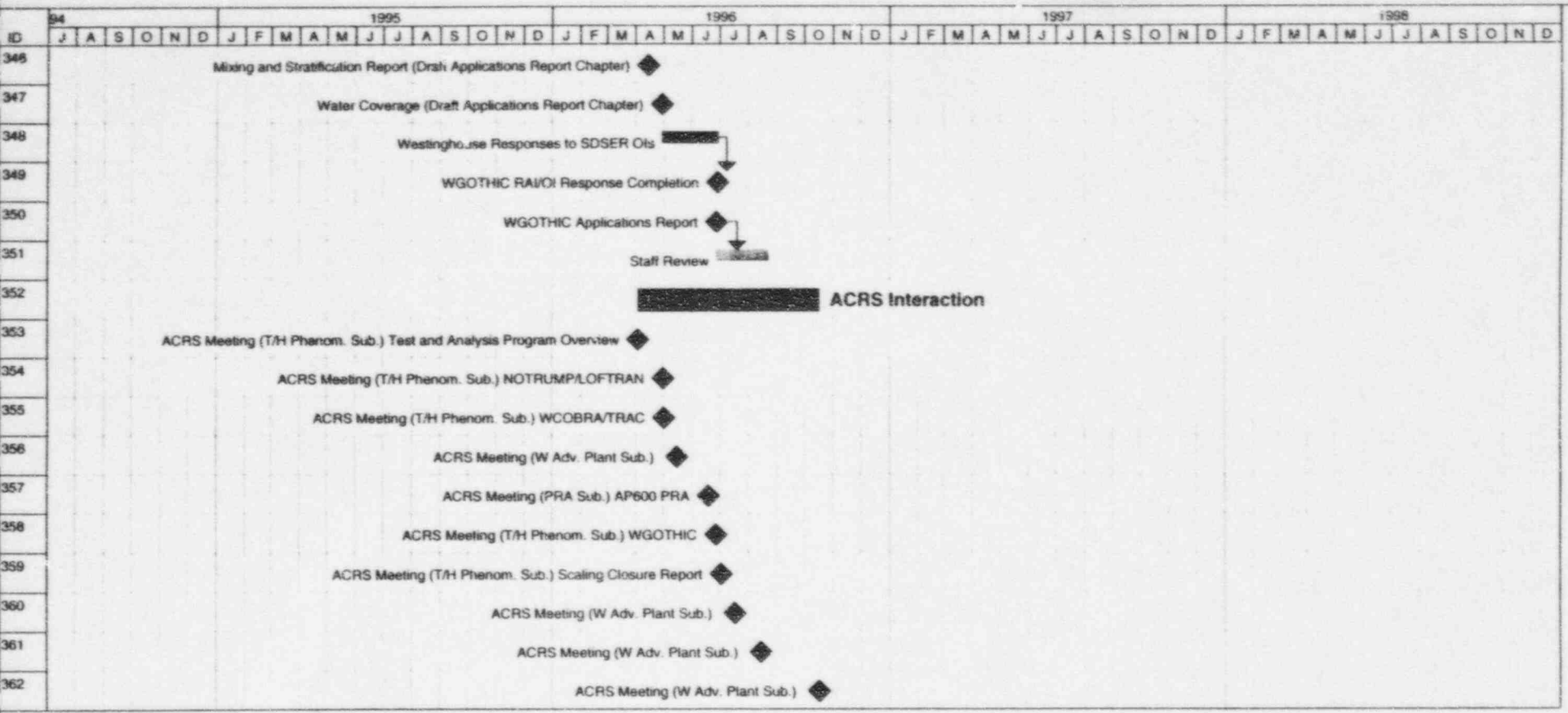
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 NRC Task Milestone



THERMAL/HYDRAULIC UNCERTAINTY

Debra Ohkawa
March 15, 1996



Mission Statement

To provide a higher level of comfort that AP600 success criteria have been defined "robustly" so that PRA results are not significantly impacted by:

- T&H uncertainty in the behavior of the passive systems
- MAAP4's simplified models

Important Dates in T&H Uncertainty Resolution



The T&H uncertainty and MAAP4 benchmarking issues continue to evolve as Westinghouse addresses NRC comments

- **July 27, 1995** Meeting to discuss resolution of T&H Uncertainty and MAAP4 Benchmarking as an integrated plan
- **Aug. 14, 1995** NRC letter identifying 5 outstanding issues
- **Sept. 12 - 14, 1995** Working meeting to discuss MAAP4 results for success criteria analyses
- **Oct. 24 - 25, 1995** Working meeting to discuss the MAAP4 code and how it has been applied for AP600 analyses
- **Dec. 8, 1995** Submittal of written plan for T&H Uncertainty Resolution and MAAP4 Benchmarking
- **Jan. 18, 1996** NRC letter with comments on Dec. 8 plan
- **Feb. 29, 1996** Meeting in which the T&H Uncertainty and MAAP4 Benchmarking issues were separated

T&H Uncertainty Resolution



Purpose: To show that the results of the focused PRA are not significantly impacted by the T&H analytical uncertainty of passive systems

- 1) Perform sensitivity on the focused PRA to determine risk-significant, low-margin accident scenarios

- 2) Perform T&H analyses with NOTRUMP to examine risk-significant, low-margin accident scenarios
 - NOTRUMP analyses will consider the uncertainty associated with the operation of passive systems

MAAP4 Benchmarking Plan



Purpose: To show an understanding of the AP600 plant behavior and confirmation of PRA success scenarios

- **Understanding will be demonstrated through use of MAAP4 and NOTRUMP results and engineering evaluation**
 - **Code results are evaluated and documented**
 - **The MAAP4 Benchmarking Plan consists of comparisons between MAAP4 and NOTRUMP for a comprehensive set of cases**
 - **The MAAP4 Benchmarking Plan does not include comparisons to tests**

Needed for Closure



NRC Actions

- **Maintain continuity of personnel and focus until closure**
- **Feedback on the plan presented February 29**

Westinghouse Actions

- **Address NRC concerns on longterm recirculation**
- **Proceeding with Benchmarking Plan**

Joint Action

- **Discuss assumptions for NOTRUMP analyses to support T&H Uncertainty resolution**



Passive Autocatalytic Recombiners

Donald Lindgren
Advanced Plant Safety and Licensing

Passive Autocatalytic Recombiners



Status

- A mark up of subsection 6.2.4 of the SSAR and supporting documentation for design basis accident hydrogen control was sent to NRC on January 11, 1996.
- A meeting was held on February 27, 1996 to provide the staff with an understanding of the PAR database.
- The staff now has a good understanding of the use of PARs in the AP600.
- Action Items were identified
- Westinghouse is awaiting the results of the sufficiency review.

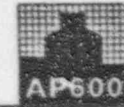
Passive Autocatalytic Recombiners



Westinghouse action items from the February 27 meeting.

1. Identify the PAR vendor tests to be included as part of the AP600 application.
2. Provide additional information on the margin between design basis accident methodology and test results.
3. Address the potential impact of design basis accident generated debris.
4. Identify the operating conditions and qualification requirements and address the issue of potential poisons.

Passive Autocatalytic Recombiners



Catalyst poisons

- The major open issue is the consideration of catalyst poisons during design basis accidents.



Application of ROAAM Frame to AP600

**James Scobel
March 19, 1996**

Application of Risk Oriented Accident Analysis Methodology (ROAAM) Frame to AP600



Mar. 20-21 W presents Application of ROAAM Frame to Management of Severe Accident Risk for the AP600 and IVR Resolution Path to the NRC Staff

Chronology:

Nov. 94 DOE/ID-10460, In-Vessel Coolability and Retention of a Core Melt, Draft Report Issued for Peer Review

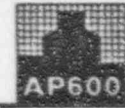
July 95 DOE/ID-10460 final report issued

Aug. 95 W meets with NRC to present IVR-friendly RPV reflective insulation concept

Jan. 96 W issues position paper, Westinghouse Position on In-Vessel Retention of Molten Core Debris

Feb. 96 DOE Presentation of Risk Oriented Accident Analysis Methodology (ROAAM) Frame to ACRS PRA Subcommittee and to the NRC Staff
- Illustration of application to AP600 presented to NRC Staff

Overview of Topics



- **ROAAM Frame**
 - goal for the prevention and mitigation of containment failure due to severe accident phenomena
 - very low frequency of phenomena occurrence (Level 1 PRA), or
 - containment failure is "physically unreasonable" (ROAAM)
 - i.e., containment will not fail

- **In-Vessel Retention of Core Debris Issue Resolution**
 - strategy to mitigate ex-vessel phenomena which have large uncertainties
 - important to demonstrating containment failure is physically unreasonable

Needed for Closure



Timeliness of NRC review of ROAAM Frame and implementation of AP600 PRA to support AP600 Design Certification review.



