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Vol. 7, No. 1  
February 15, 1985

# UNRESOLVED SAFETY ISSUES SUMMARY

AQUA BOOK

UNITED STATES NUCLEAR REGULATORY COMMISSION



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# UNRESOLVED SAFETY ISSUES SUMMARY

## AQUA BOOK

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Manuscript Completed: February 1985  
Date Completed: February 1985

OFFICE OF NUCLEAR REACTOR REGULATION  
U. S. NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555



## FOREWORD

THE UNRESOLVED SAFETY ISSUES SUMMARY IS DESIGNED TO PROVIDE THE MANAGER-INT OF THE NUCLEAR REGULATORY COMMISSION WITH A QUARTERLY OVERVIEW OF THE PROGRESS AND PLANS FOR COMPLETION OF GENERIC TASKS ADDRESSING UNRESOLVED SAFETY ISSUES REPORTED TO CONGRESS PURSUANT TO SECTION 210 OF THE ENERGY REORGANIZATION ACT OF 1974 AS AMENDED. THIS SUMMARY UTILIZES DATA COLLECTED FROM THE OFFICE OF NUCLEAR REACTOR REGULATION, OFFICE OF NUCLEAR REGULATORY RESEARCH, AND THE NATIONAL LABORATORIES AND IS PREPARED BY THE OFFICE OF NUCLEAR REACTOR REGULATION.

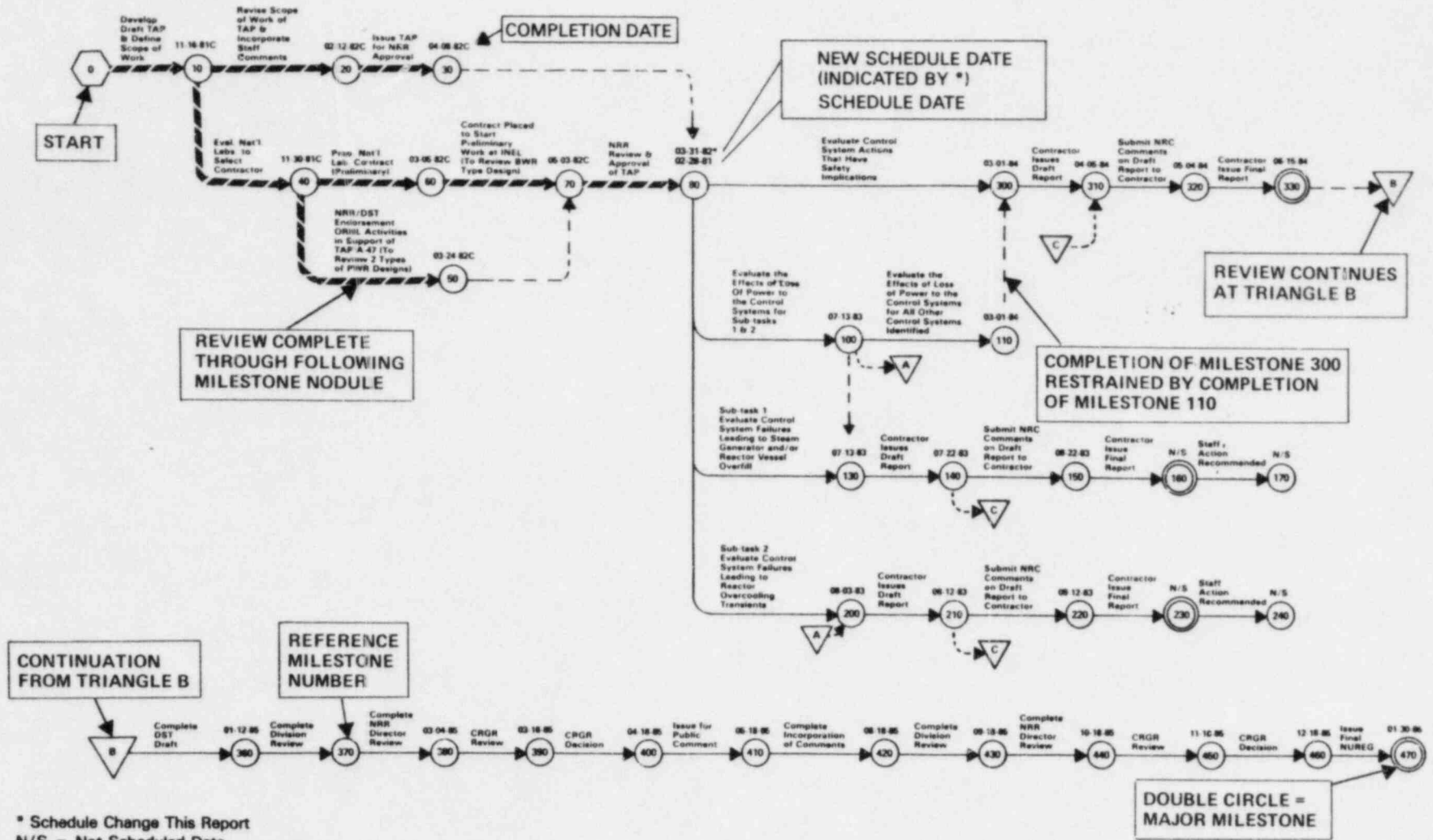
THE DEFINITION OF WHAT CONSTITUTES COMPLETION OF AN UNRESOLVED SAFETY ISSUE (USI) INCLUDES THE IMPLEMENTATION OF THE TECHNICAL RESOLUTION. THIS IS IN ACKNOWLEDGEMENT OF THE FACT THAT REAL SAFETY BENEFITS OCCUR ONLY AFTER THE IMPLEMENTATION HAS TAKEN PLACE. IMPORTANT ELEMENTS OF THIS IMPLEMENTATION PHASE ARE:

- (1) THE PROVISION OF A PUBLIC COMMENT PERIOD FOLLOWING THE ISSUANCE OF A DRAFT NUREG REPORT INCORPORATING THE STAFF'S TECHNICAL RESOLUTION FOLLOWED BY A DISCUSSION AND DISPOSITION OF THE COMMENTS RECEIVED IN A FINAL NUREG REPORT.
- (2) THE PROVISION FOR INCORPORATION OF THE TECHNICAL RESOLUTION INTO THE NRC'S REGULATIONS, STANDARD REVIEW PLAN, REGULATORY GUIDES, OR OTHER NRC OFFICIAL GUIDANCE OR REQUIREMENTS, AS APPROPRIATE.
- (3) THE PROVISION FOR APPLICATION OF THE TECHNICAL RESOLUTION TO INDIVIDUAL OPERATING PLANTS IN THE FORM OF HARDWARE OR DESIGN CHANGES, TECHNICAL SPECIFICATION CHANGE, AND/OR CHANGE TO OPERATING PROCEDURES AND TRAINING, AS APPROPRIATE.

THE MILESTONE CHARTS FOR EACH USI SHOW THE CURRENT SCHEDULE AS OF THE DATE OF PUBLICATION. IF A MILESTONE DATE HAS CHANGED SINCE THE LAST REPORT, THE OLD DATE WILL BE SHOWN WITH THE NEW DATE IMMEDIATELY ABOVE IT. THE NEW DATE WILL BE MARKED WITH AN ASTERISK WITH A FOOTNOTE INDICATING THAT A SCHEDULE CHANGE HAS BEEN MADE. THE PROGRAM STATUS TABLE WHICH BEGINS ON PAGE 3 OF THIS NUREG SHOWS THE COMPLETION DATE STATED IN THE LATEST APPROVED TASK ACTION PLAN AND THE CURRENT SCHEDULED COMPLETION DATE. THE MILESTONE AT THE END OF EACH ACTION PLAN WHICH REPRESENTS THE INITIATION OF THE IMPLEMENTATION PROCESS BOTH WITH RESPECT TO INCORPORATION OF THE TECHNICAL RESOLUTION IN THE NRC OFFICIAL GUIDANCE OR REQUIREMENTS AND ALSO THE APPLICATION OF CHANGES TO INDIVIDUAL OPERATING PLANTS. THE SCHEDULE FOR IMPLEMENTATION WILL NOT NORMALLY BE INCLUDED IN THE TASK ACTION PLAN(S) FOR THE RESOLUTION OF A USI SINCE THE NATURE AND EXTENT OF THE ACTIVITIES NECESSARY TO ACCOMPLISH THE IMPLEMENTATION CANNOT NORMALLY BE REASONABLY DETERMINED PRIOR TO THE DETERMINATION OF A TECHNICAL RESOLUTION. THE PROGRESS AND STATUS FOR IMPLEMENTATION OF UNRESOLVED SAFETY ISSUES FOR WHICH A TECHNICAL RESOLUTION HAS BEEN COMPLETED ARE REPORTED SPECIFICALLY IN A SEPARATE TABLE PROVIDED IN THIS SUMMARY. MORE DETAIL ON THE STATUS OF IMPLEMENTATION IN PROGRESS ON A SPECIFIC UNRESOLVED SAFETY ISSUE WHERE THE TECHNICAL RESOLUTION REQUIRES CHANGES TO INDIVIDUAL OPERATING PLANTS IS PROVIDED IN NUREG-0748, "OPERATING REACTORS LICENSING ACTIONS SUMMARY" WHICH IS PUBLISHED MONTHLY.

KARL KYTEL, CHIEF OF THE GENERIC ISSUES BRANCH, DIVISION OF SAFETY TECHNOLOGY, OFFICE OF NUCLEAR REACTOR REGULATION IS RESPONSIBLE FOR MANAGING THE GENERIC TASKS INCLUDED IN THIS SUMMARY.

EXAMPLE PAGE



\* Schedule Change This Report  
N/S = Not Scheduled Date

## TABLE OF CONTENTS

| PAGE NO. | TASK NO.      | TASK MANAGER      | DESCRIPTION   |
|----------|---------------|-------------------|---|
| 1-2      | ---           | ---               | ABBREVIATIONS   |
| 3-4      | ---           | ---               | PROGRAM STATUS  |
| 5-9      | ---           | ---               | USI'S FOR WHICH TECHNICAL RESOLUTION IS COMPLETE                            |
| 10-11    | A-3, A-4, A-5 | JACK STROSNIDER   | W. CE AND B&W STEAM GENERATOR TUBE INTEGRITY                                |
| 12-15    | A-17          | DALE THATCHER     | SYSTEMS INTERACTIONS IN NUCLEAR POWER PLANTS                                |
| 16-19    | A-40          | SYED SHAUKAT      | SEISMIC DESIGN CRITERIA - SHORT TERM PROGRAM                                |
| 20-21    | A-43          | ALECK SERKIZ      | CONTAINMENT EMERGENCY SUMP PERFORMANCE                                      |
| 22-23    | A-44          | ALAN RUBIN        | STATION BLACKOUT  |
| 24-27    | A-45          | ANDREW MARCHESE   | SHUTDOWN DECAY HEAT REMOVAL REQUIREMENTS                                    |
| 28-31    | A-46          | T. Y. CHANG       | SEISMIC QUALIFICATION OF EQUIPMENT IN OPERATING PLANTS                      |
| 32-37    | A-47          | ANDREW STUJENWICZ | SAFETY IMPLICATIONS OF CONTROL SYSTEMS                                      |
| 38-41    | A-48          | TSUNG SU          | HYDROGEN CONTROL MEASURES AND EFFECTS OF HYDROGEN BURNS ON SAFETY EQUIPMENT |
| 42-48    | A-49          | ROY WOODS         | PRESSURIZED THERMAL SHOCK   |