TECHNICAL SPECIFICATIONS

**T. L. SCHULZ
SYSTEMS ENGINEERING
MARCH 19, 1996**

TECH SPEC APPROACH



- **AP600 Tech Spec Approach**

- Based on Westinghouse Standard Tech Spec (NUREG 1431)
- Changes made to accommodate Passive Systems
 - AP600 shutdown capability incorporated (LCO 3.0.3)
 - Standard Completion and Surveillance Times developed
 - Plant maintenance capability inputs
 - AP600 T&H understanding and risk importance inputs
- Low power and shutdown modes included

- **Benefits**

- Minimizes changes to STS while accommodating AP600 systems
- Avoids hasty maintenance activities
- Simplifies plant operation
- Approach supported by NRC

TECH SPEC APPROACH



- **Tech Spec Shutdown End-State**

- End-state for LCO 3.0.3 is Mode 4 (RCS < 420 F)
- Consistent with AP600 design / safe shutdown described in SSAR
- Avoids unnecessary transitions to Mode 5
 - Avoids problems associated with systems re-alignment
- Continue to Mode 5 when needed for plant maintenance
 - Use normal systems as available

- **Tech Spec Cover Shutdown Operation**

- Covers hot standby, hot shutdown, cold shutdown, refueling
- Passive systems facilitate implementing shutdown Tech Spec
 - Passive systems not used during shutdowns
 - Planned maintenance performed when passive systems not required
 - Accum not required < 1000 psig
 - CMT & PRHR HX not required when RCS open
 - IRWST not required when refueling cavity filled

TECH SPEC APPROACH



- **Criteria for Completion Times & Surveillance Frequencies**
 - Reasonable maintenance times identified
 - By experienced plant operating staff
 - Plant T&H performance capabilities determined
 - Conservative Design Basis analysis with single failure
 - Realistic PRA success criteria analysis with multiple failures
 - Standard Completion Times & Surveillance Frequencies developed
 - Based on STS times / frequencies
 - Limited set of times / frequencies selected to simplify operation
 - Logic for application to systems developed

- **Use of PRA in AP600 Tech Spec**
 - AP600 PRA will incorporate AP600 Tech Spec
 - Tech Spec will be reviewed against Importance measures

TECH SPEC APPROACH



- **AP600 Tech Spec Development**
 - Westinghouse and NRC staff have been discussing this approach
 - Substantial progress has been made
 - No impasse is foreseen

- **AP600 Tech Spec Status**
 - AP600 Tech Spec position paper to NRC by 3/30/96
 - Will address NRC letter of 7/7/95
 - Tech Spec review meeting mid April
 - Westinghouse will send ahead several Tech Spec sections
 - Purpose is to review position paper and those Tech Spec
 - AP600 Tech Spec finalized by 6/96

Westinghouse Electric Corporation

W/NRC SENIOR MANAGEMENT MEETING

AP600 Design Certification Schedule

John Butler

March 19, 1996

Rockville, MD

AP600 Design Certification Schedule

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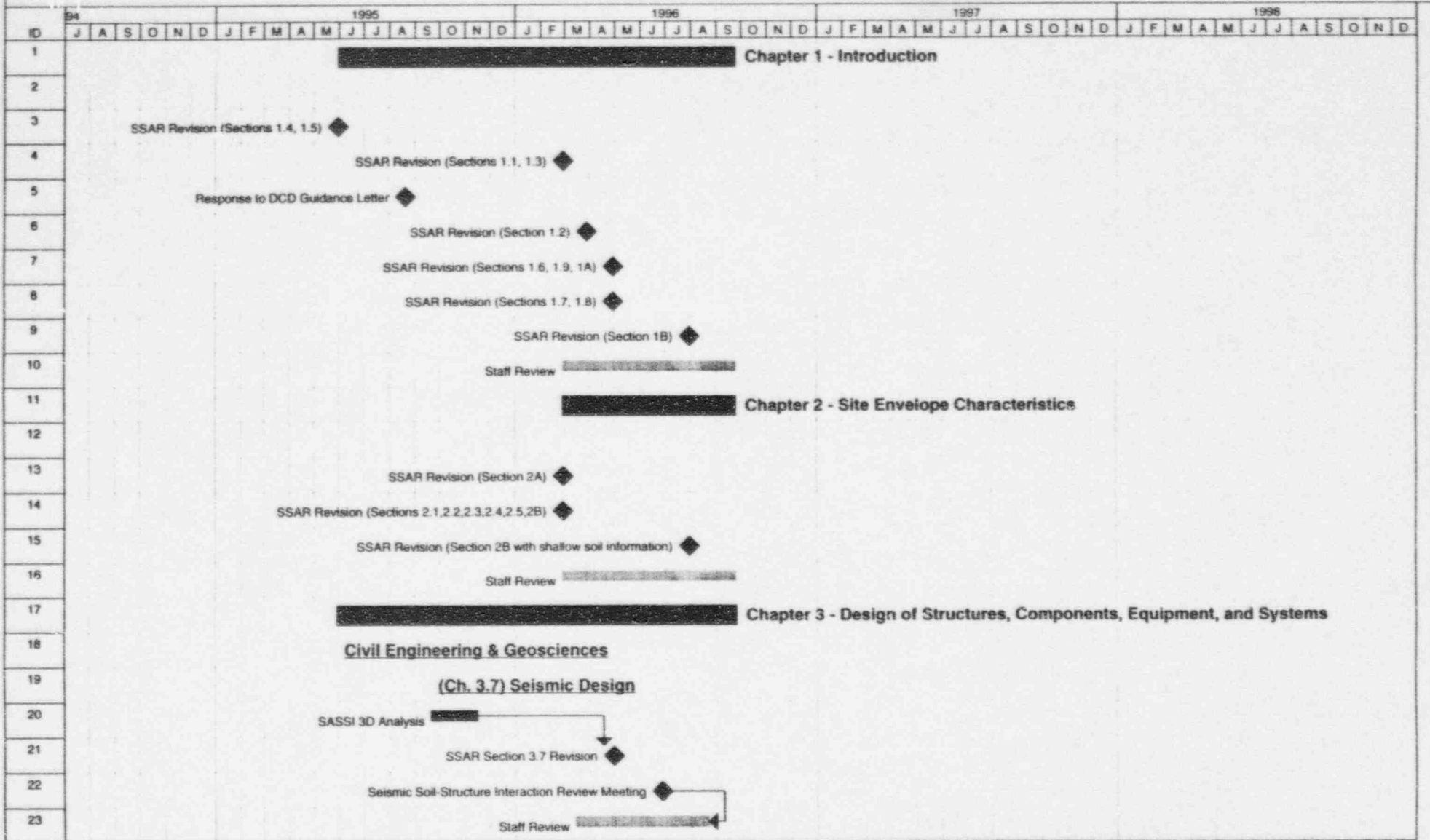
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AP600 Design Certification Schedule

Review areas needing focused attention to maintain schedule:

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AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task

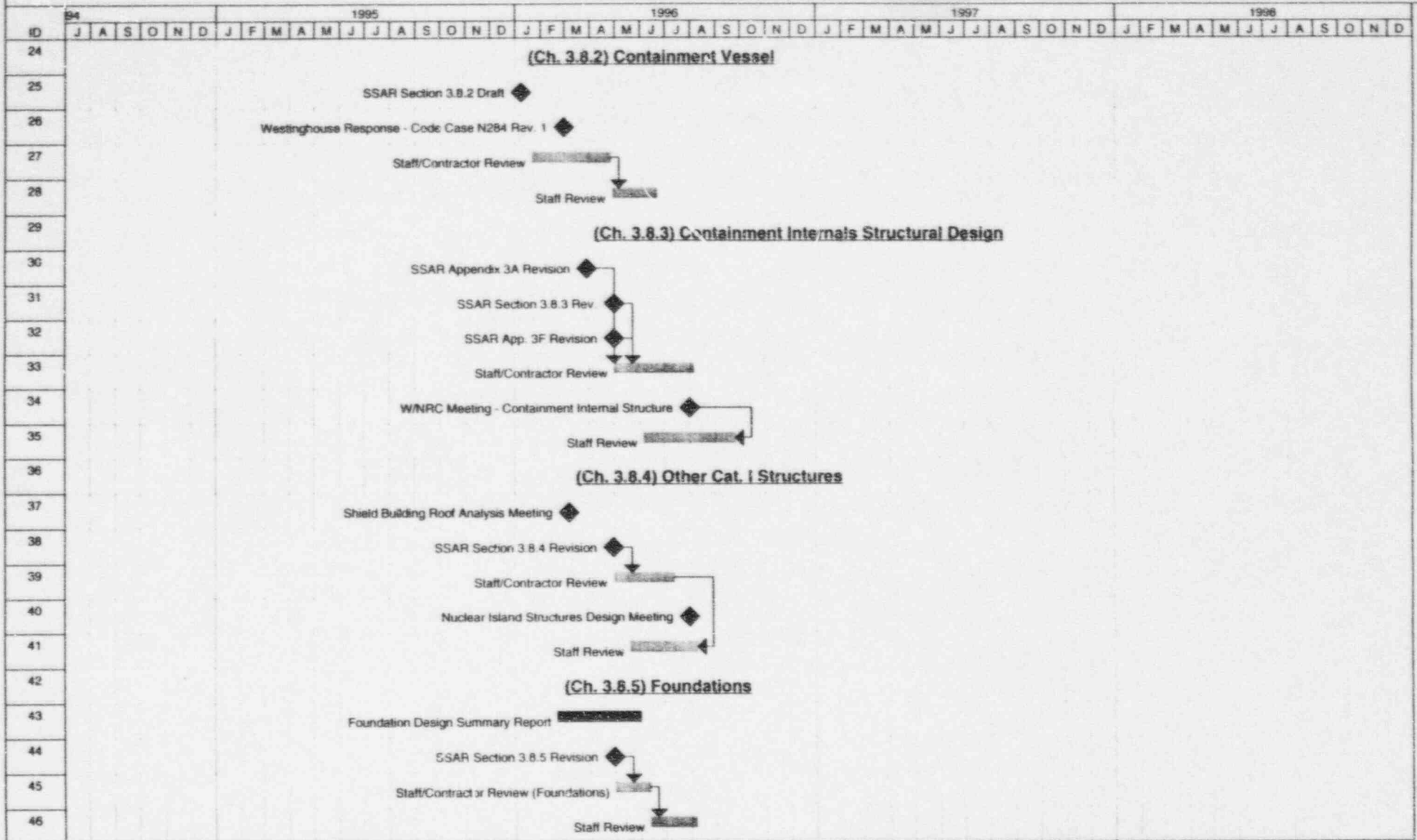
NRC Task

Progress

Milestone ◆

Summary

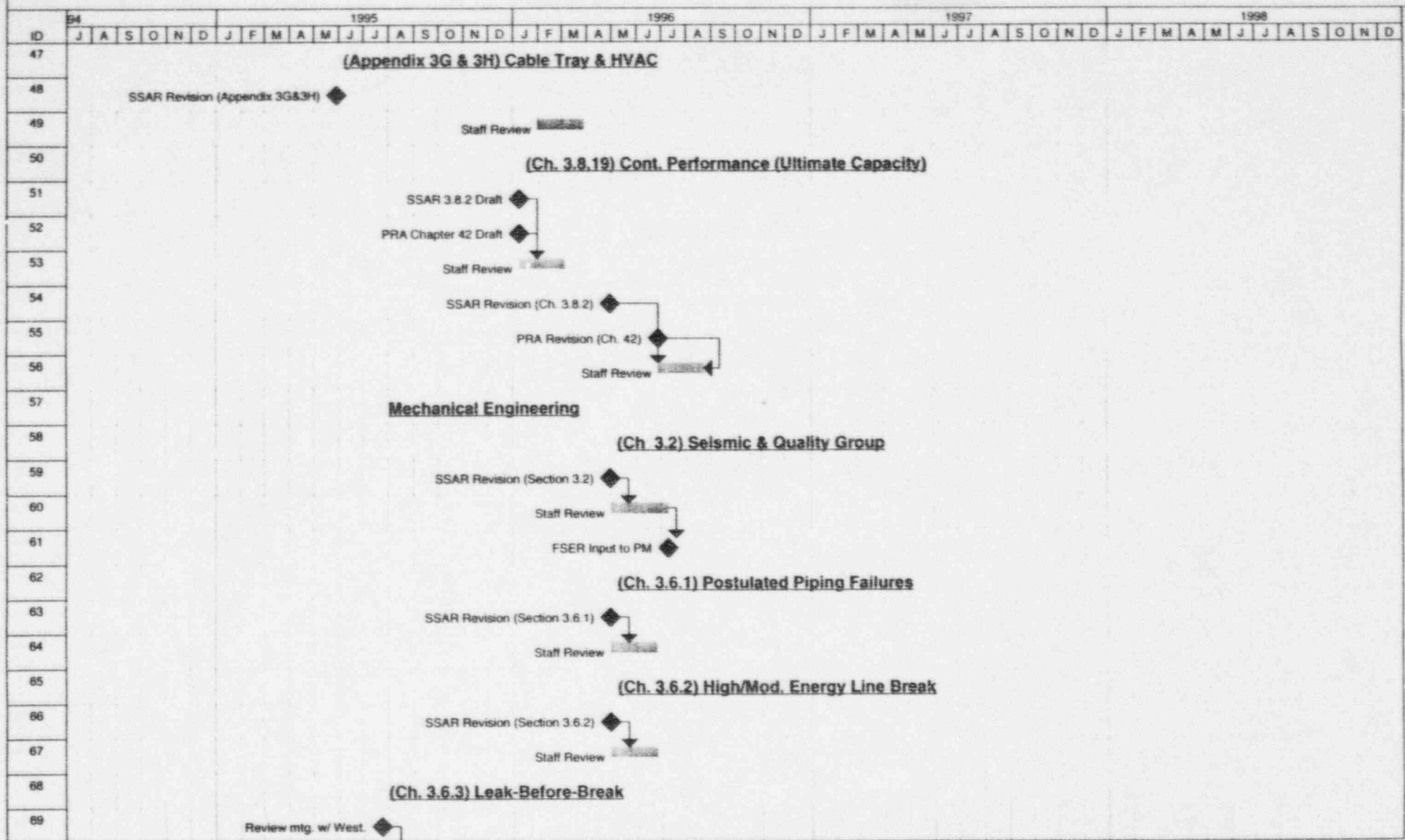
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
NRC Task Milestone

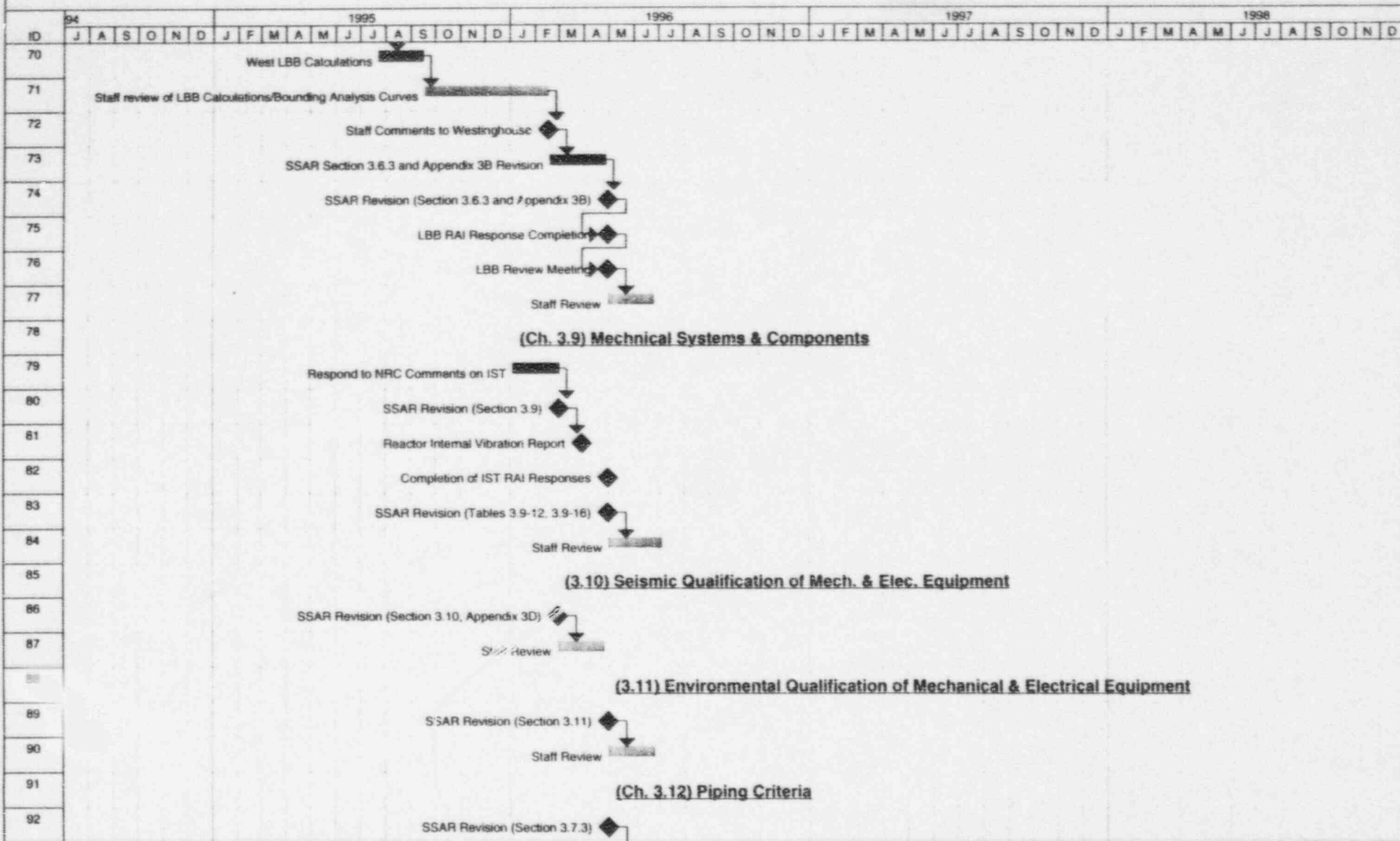
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
 NRC Task Milestone