# ABBREVIATIONS

|      |  |        |  |        |   |
|------|--|--------|--|--------|---|
| AAB  | ACCIDENT ANALYSIS BRANCH (FORMER NRB BRANCH)                               | DC     | DIRECT CURRENT   | HEB    | HUMAN FACTORS ENGINEERING BRANCH, DIVISION OF HEALTH, SITING AND WASTE MANAGEMENT (RES) |
| AB   | ADMINISTRATION BRANCH, TRAINING AND ADMINISTRATION STAFF (IE)              | DE     | DIVISION OF ENGINEERING (NRR)  | HST    | HEAVY SECTION STEEL TECHNOLOGY  |
| AC   | ALTERNATING CURRENT  | DEDRGR | DEPUTY EXECUTIVE DIRECTOR FOR REGIONAL OPERATIONS AND GENERIC REQUIREMENTS | ICBR   | INSTRUMENTATION AND CONTROL BRANCH, DIVISION OF FACILITY OPERATIONS (RES)               |
| ACRS | ADVISORY COMMITTEE ON REACTOR SAFEGUARDS                                   | DFO    | DIVISION OF HUMAN FACTORS SAFETY (NRR)                                     | ICBR   | INSTRUMENTATION AND CONTROL SYSTEMS BRANCH, DIVISION OF SYSTEMS INTEGRATION (NRR)       |
| AD   | ASSISTANT DIRECTOR   | DHFS   | DECAY HEAT REMOVAL SYSTEMS   | IE     | INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS                                       |
| ADG  | ANALYSIS AND DEVELOPMENT BRANCH, DIVISION OF REACTOR SAFETY RESEARCH (RES) | DHRE   | DIVISION OF LICENSING (NRR)  | IEE    | INTEGRATED RELIABILITY EVALUATION PROGRAM   |
| AE   | ACCIDENT EVALUATION BRANCH, DIVISION OF SYSTEMS INTEGRATION (NRR)          | DI     | U. S. DEPARTMENT OF ENERGY   | IEE    | INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS                                       |
| AEDD | OFFICE OF THE ANALYSIS AND EVALUATION OF OPERATIONAL DATA                  | DOR    | DIVISION OF OPERATING REACTORS (FORMER NRR DIVISION)                       | INE    | INDIAN POINT  |
| AIF  | ATOMIC INDUSTRIAL FORUM  | DRK    | DIVISION OF RISK ANALYSIS (RES)  | IEP    | INTEGRATED RELIABILITY EVALUATION PROGRAM   |
| APTS | ACTION PLAN TRACKING SYSTEM  | DSE    | DIVISION OF SYSTEMS INTEGRATION (NRR)                                      | IS     | IN-SERVICE INSPECTION   |
| ARL  | ALDEN RESEARCH LABORATORY  | DSS    | DIVISION OF SYSTEMS SAFETY (FORMER NRR DIVISION)                           | LAL    | LCS ALABAMA NATIONAL LABORATORY   |
| ASB  | AUXILIARY SYSTEMS BRANCH, DIVISION OF SYSTEMS INTEGRATION (NRR)            | DST    | DIVISION OF SAFETY TECHNOLOGY (NRR)  | LER    | LICENSEE EVENT REPORT   |
| ASNE | AMERICAN SOCIETY OF MECHANICAL ENGINEERS                                   | E      | ENGINEERING  | LNL    | LAWRENCE LIVERMORE NATIONAL LABORATORY  |
| ASTM | AMERICAN SOCIETY OF TESTING MATERIALS                                      | EP     | ENFORCEMENT BRANCH, ENFORCEMENT AND INVESTIGATIONS STAFF (IE)              | LCA    | LOSS-OF-COOLANT ACCIDENT  |
| ATMS | ANTICIPATED TRANSIENTS WITHOUT SCRAM                                       | ECC    | EMERGENCY CORE COOLING   | LFP    | LEAD PLANT PROGRAM  |
| BBE  | BALTIMORE GAS AND ELECTRIC COMPANY   | EEB    | ENVIRONMENTAL ENGINEERING BRANCH, DIVISION OF ENGINEERING (NRR)            | LTP    | LONG TERM PROGRAM   |
| BBW  | BABCOCK AND WILCOX COMPANY   | EPF    | EFFECTIVE FULL-POWER YEARS   | LWR    | LIGHT-WATER REACTOR   |
| BNC  | BROOKHAVEN NATIONAL CONSERVATORY   | EGAG   | EDGERTON, GERMESHAUSER & GRIER   | MAR    | CONTAINMENT TYPES FOR BOILING WATER REACTORS  |
| BNL  | BROOKHAVEN NATIONAL LABORATORY   | EP     | EMERGENCY PREPAREDNESS   | MEB    | MECHANICAL ENGINEERING BRANCH, DIVISION OF ENGINEERING (NRR)                            |
| BOP  | BALANCE OF PLANT   | EPF    | ELECTRIC POWER RESEARCH INSTITUTE  | MIT    | MASSACHUSETTS INSTITUTE OF TECHNOLOGY   |
| BWR  | BOILING WATER REACTOR  | EBB    | EQUIPMENT QUALIFICATION BRANCH, DIVISION OF ENGINEERING (NRR)              | MSL    | MAIN STEAM LINE BREAK   |
| CE   | CHEMICAL ENGINEERING BRANCH, DIVISION OF ENGINEERING (NRR)                 | FIN    | FINANCIAL  | MTB    | MATERIALS ENGINEERING BRANCH, DIVISION OF ENGINEERING (NRR)                             |
| CNEB | CHEMICAL ENGINEERING BRANCH, DIVISION OF ENGINEERING (NRR)                 | FSTF   | FULL-SCALE TEST FACILITY   | NDE    | NON-DESTRUCTIVE EXAMINATION   |
| CFR  | CODE OF FEDERAL REGULATIONS  | FW     | FEEDWATER  | NRC    | NUCLEAR REGULATORY COMMISSION   |
| CP   | CONSTRUCTION PERMIT  | FY     | FISCAL YEAR  | NEP    | NEUTRON RESONANCE ESCAPE PROBABILITY  |
| CFB  | CORE PERFORMANCE BRANCH, DIVISION OF SYSTEMS INTEGRATION (NRR)             | GSB    | GEOSCIENCES BRANCH, DIVISION OF ENGINEERING (NRR)                          | NRE    | OFFICE OF NUCLEAR REACTOR REGULATION  |
| CR   | CONTRACTOR REPORT  | GE     | GENERAL ELECTRIC   | NRS    | NUCLEAR STEAM SYSTEM  |
| CRGR | COMMITTEE TO REVIEW GENERIC REQUIREMENTS                                   | GBR    | GENERIC ISSUES BRANCH, DIVISION OF SAFETY TECHNOLOGY (NRR)                 | NUR    | NUCLEAR REGULATORY REPORT (PREPARED IN-HOUSE)   |
| CSB  | CONTAINMENT SYSTEMS BRANCH, DIVISION OF SYSTEMS INTEGRATION (NRR)          |        |  | NUR/CP | NUCLEAR REGULATORY REPORT (PREPARED BY CONTRACTOR)                                      |
|      |  |        |  | OL     | OPERATING LICENSE   |
|      |  |        |  | ORAB   | OPERATING REACTORS ASSESSMENT BRANCH, DIVISION OF LICENSING (NRR)                       |