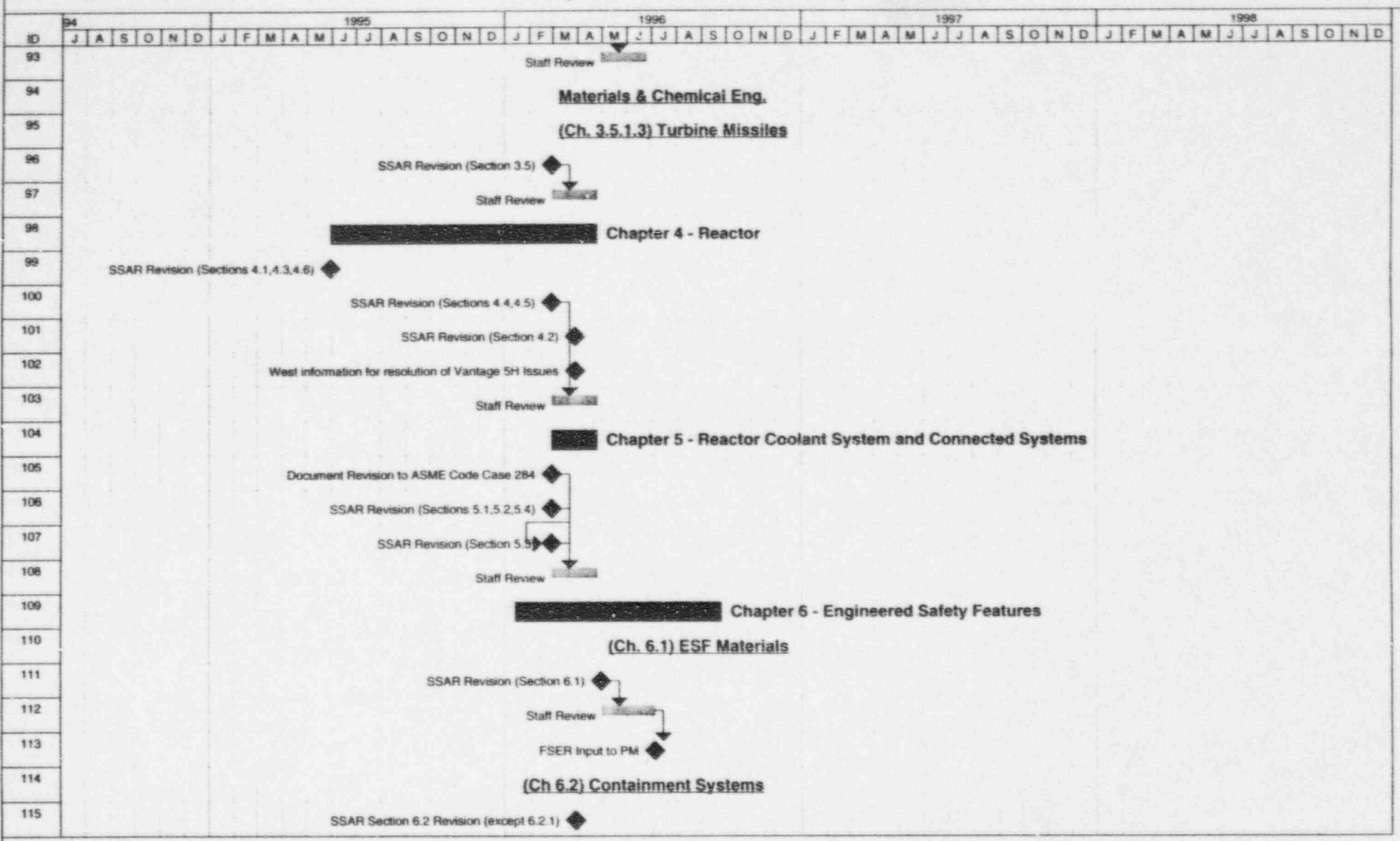
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
NRC Task Milestone

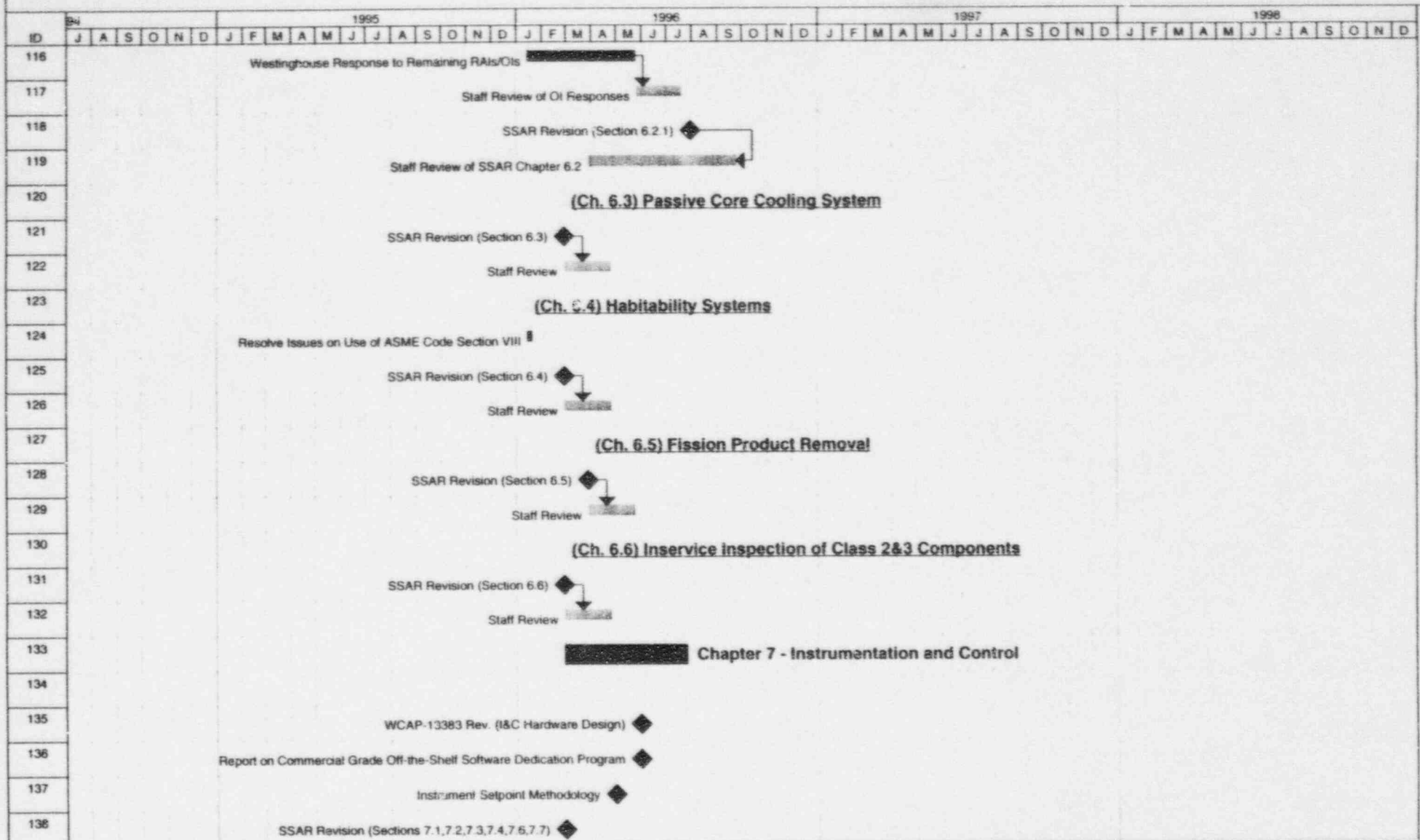
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
 NRC Task Milestone

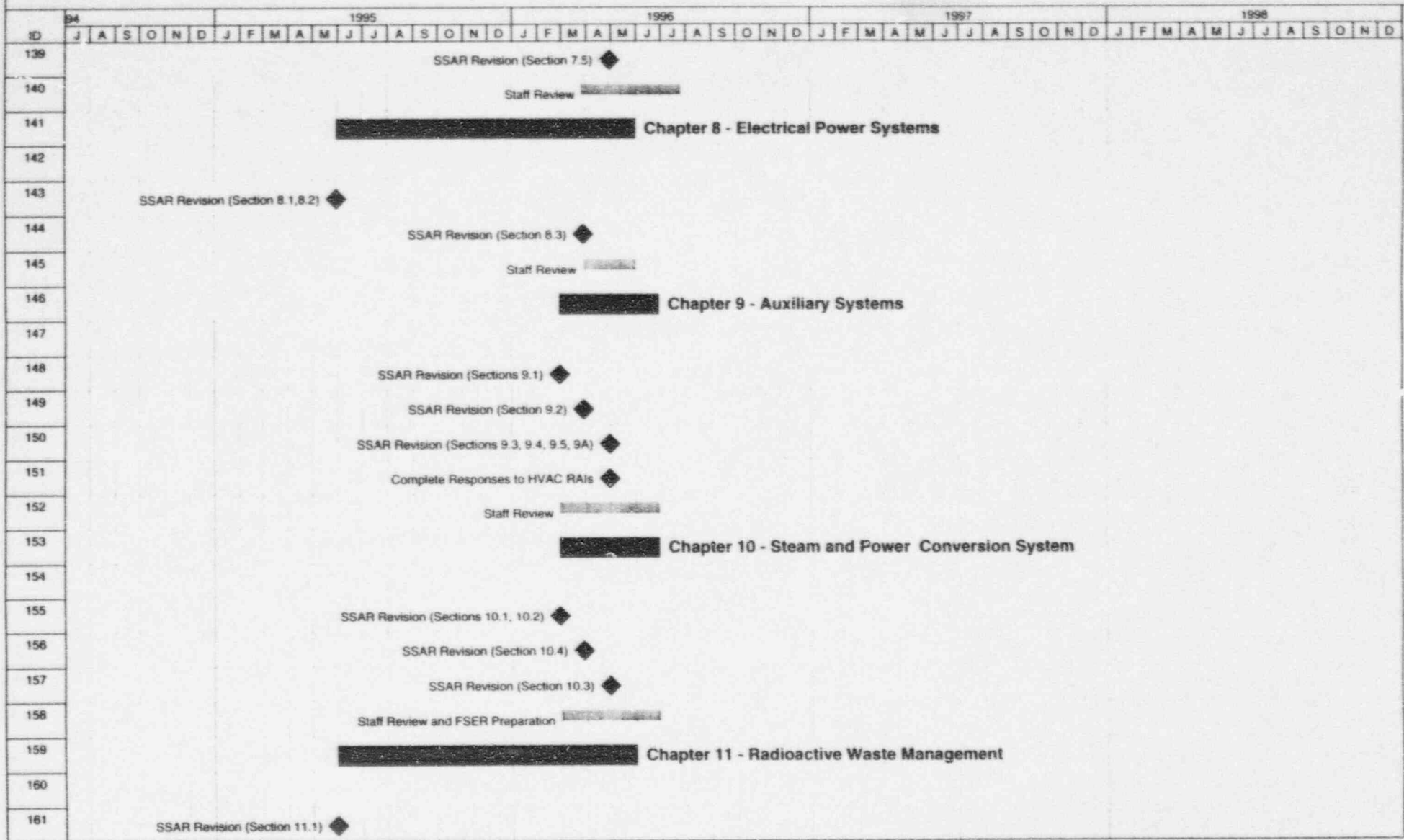
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
NRC Task Milestone

AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task



Progress



Summary



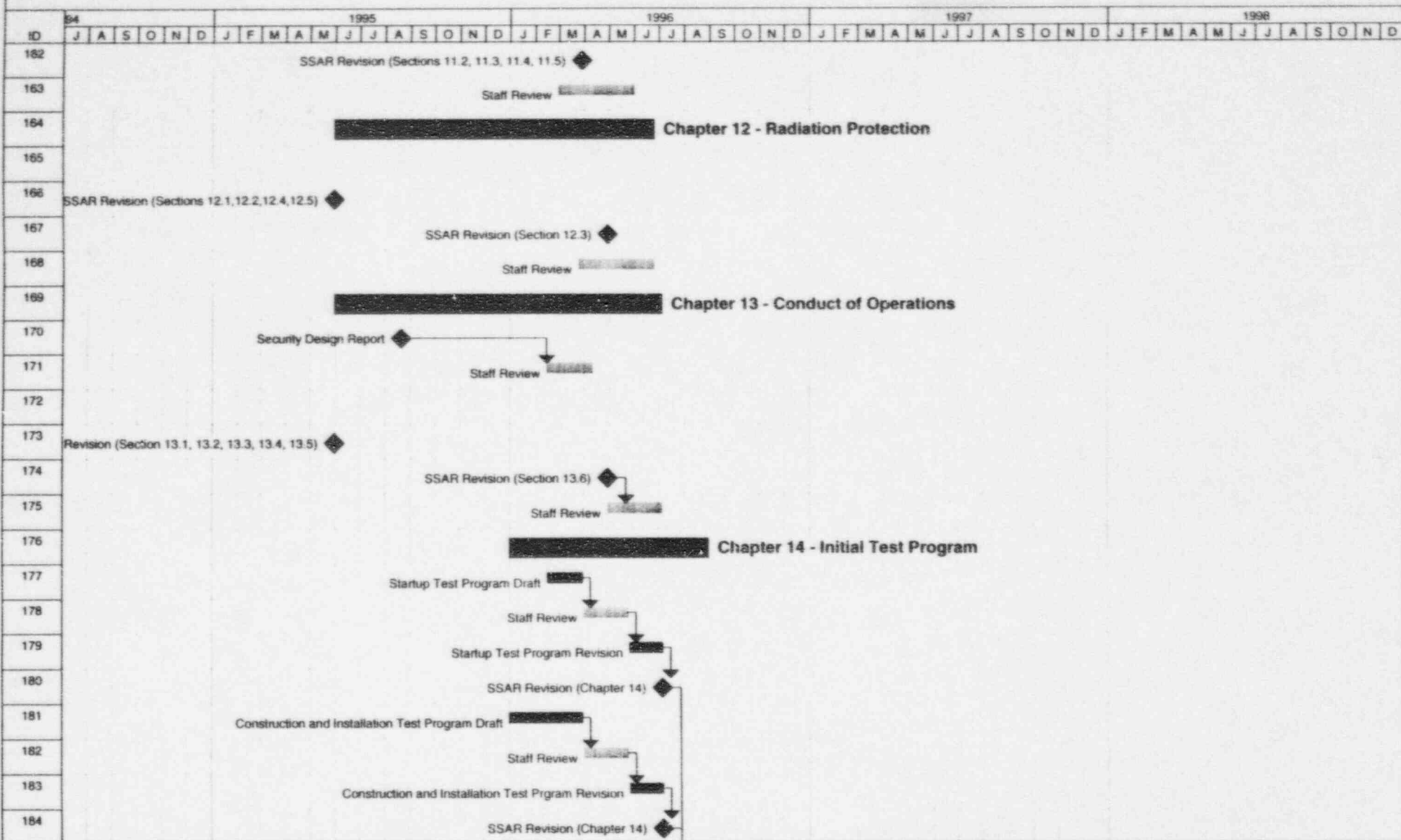
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Milestone



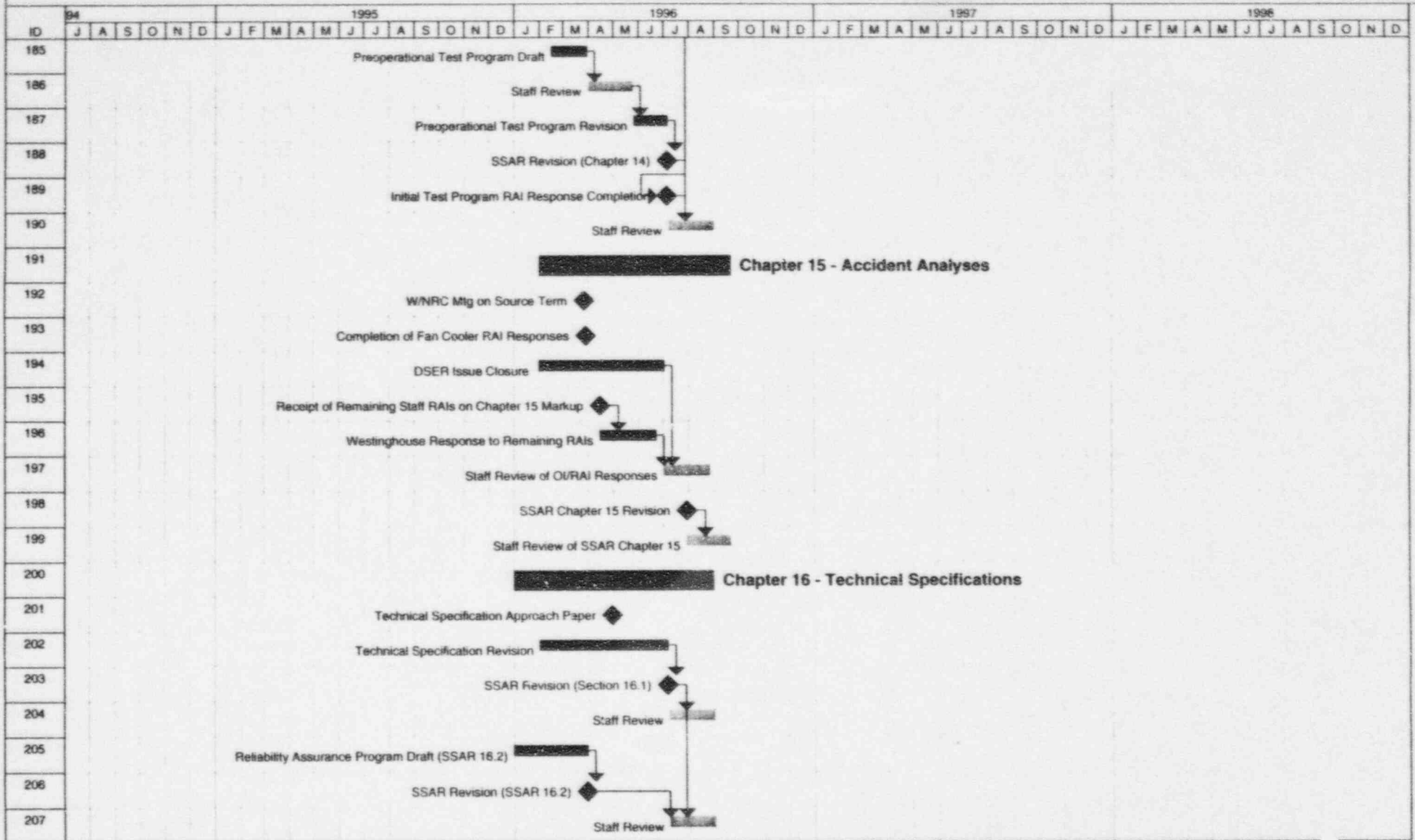
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
 NRC Task Milestone