# ABBREVIATIONS

|        |   |      |   |
|--------|---|------|---|
| ORB    | OPERATING REACTORS BRANCH, DIVISION OF LICENSING (NRR)                    | SEB  | STRUCTURAL AND GEOTECHNICAL ENGINEERING BRANCH, DIVISION OF ENGINEERING (NRR) |
| ORNL   | ORNL RYAN NATIONAL LABORATORY   | SEP  | SYSTEMS EVALUATION PROGRAM  |
| OSD    | OFFICE OF STANDARDS DEVELOPMENT (FORMER NRC OFFICE)                       | SEPE | SYSTEMS EVALUATION PROGRAM BRANCH, DIVISION OF LICENSING (NRR)                |
| OTSG   | ONCE-THROUGH STEAM GENERATOR  | SEP  | SAFETY EVALUATION REPORT  |
| PASNY  | POWER AUTHORITY OF THE STATE OF NEW YORK                                  | SS   | STEAM GENERATOR   |
| FDA    | PRELIMINARY DESIGN APPROVAL   | SSWH | STEAM GENERATOR WATER HAMMER  |
| PNL    | PACIFIC NORTHWEST LABORATORY (BATTELLE)                                   | SAL  | SANDIA NATIONAL LABORATORY  |
| PRA    | PROBABILISTIC RISK ASSESSMENT   | SOJG | SEISMIC QUALIFICATION UTILITIES GROUP   |
| PSB    | POWER SYSTEMS BRANCH, DIVISION OF SYSTEMS INTEGRATION (NRR)               | SEP  | STANDARD REVIEW PLAN  |
| PSU    | PLANT SYSTEMS UNIT (AEDD)   | SRV  | SAFETY RELIEF VALVE   |
| PTRB   | PROCEDURES AND TEST REVIEW BRANCH, DIVISION OF HUMAN FACTORS SAFETY (NRR) | SSE  | SAFE SHUTDOWN EARTHQUAKE  |
| PNR    | PRESSURIZED WATER REACTOR   | SSPB | STANDARDIZATION AND SPECIAL PROJECTS BRANCH, DIVISION OF LICENSING (NRR)      |
| RAB    | RADIOLOGICAL ASSESSMENT BRANCH, DIVISION OF SYSTEMS INTEGRATION (NRR)     | STF  | SHORT-TERM PROGRAM  |
| RCIC   | REACTOR CORE ISOLATION COOLING  | TAP  | TASK ACTION PLAN  |
| REF    | REFERENCE   | TER  | TECHNICAL EVALUATION REPORT   |
| RES    | OFFICE OF NUCLEAR REGULATORY RESEARCH                                     | TH   | THERMAL HYDRAULICS  |
| RFF    | REQUEST FOR PROPOSAL  | TM   | TASK MANAGER  |
| RHR    | RESIDUAL HEAT REMOVAL   | TMJ  | THREE MILE ISLAND   |
| RPV    | REACTOR PRESSURE VESSEL   | UCLA | UNIVERSITY OF CALIFORNIA, LOS ANGELES   |
| RM     | OFFICE OF RESOURCE MANAGEMENT   | USI  | UNRESOLVED SAFETY ISSUE   |
| RRAB   | RELIABILITY AND RISK ASSESSMENT BRANCH                                    | N    | NORTHWEST ELECTRIC CORPORATION  |
| RRRC   | DIVISION OF SAFETY TECHNOLOGY (NRR)                                       | WH   | WESTINGHOUSE ELECTRIC CORPORATION   |
| RS     | REGULATORY REQUIREMENTS REVIEW COMMITTEE                                  |      |   |
| RSB    | REACTOR SAFETY (FORMER NRR BRANCH)  |      |   |
| RSB    | REACTOR SYSTEMS BRANCH, DIVISION OF SYSTEMS INTEGRATION (NRR)             |      |   |
| RSSMAP | REACTOR SAFETY STUDY METHODOLOGY APPLICATION PROGRAM                      |      |   |
| RV     | REACTOR VESSEL  |      |   |
| SAT    | SCIENCE APPLICATIONS, INC.  |      |   |
| SCC    | STRESS-CORROSION CRACKING   |      |   |



# PROGRAM STATUS

| USI NO.             | TITLE   | SCHEDULED COMPLETION DATE FROM LATEST APPROVED TASK ACTION PLAN | CURRENT SCHEDULED COMPLETION DATE | REMARKS  |
|---------------------|---|---|-----------------------------------|--|
| A-3,<br>A-4,<br>A-5 | STEAM GENERATOR TUBE INTEGRITY                | MAY 1984  | NOT SCHEDULED                     | A COMMISSION BRIEFING WAS HELD ON SEPTEMBER 10, 1984. THE COMMISSION APPROVED SECY-84-13B WITH THE EXCEPTION THAT A REVISED GENERIC LETTER TO PWR LICENSEES BE PREPARED BY FEBRUARY 12, 1985 FOR COMMISSION APPROVAL.  |
| A-17                | SYSTEMS INTER-ACTIONS IN NUCLEAR POWER PLANTS | MARCH 1986  | MAY 30, 1986                      | WORK ORIGINALLY PLANNED UNDER TAP A-17 AND TMI ACTION PLAN ITEM 11.C.3, SYSTEMS INTERACTION, WERE COMBINED UNDER USI A-17 AND A NEW TASK MANAGER APPOINTED. A REVISED TASK ACTION PLAN HAS BEEN APPROVED BY THE DIRECTOR, MWR. THE DRNL FINAL REPORT HAS BEEN COMPLETED. DRNL WILL BE REVIEWING POTENTIAL SEARCH METHODS FOR USE IN UNCOVERING ADVERSE SYSTEMS INTER-ACTION EVENTS AND IN ADDITION, DRNL WILL BE ASSESSING THE POTENTIAL SAFETY SIGNIFICANCE OF THE ADVERSE SYSTEMS INTERACTION EVENTS.  |
| A-40                | SEISMIC DESIGN CRITERIA                       | JANUARY 1985  | JANUARY 20, 1986                  | BRIDGEMAN AND LIVERMORE HAVE COMPLETED THEIR STUDIES OF INDIAN POINT 3 AND THE STAFF IS REVIEWING THE RESULTS.   |
| A-43                | CONFIDENTIAL EMERGENCY SURVIVAL PERFORMANCE   | SEPTEMBER 30, 1984  | MARCH 31, 1985                    | THE MRC STAFF INTERNAL REVIEW HAS BEEN COMPLETED. A VALUE/IMPACT ANALYSIS HAS BEEN PREPARED AND A CRGR SUBMITTAL PACKAGE IS UNDER REVIEW BY THE ACTING DIRECTOR OF THE DIVISION OF ENGINEERING AND EXPECTED TO BE FORWARDED TO CRGR BY MARCH 1, 1985.  |
| A-44                | STATION BLACKOUT                              | MAY 1985  | JANUARY 30, 1986                  | ALL TECHNICAL SUPPORT (NUREG/CR) REPORTS HAVE BEEN ISSUED. NUREG-0897 AND NUREG-0869 ALONG WITH SRP SECTION 6.2.2 WERE ISSUED FOR PUBLIC COMMENT IN MAY 1983. THE PUBLIC COMMENT PERIOD ENDED IN JULY 1983 AND THE COMMENTS RECEIVED WERE UTILIZED IN THE PREPARATION OF THE REVISED CRGR SUBMITTAL OF JUNE 14, 1984. THE REGULATORY ANALYSIS HAS BEEN REVISED TO REFLECT COMMENTS RECEIVED FROM THE JULY 11, 1984 CRGR MEETING AND A FOLLOWUP MEETING WITH CRGR WILL BE SCHEDULED SOON.<br><br>THE PROPOSED RULEMAKING PACKAGE HAS BEEN REVISED TO INCLUDE THE CRGR RECOMMENDATIONS. NUREG-1032, "EVALUATION OF STATION BLACKOUT ACCIDENTS AT NUCLEAR POWER PLANTS, TECHNICAL FINDINGS RELATED TO USI A-44," IS BEING PREPARED TO BE ISSUED FOR PUBLIC COMMENT. |

--- SCHEDULE CHANGE THIS REPORT

# PROGRAM STATUS

| USI NO. | TITLE   | SCHEDULED COMPLETION DATE FROM LATEST APPROVED TASK ACTION PLAN |                   | REMARKS  |
|---------|---|---|-------------------|--|
|         |   | FEBRUARY 1986   | FEBRUARY 28, 1986 |  |
| A-45    | SHUTDOWN DECAY HEAT REMOVAL REQUIREMENTS                                    |   |                   | PLANT VISITS FOR THE PURPOSE OF OBTAINING MISSING INFORMATION RELATIVE TO DHR SYSTEMS ANALYSES HAVE TAKEN PLACE AT POINT BEACH, TURKEY POINT, QUAD CITIES, ARKANSAS NUCLEAR NO. 1, TROJAN, COOPER AND ST. LUCIE.   |
| A-46    | SEISMIC QUALIFICATION OF EQUIPMENT IN OPERATING PLANTS                      | DECEMBER 1984   | JUNE 15, 1985*    | WORK ON ALL TASKS IS ESSENTIALLY COMPLETE WITH THE EXCEPTION OF TASK 4. AN INTERIM REPORT WHICH SUMMARIZES THE STATUS OF WORK ACCOMPLISHED ON A-46 WAS ISSUED AS NUREG-1018 IN OCTOBER 1983. THE A-46 CRGR PACKAGE (INCLUDING DRAFT NUREG-1030) WAS APPROVED BY THE DIRECTOR OF NRC ON OCTOBER 31, 1984 AND SENT TO CRGR FOR REVIEW AND APPROVAL ON NOVEMBER 1, 1984. A MEETING WAS HELD WITH CRGR ON DECEMBER 3, 1984. THE CRGR DECIDED THEY DID NOT HAVE ENOUGH INFORMATION TO MAKE A DECISION. THE CRGR PACKAGE IS BEING REVISED AND ADDITIONAL INFORMATION INCORPORATED PRIOR TO RE-SUBMITTING FOR CRGR REVIEW.  |
| A-47    | SAFETY IMPLICATIONS OF CONTROL SYSTEMS                                      | APRIL 1986  | APRIL 1, 1986     | DRAFT REPORT ON THE SAFETY IMPLICATIONS OF CONTROL SYSTEMS OF A B&W PWR DESIGN WAS SUBMITTED BY ORNL IN OCTOBER 1984.<br><br>PWR RISK ASSESSMENT DRAFT REPORTS ON CONTROL SYSTEMS FAILURES FOR GE WESTINGHOUSE, AND B&W DESIGNS HAVE BEEN SUBMITTED BY PNL FOR STAFF REVIEW.   |
| A-48    | HYDROGEN CONTROL MEASURES AND EFFECTS OF HYDROGEN BURNS ON SAFETY EQUIPMENT | JUNE 1986   | NOT SCHEDULED     | WORK ON THIS USI IS LIMITED TO THE GENERIC RESOLUTION OF HYDROGEN CONTROL AND EQUIPMENT QUALIFICATION FOR ICE CONDENSER AND BWR MARK III CONTAINMENTS. A COMMISSION PAPER REGARDING HYDROGEN CONTROL FOR MARK III AND ICE CONDENSER CONTAINMENT WAS REVIEWED AND ENDORSED BY THE CRGR ON JUNE 1, 1983. THE COMMISSION PAPER WAS FORWARDED ON TO THE COMMISSION ON AUGUST 26, 1983, AND ADDITIONAL INFORMATION PROVIDED ON DECEMBER 28, 1983. ON JANUARY 18, 1985, THE COMMISSION APPROVED ISSUANCE OF THE HYDROGEN FINAL RULE.<br><br>THE RESULTS OF THE LARGE SCALE HYDROGEN BURN TESTS CONDUCTED AT THE NEVADA TEST SITE SHOW POTENTIAL CHALLENGE TO EQUIPMENT SURVIVABILITY. THE STAFF'S PRELIMINARY EVALUATION OF THE DATA INDICATED THAT THE POSTULATED HYDROGEN BURN. FURTHER EVALUATION OF THE DATA IS PLANNED. |
| A-49    | PRESSURIZED THERMAL SHOCK   | DECEMBER 31, 1985   | MARCH 31, 1986    | NRC STAFF PROPOSED PTS RULE WAS APPROVED BY THE COMMISSION IN JANUARY 1984. THIS NEW PTS RULE WAS PUBLISHED FOR PUBLIC COMMENT ON FEBRUARY 7, 1984. THE PROPOSED FINAL RULE, TAKING THE PUBLIC COMMENTS INTO ACCOUNT, WILL BE SUBMITTED TO THE COMMISSION FOR APPROVAL IN MARCH 1985.  |

\*SCHEDULE CHANGE THIS REPORT

# USI'S FOR WHICH TECHNICAL RESOLUTION IS COMPLETE

IMPLEMENTATION  
TASK MANAGER/  
TELEPHONE NO.

| USI NO. | TITLE        | DATE COMPLETED | REPORTS PUBLISHED   | IMPLEMENTATION STATUS  |
|---------|--------------|----------------|---|--|
| A-1     | WATER HAMMER | MARCH 15, 1984 | MUREG-0927, REV. 1<br>MUREG-0933, REV. 1<br>SRP SECTIONS<br>3.9.3, REV. 1<br>3.9.4, REV. 2<br>5.4.6, REV. 3<br>5.4.7, REV. 3<br>6.3, REV. 2<br>9.2.1, REV. 3<br>9.2.2, REV. 2<br>10.3, REV. 3<br>10.4.7, REV. 3 | THE REVISED SRP SECTIONS WILL BE USED ONLY FOR REVIEW OF "CUSTOM PLANT" CONSTRUCTION PERMIT APPLICATIONS, AND FOR STANDARD PLANT APPLICATIONS DOCKETED AFTER THE ISSUANCE OF THESE SRP SECTION REVISIONS, WHICH ARE INTENDED FOR REFERENCING IN CONSTRUCTION PERMIT APPLICATIONS. (FORWARD FIT IMPLEMENTATION ONLY.) |

JIM SHEA  
492-7231

|     |   |               |            |   |
|-----|---|---------------|------------|---|
| A-2 | ASYMMETRIC BLOWDOWN<br>LOADS ON REACTOR<br>PRIMARY COOLANT<br>SYSTEMS | DECEMBER 1980 | MUREG-0609 | ALL PWR PLANT ASSESSMENTS FOR ASYMMETRIC LOADS HAVE BEEN RECEIVED AND HAVE BEEN EVALUATED BY THE STAFF AND EG&G. THE BASIS FOR THE EVALUATIONS WAS CRITERIA INCLUDED IN MUREG-0609. SER'S FOR ALL BAW OWNERS' GROUP PLANTS HAVE BEEN ISSUED. SER'S FOR THE COMBUSTION ENGINEERING OWNER'S GROUP PLANTS AND SER'S FOR THE PLANT-SPECIFIC SUBMITTALS HAVE BEEN DELAYED. SER'S FOR THE 4 CE PLANTS HAVE BEEN SENT TO OEL FOR COMMENT AND/OR APPROVAL. THE WESTINGHOUSE OWNERS GROUP "LEAK BEFORE BREAK" CONCEPT WAS APPROVED. THE " WAS THE SUBJECT OF 6L-84-04 DATED FEBRUARY 4, 1984. TACS FOR THE 16 AFFECTED PLANTS WERE CLOSED. MPA ITEM D-10 WILL BE CLOSED WHEN THESE REMAINING SER'S ARE ISSUED. THE CURRENT SCHEDULE SHOWS THAT THIS WILL OCCUR SEPTEMBER 30, 1985. |
|-----|---|---------------|------------|---|

# USI'S FOR WHICH TECHNICAL RESOLUTION IS COMPLETE

IMPLEMENTATION  
TASK MANAGER/  
TELEPHONE NO.