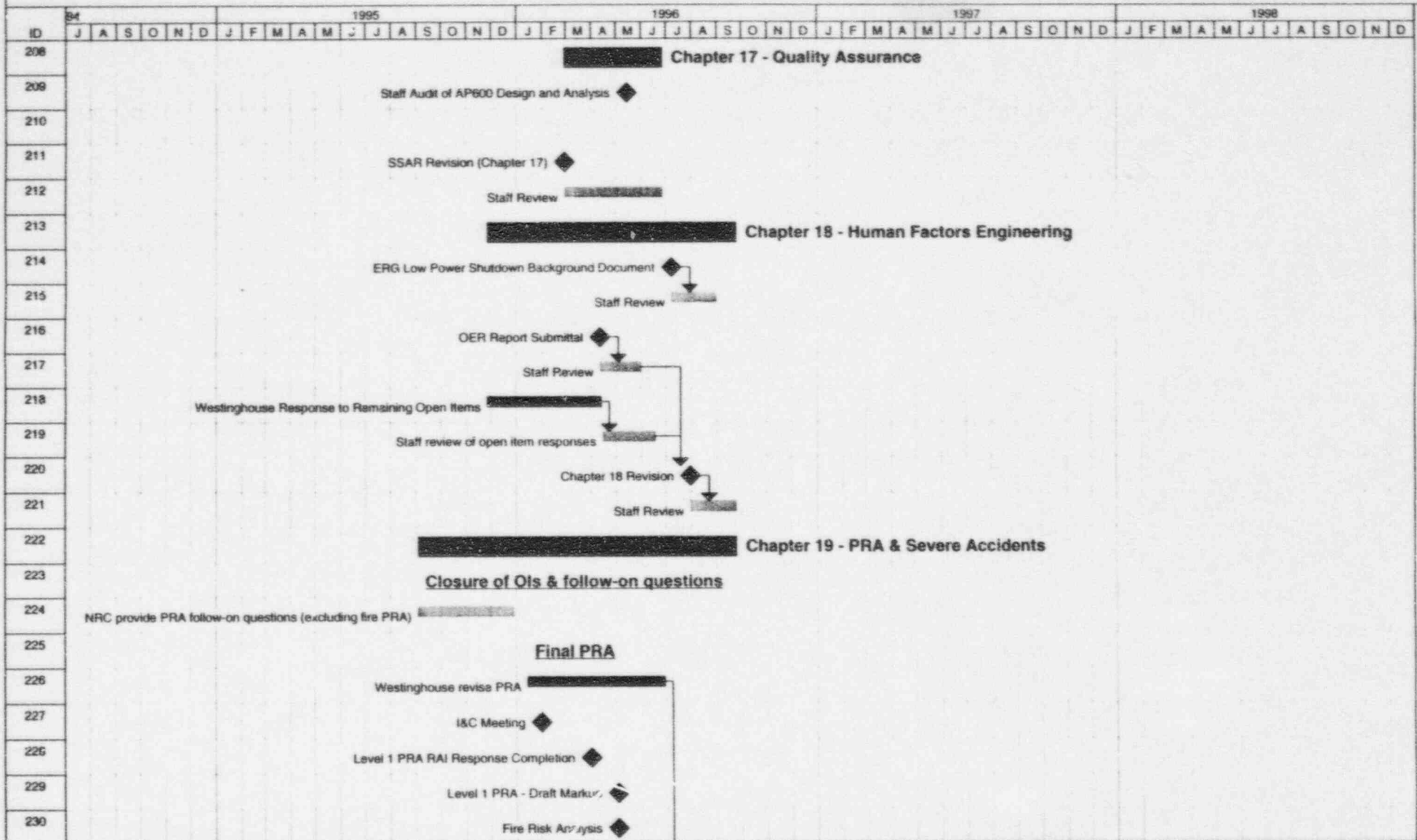
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
NRC Task Milestone

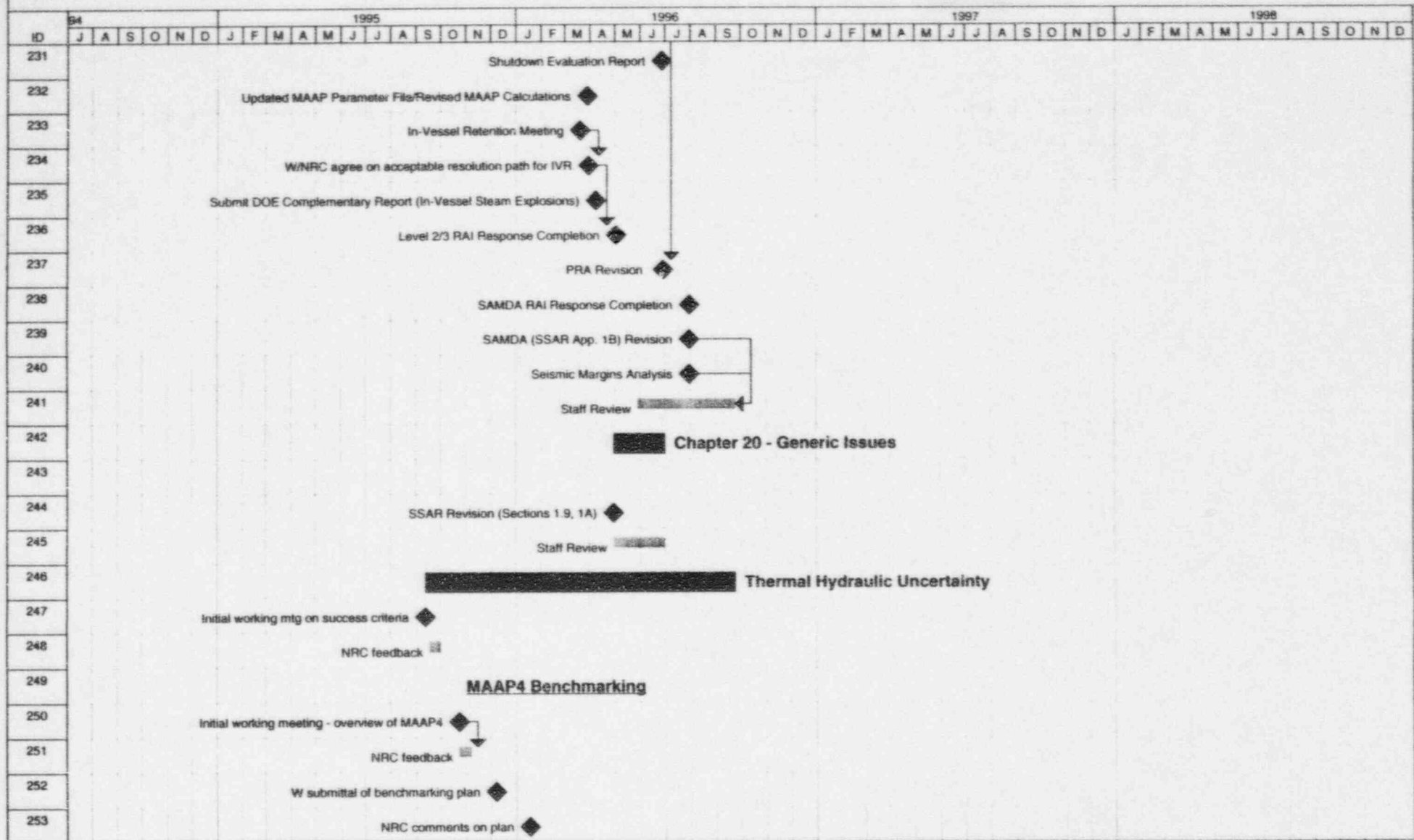
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
NRC Task Milestone

AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



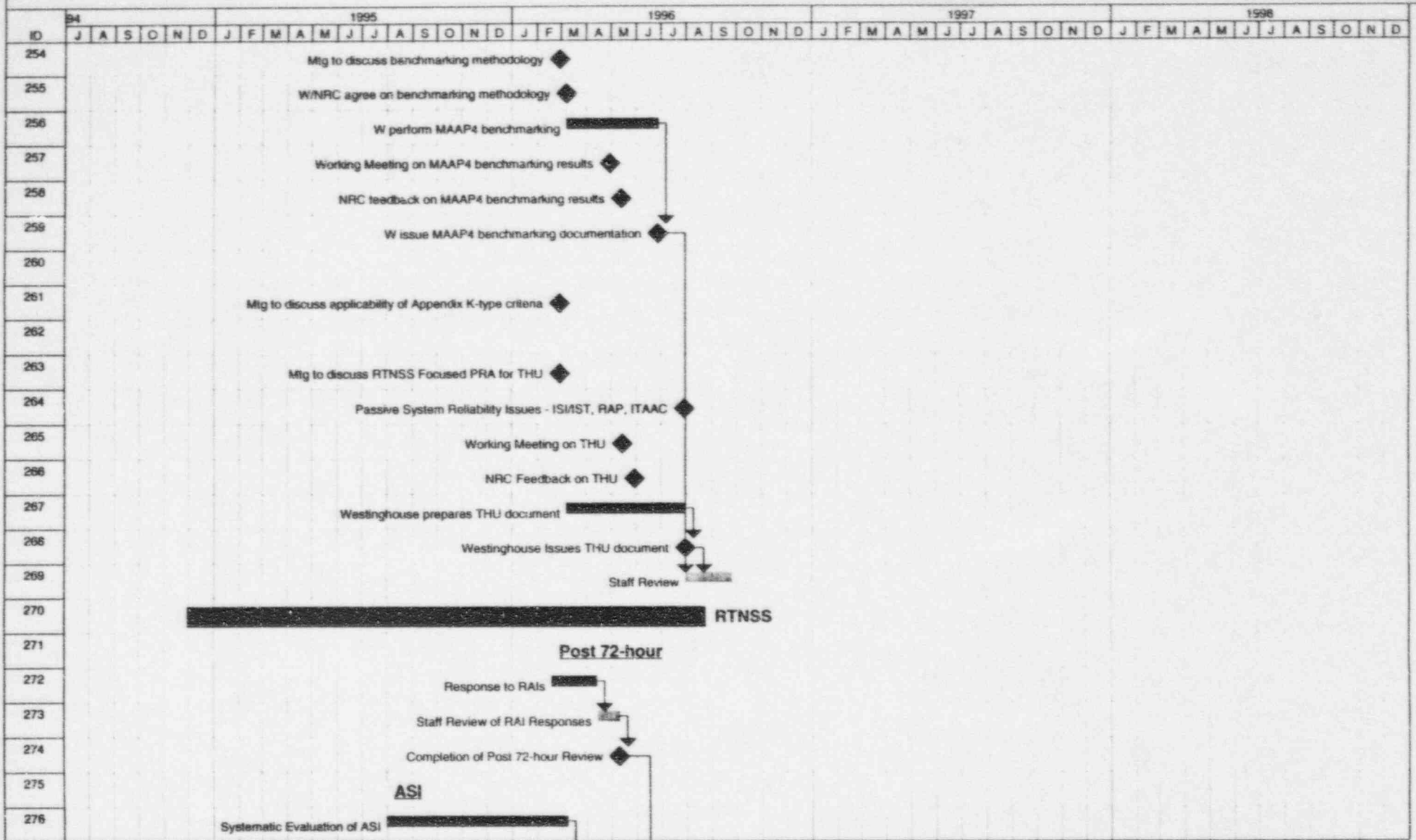
Project: AP600 Design Certification
Date: 3/17/96