BYRON SIEGEL  
492-7534

BYRON SIEGEL  
492-7534

BYRON SIEGEL  
492-7534

DAVID PYATT, RES  
443-7631

| USI NO. | TITLE                                  | DATE COMPLETED           | REPORTS PUBLISHED  | IMPLEMENTATION STATUS  |
|---------|--|--------------------------|--|--|
| A-6     | MARK I SHORT TERM PROGRAM              | DECEMBER 1977            | NUREG-0408   | COMPLETE - ALL PLANT-UNIQUE ANALYSES AND EQUIPMENT MODIFICATIONS AS REQUIRED WERE REVIEWED AND ACCEPTED AND APPROPRIATE TECHNICAL SPECIFICATION CHANGES WERE MADE.   |
| A-7     | MARK I LONG TERM PROGRAM               | JULY 1980<br>AUGUST 1982 | NUREG-0661<br>NUREG-0661, SUPPL. NO. 1<br>SRP SECTION 6.2.1.1C           | LICENSEES ARE IN THE PROCESS OF OR HAVE INSTALLED MODIFICATIONS TO MEET THE COMMISSION'S ORDER DATE FOR EACH OPERATING PLANT. MORE THAN THREE QUARTERS OF THE PLANTS AFFECTED HAVE COMPLETED THESE MODIFICATIONS. THE LICENSEES HAVE SUBMITTED PLANT-UNIQUE ANALYSES TO THE STAFF FOR POST-IMPLEMENTATION AUDIT REVIEW FOR COMPLIANCE WITH THE ACCEPTANCE CRITERIA CONTAINED IN APPENDIX A TO NUREG-0461. OUR CONTRACTORS, BNL AND THE FRANKLIN RESEARCH CENTER, ARE REVIEWING THESE SUBMITTALS AND HAVE COMPLETED THE REVIEW FOR ELEVEN PLANTS AND SEVERAL HAVE BEEN ISSUED FOR THIRTEEN PLANTS. SEE MULTIPLANT ACTION ITEM D-01 IN NUREG-0740. |
| A-8     | MARK II CONTAINMENT POOL DYNAMIC LOADS | AUGUST 1981              | NUREG-0808<br>SRP SECTION 6.2.1.1C                                       | THE REQUIREMENTS RECOMMENDED IN NUREG-0808 ARE BEING IMPLEMENTED DURING THE OPERATING LICENSE REVIEW FOR EACH PLANT WITH A MARK II CONTAINMENT. THESE REQUIREMENTS HAVE ALSO BEEN INCLUDED AS AN ADDITION TO THE APPROPRIATE SECTION OF THE STANDARD REVIEW PLAN.  |
| A-9     | ATWS                                   | SEPTEMBER 1980           | NUREG-0460,<br>VOL. 4<br>PROPOSED RULE 46FR57521<br>FINAL RULE 49FR57521 | THE TECHNICAL FINDINGS FOR THIS ISSUE HAVE BEEN PUBLISHED IN NUREG-0460, "ANTICIPATED TRANSIENTS WITHOUT SCRAM FOR LIGHT WATER REACTORS," VOL. 4. A PROPOSED RULE BASED ON THIS WORK PLUS ADDITIONAL ANALYSIS WAS PUBLISHED FOR COMMENT. THE COMMENTS RECEIVED WERE ADDRESSED AND A FINAL RULE WAS AFFIRMED BY THE COMMISSION IN DECEMBER 1983. THE FINAL RULE WAS PUBLISHED IN JUNE 26, 1984. GUIDANCE FOR IMPLEMENTATION IS INCLUDED IN THE FINAL RULE.  |

USI'S FOR WHICH TECHNICAL RESOLUTION IS COMPLETE

IMPLEMENTATION  
TASK MANAGER/  
TELEPHONE NO.

ROBERT GILBERT  
492-7128

| USI NO. | TITLE                         | DATE COMPLETED | REPORTS PUBLISHED | IMPLEMENTATION STATUS   |
|---------|-------------------------------|----------------|-------------------|---|
| A-10    | BWR FEEDWATER NOZZLE CRACKING | NOVEMBER 1980  | NUREG-0619        | RESPONSES FROM LICENSEES TO AN IMPLEMENTATION LETTER HAVE BEEN RECEIVED AND RECOMMENDED TREATMENT OF THESE RESPONSES HAVE BEEN SUBMITTED TO NRC MANAGEMENT. ADDITIONAL INFORMATION HAS BEEN REQUESTED OF LICENSEES. ALL PLANTS HAVE RECEIVED LETTERS ACCEPTING THEIR PROPOSED MODIFICATION PLANS. VERMONT YANKEE'S OPERATION IS SUCH THAT NO FEEDWATER NOZZLES NEED BE INSTALLED. LASCROSSE, BIG ROCK POINT, AND DRESDEN 1 DO NOT HAVE SUSCEPTIBLE PLANT SYSTEM CONFIGURATIONS AND ARE CONSIDERED COMPLETE WITH REGARD TO THIS ACTION. HUMPHOLT DAY, BY VIRTUE OF ITS STATUS (SHUTDOWN, NO FORSEEABLE RESTART) IS ALSO CONSIDERED COMPLETE. COMPLETE - SEE MULTIPLANT ACTION ITEM B-25 IN NUREG-0748. |

AL DEGAZIO  
492-8945

GENERIC LETTER 82-26 TRANSMITTED THIS NUREG REPORT. NO FURTHER ACTION IS CONTEMPLATED.

AL DEGAZIO  
492-8945

THE PROPOSED A-12 RESOLUTION IMPLEMENTATION WILL APPLY TO NEW CONSTRUCTION ONLY, THROUGH A NEW SRP SECTION 5.3.4, WITH NO BACKFITTINGS. SRP SECTION 5.3.4 HAS BEEN REVISED BASED ON PUBLIC COMMENTS RECEIVED AND FURTHER REVIEW BY THE STAFF AND CRGR. THE REVISED SRP SECTION 5.3.4 IS PART OF AN ISSUANCE PACKAGE WHICH IS UNDERGOING FINAL REVIEW PRIOR TO SUBMITTAL TO THE EXECUTIVE DIRECTOR FOR OPERATIONS.

A-11 REACTOR VESSEL MATERIALS TOUGHNESS

OCT. 15, 1982

NUREG-0744  
VOLS. I AND II

A-12 STEAM GENERATOR AND REACTOR COOLANT PUMP SUPPORTS

OCT. 11, 1983

NUREG-0577,  
REVISION 1  
SRP SECTION  
5.3.4

## USI'S FOR WHICH TECHNICAL RESOLUTION IS COMPLETE

IMPLEMENTATION  
TASK MANAGER/  
TELEPHONE NO.

JOSE CALVO  
492-8563

AL DEAGAZIO  
492-8945

DON NEIGHDMS  
492-4837

| USI NO. | TITLE  | DATE COMPLETED | REPORTS PUBLISHED   | IMPLEMENTATION STATUS   |
|---------|--|----------------|---|---|
| A-24    | QUALIFICATION OF CLASS 1E SAFETY RELATED EQUIPMENT | AUGUST 1981    | NUREG-0588<br>NEW RULE<br>48FR2729  | EOB HAS THE LEAD IN IMPLEMENTING THE POSITIONS IDENTIFIED IN THE REPORT. SEE MULTIPLANT ACTION ITEM B-60 IN NUREG-0748.   |
| A-26    | REACTOR VESSEL PRESSURE TRANSIENT PROTECTION       | SEPTEMBER 1978 | NUREG-0224<br>SRP SECTION 5.2   | ALL PLANTS WERE REQUESTED TO PROVIDE AN OVER-PRESSURE PREVENTION SYSTEM THAT WOULD BE USED WHENEVER THE PLANT WAS IN A COLD SHUTDOWN CONDITION. ALL PWRs IMPLEMENTED THEIR SYSTEMS WITH PRELIMINARY APPROVAL FROM THE NRC, AND A COMPLETE REVIEW TOOK PLACE ON A POST-IMPLEMENTATION BASIS. ONE LICENSING ACTION REMAINS TO BE COMPLETED. SEE MULTIPLANT ACTION ITEM B-04 IN NUREG-0748.  |
| A-31    | RESIDUAL HEAT REMOVAL REQUIREMENTS                 | MAY 1978       | REGULATORY GUIDE<br>1.139<br>SRP SECTION 5.4.7<br>REGULATORY GUIDE<br>(DRAFT) 1.113 | RRRC APPROVED IMPLEMENTATION PLAN OF JANUARY 31, 1978 IS BEING IMPLEMENTED ON NTOLS DURING THE REVIEW PROCESS. NO BACKFIT TO OPERATING REACTORS IS PLANNED.   |
| A-36    | CONTROL OF HEAVY LOADS NEAR SPENT FUEL             | JULY 1980      | NUREG-0612<br>SRP SECTION<br>9.1.5  | IMPLEMENTATION REQUIREMENTS WERE ISSUED TO ALL LICENSEES BY LETTER DATED DECEMBER 22, 1980. THE LETTER REQUESTED: INTERIM ACTIONS TO BE COMPLETED IN 90 DAYS, A PHASE I ACTION (REPORT, CONFIRMATION AND JUSTIFICATION) IN SIX MONTHS AND PHASE II (SPECIFIC REQUIREMENTS) IN NINE MONTHS. ALL LICENSEES HAVE RESPONDED TO THE DECEMBER 22, 1980 GENERIC LETTER AND THEIR RESPONSES ARE BEING EVALUATED. AS OF FEBRUARY 22, 1985, ALL BUT 11 PHASE I REVIEWS HAVE BEEN COMPLETED AND IT IS ANTICIPATED TO COMPLETE THE REST IN FY-85. MPA C-15 HAS BEEN ESTABLISHED FOR PHASE II, AND 20 FACILITIES ARE BEING REVIEWED IN A PILOT PROGRAM. IT IS EXPECTED TO CLOSE OUT PHASE II IN FY-85. |

**USI'S FOR WHICH TECHNICAL RESOLUTION IS COMPLETE**

IMPLEMENTATION  
TASK MANAGER/  
TELEPHONE NO.

BYRON SIEBEL  
492-7534

DICK CLARK  
492-7162

| USI NO. | TITLE  | DATE COMPLETED   | REPORTS PUBLISHED  | IMPLEMENTATION STATUS   |
|---------|--|--|--|---|
| A-39    | DETERMINATION OF SAFETY RELIEF VALVE (SRV) POOL DYNAMIC LOADS AND TEMPERATURE LIMITS FOR BWR CONTAINMENT | MARK I -02-29-80<br>MARK II -09-30-82<br>MARK III-10-14-82 | NUREG-0763<br>NUREG-0783<br>NUREG-0802<br>SRP SECTION 2.1.1C | GENERIC LETTERS TRANSMITTING THESE NUREGS TO BWR APPLICANTS AND LICENSEES HAVE BEEN ISSUED. IMPLEMENTATION ON MARK I PLANTS IS PART OF USI A-7. IMPLEMENTATION ON MARK II AND MARK III PLANTS IS BEING PERFORMED DURING THE OPERATING LICENSE REVIEW FOR EACH PLANT.  |
| A-42    | PIPE CRACKS IN BOILING WATER REACTORS  | JULY 1980  | NUREG-0313, REV. 1   | IN FEBRUARY 1981, NUREG-0313, REV. 1 WAS ISSUED TO ALL HOLDERS OF BWR OPERATING LICENSES OR CONSTRUCTION PERMITS AND TO ALL APPLICANTS FOR OPERATING LICENSES. BY JULY 1, 1981, THE APPLICANTS/LICENSEES WERE TO PROVIDE THEIR PROGRAM FOR REPLACEMENT OF SERVICE SENSITIVE LINES AND WELDS, THEIR PROGRAM FOR AUGMENTED INSERVICE INSPECTION, THEIR PROGRAM FOR IMPROVING THE WATER CHEMISTRY ENVIRONMENT AND INCORPORATION OF ADEQUATE LEAK DETECTION CAPABILITY. BASED ON OUR REVIEW OF THE INSPECTIONS AND OTHER ACTIONS TAKEN BY BWR LICENSEES TO DETECT AND MINIMIZE INTERGRANULAR STRESS CORROSION CRACKING, WE HAVE SENT LETTERS TO ALL OPERATING BWR LICENSEES ADVISING THEM THAT A-42 HAS BEEN SATISFACTORILY RESOLVED FOR THEIR FACILITIES. THIS ISSUE IS NOW CONSIDERED COMPLETE. |