W Task 
NRC Task 

Progress 
Milestone 

Summary 

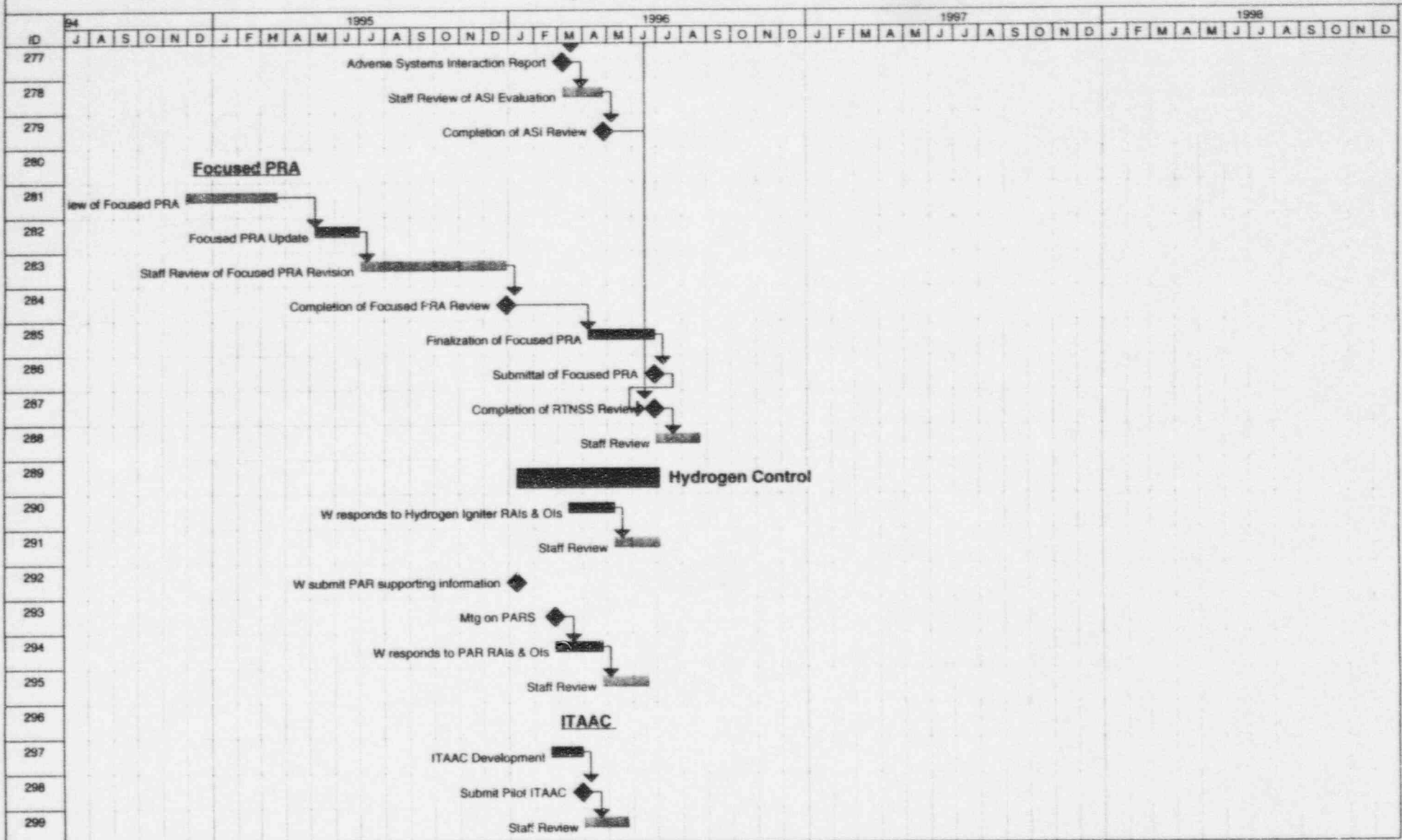
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
NRC Task Milestone

AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



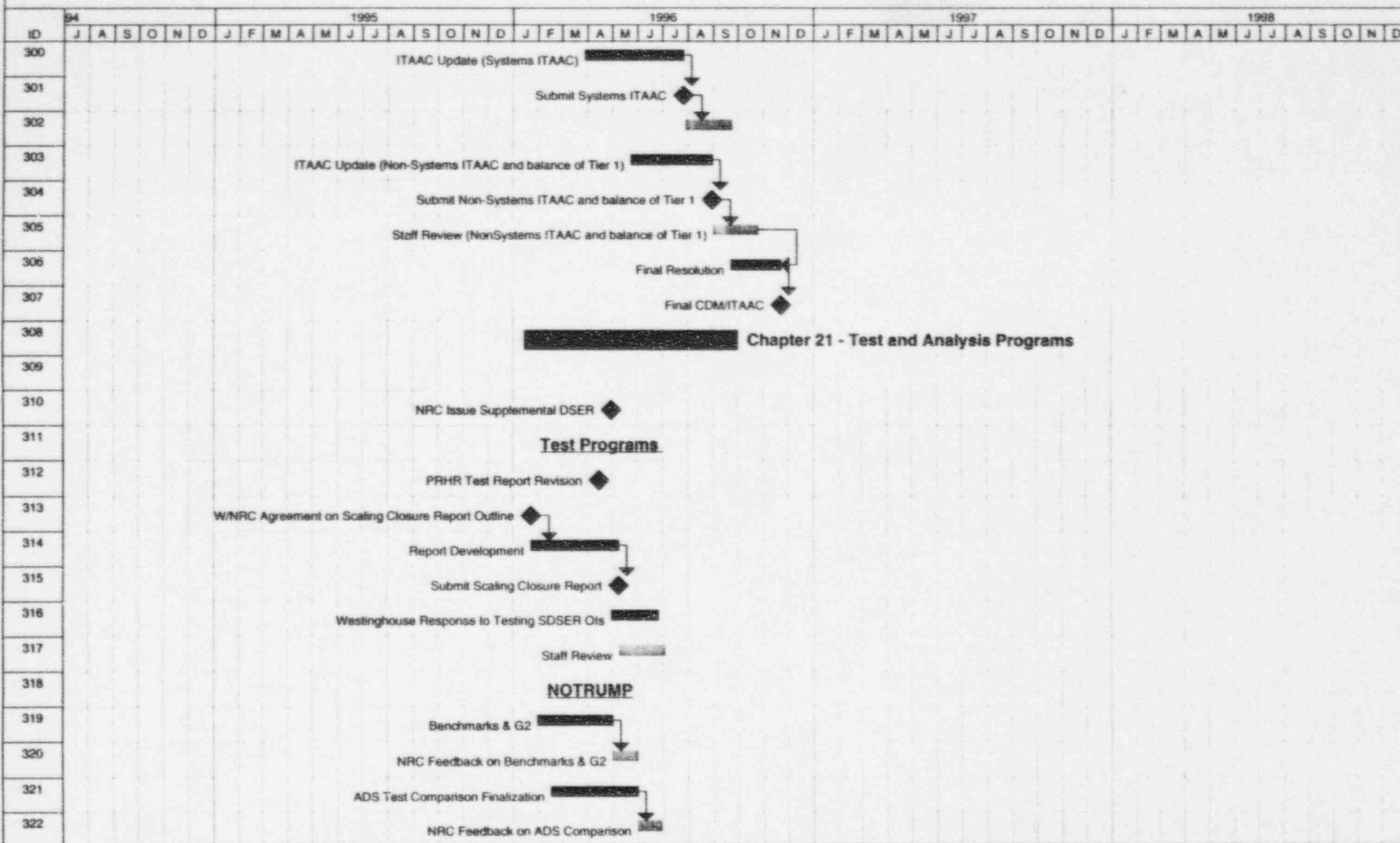
Project: AP600 Design Certification
Date: 3/17/96

W Task NRC Task

Progress Milestone

Summary

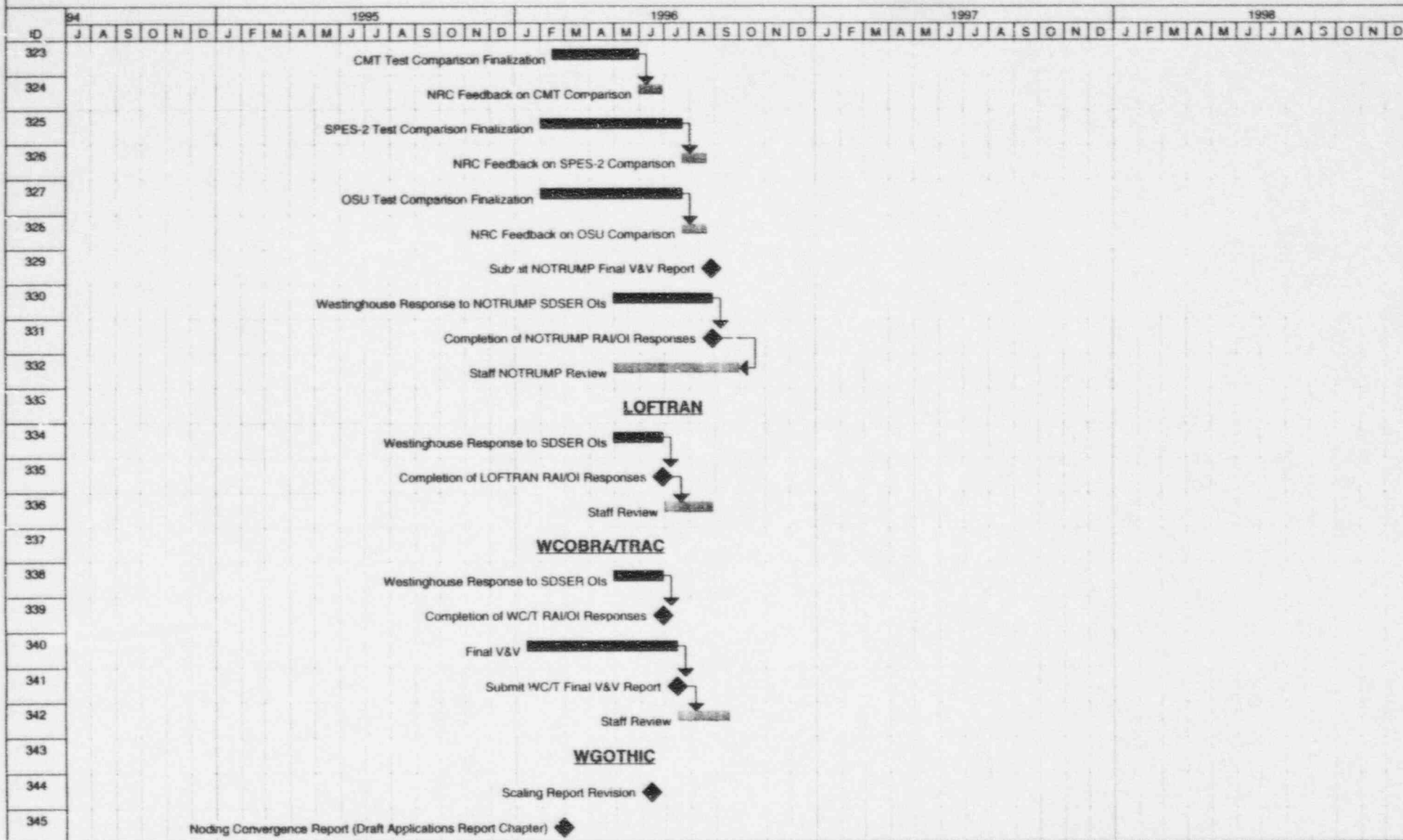
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

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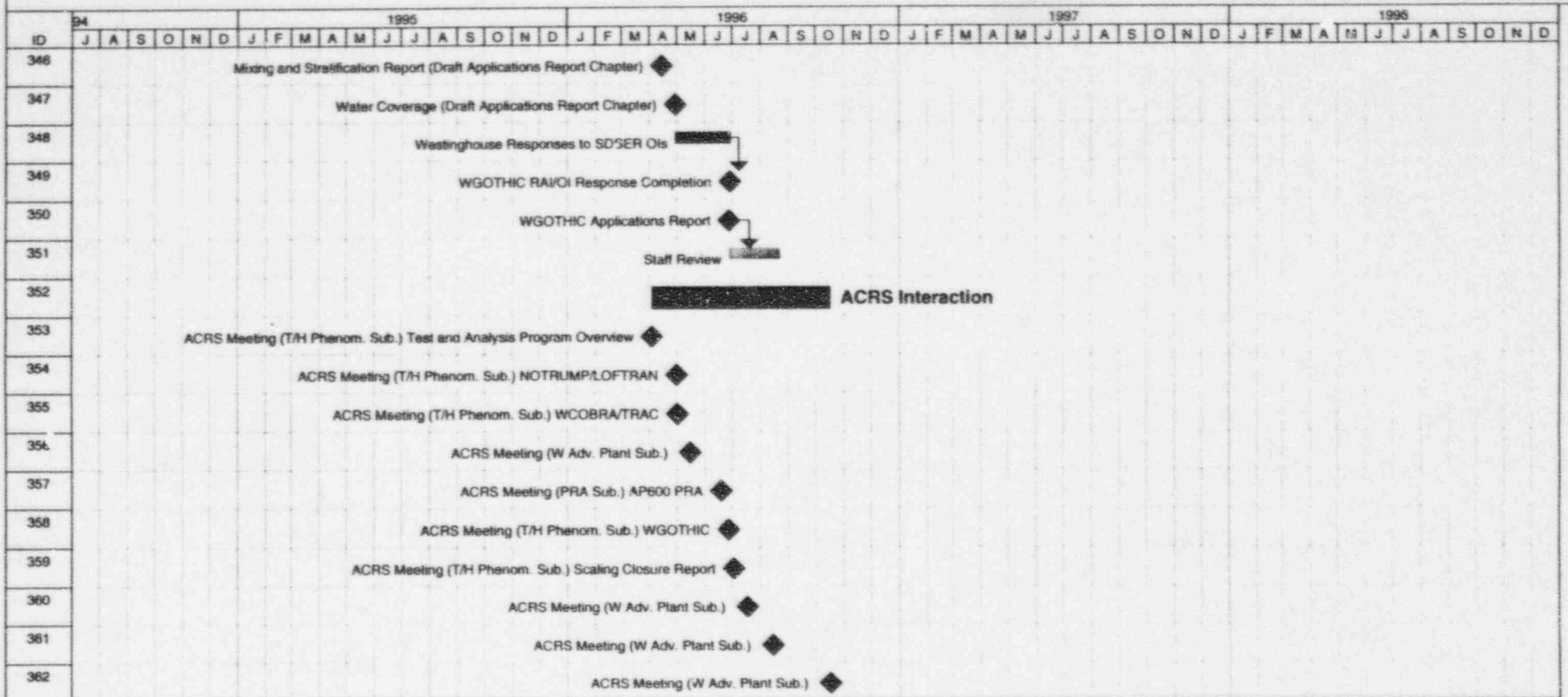
AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task Progress Summary
NRC Task Milestone

AP600 DESIGN CERTIFICATION SCHEDULE (TARGET MILESTONES)



Project: AP600 Design Certification
Date: 3/17/96

W Task 
NRC Task 

Progress 
Milestone 

Summary 

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PROPOSED AP600 SCHEDULE

	<u>Westinghouse Proposal</u>	<u>Staff Target</u>
Supplement to the DSER (Codes and Testing)	April 1996	April 1996
Advanced FSER	December 1996	April 1997
Final Design Approval	April 1997	August 1997

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CURRENT SCHEDULE ESTIMATES

	<u>Suppl.</u> <u>D SER</u>	<u>Final</u> <u>SER</u>	<u>Publ. FSER/</u> <u>FDA Issued</u>
Westinghouse proposal	4/96	12/96	4/97
Staff Estimate	4/96	Spring 1997	Fall 1997

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T-H UNCERTAINTY

* POTENTIAL SUCCESS PATH DISCUSSED AT 2/29/96 MTG

- USE MORE CONSERVATIVE SUCCESS CRITERIA
- DETERMINE IMPORTANT SEQUENCES USING MAAP
+ ENGINEERING EVALUATIONS
- CONFIRM IMPORTANT SEQUENCES USING NOTRUMP
- PERFORM SENSITIVITY ANALYSES USING NOTRUMP FOR
LIMITING SEQUENCES TO DEMONSTRATE T-H MARGIN

* CONCERNS

- APPROACH IS CONCEPTUAL -- NEEDS DOCUMENTATION
- SCOPE OF SENSITIVITY STUDY NOT DEFINED
- IMPACT ON BASELINE PRA INSIGHTS NOT CONSIDERED
- LONG TERM COOLING NOT ADDRESSED

Design Basis Hydrogen Control Review Status

- **Significant progress was made during February 27 meeting with Westinghouse**
 - **Reviewed PAR data base**
 - **Better understanding of approach**
- **RAIs resulting from the meeting and Westinghouse's January 11, 1996 submittal will be issued by the end of March 1996**
- **Some of the areas to be addressed by the RAIs include:**
 - **Environmental Design Basis (NUREG-1465 vs. ECCS analyses)**
 - **Use of best estimate performance data for DBA analysis**
 - **Mixing**