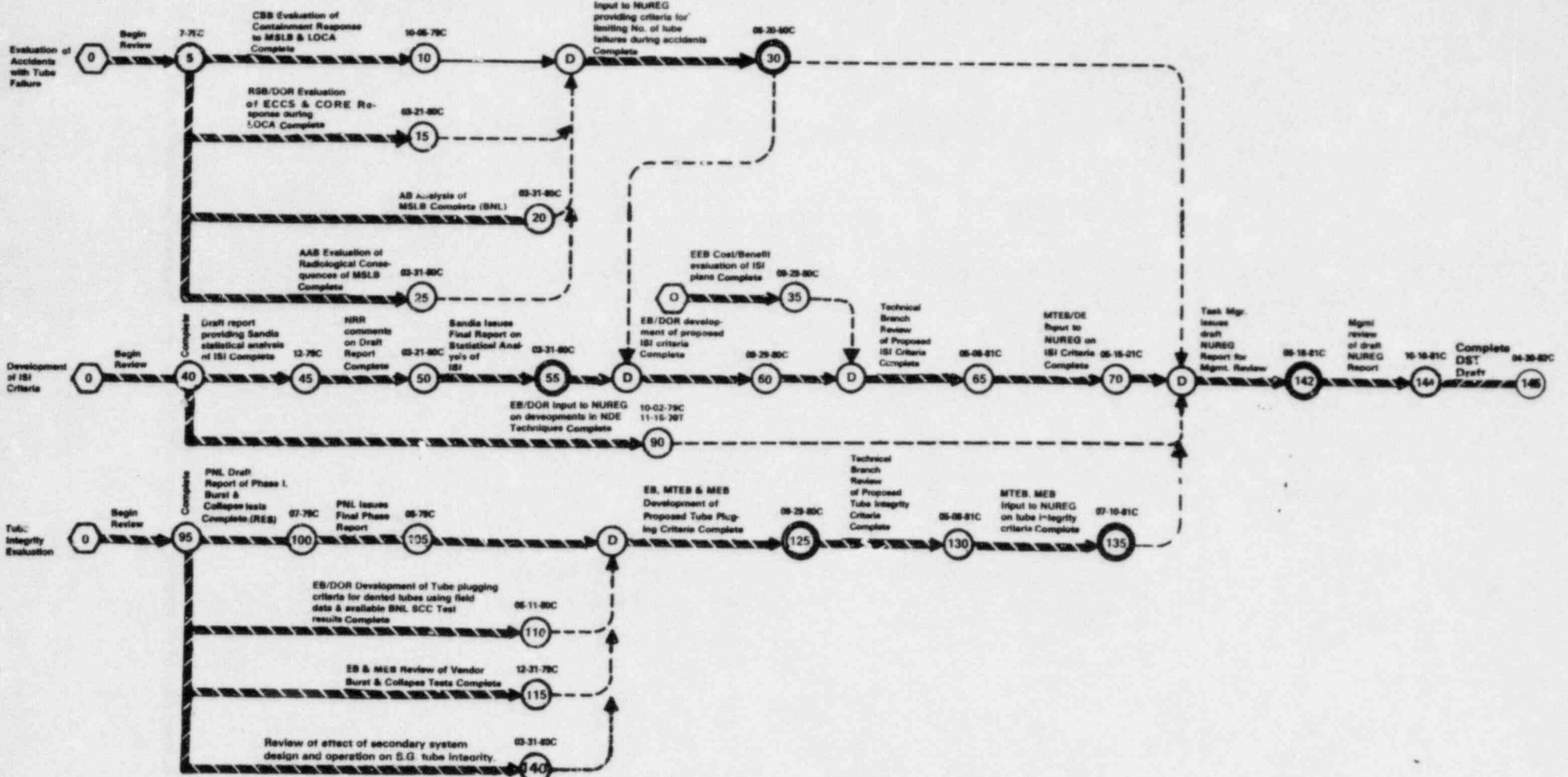
# WEST., CE & B&W STEAM GENERATOR TUBE INTEGRITY (A-3, A-4, A-5)

AS OF WEEK ENDING FEBRUARY 15, 1985

| KEY PERSONNEL  | TASK REVIEWERS   | SCHEDULED COMPLETION  |  |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
|--|--|---|--|------------|-----------|---------------|--------|--|----------|----------|-------------|--------|----------|----------|------------------|---------|---|
| <b>TASK MANAGER*</b><br>P. NORRIS X27487<br><br><i>Paul Norris</i><br><br><b>NRR ANALYST</b><br>JUDY BUTTS X24822  | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>NAME</th> <th>BRANCH</th> </tr> </thead> <tbody> <tr> <td>E. MURPHY</td> <td>ORAB/DL</td> </tr> <tr> <td>C. PARSZEWSKI</td> <td>CEB/DE</td> </tr> </tbody> </table>   | NAME  | BRANCH   | E. MURPHY  | ORAB/DL   | C. PARSZEWSKI | CEB/DE | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>J. RAJAN</th> <th>MEB/DE</th> </tr> </thead> <tbody> <tr> <td>B. TUROVLIN</td> <td>CEB/DE</td> </tr> <tr> <td>F. ODAR</td> <td>ADB/RSR</td> </tr> <tr> <td># F. AKSTULEWICZ</td> <td>ORBS/DL</td> </tr> </tbody> </table> | J. RAJAN | MEB/DE   | B. TUROVLIN | CEB/DE | F. ODAR  | ADB/RSR  | # F. AKSTULEWICZ | ORBS/DL | <b>SCHEDULED COMPLETION</b><br><br>1977 ANNUAL REPORT <u>Early 1980</u><br><br>CURRENT <u>Not Scheduled</u> |
| NAME   | BRANCH   |   |  |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
| E. MURPHY  | ORAB/DL  |   |  |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
| C. PARSZEWSKI  | CEB/DE   |   |  |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
| J. RAJAN   | MEB/DE   |   |  |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
| B. TUROVLIN  | CEB/DE   |   |  |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
| F. ODAR  | ADB/RSR  |   |  |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
| # F. AKSTULEWICZ   | ORBS/DL  |   |  |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
| <b>* PROBLEM DESCRIPTION</b><br><br>Pressurized water reactor steam generator tube integrity can be degraded by corrosion induced wastage, cracking, reduction in tube diameter (denting) and vibration induced fatigue cracks. The primary concern is the capability of degraded tubes to maintain their integrity during normal operation and under accident conditions (LOCA or a main steam line break) with adequate safety margins.<br><br>Westinghouse and Combustion Engineering steam generator tubes have suffered degradation due to wastage and stress corrosion cracking. Both types of degradation have been decreased by conversion from phosphate to an all-rotative secondary water treatment. Degradation due to denting which leads to primary side stress corrosion cracking continues to be a problem.<br><br>B&W's once-through steam generators (OTSG's) were generally free of trouble prior to the first tube leak incident at Oconee Unit 3 in July, 1976. Since then, all three Oconee units have experienced tube leak incidents. The leaks at the Oconee units are the result of cracks of unknown origins propagated in the circumferential direction by flow induced vibration and have been limited to tubes located adjacent to the open tube inspection lane.<br><br>A second form of degradation characterized as an erosion-cavitation phenomena has been observed at Oconee and other B&W units.<br><br><br><br><br><br><br><br><br><br>*The staff contact for the Division of Licensing's integrated steam generator program is Emmett Murphy, X27487. | <b>* RES INTERFACE INFORMATION</b><br><br>A. RES has funded, at the request of NRR, a major confirmatory program at PNL. The activity of this program consists of tests to verify the burst and cyclic strengths of degraded steam generator tubes and the leak rate data.<br>B. RES is funding a program addressing the factors which determine Inconel 600 susceptibility to stress corrosion cracking in primary water. Natural condition, chemistry, temperature, stress and environment will be considered. | <b>* TECHNICAL ASSISTANCE CONTRACTS</b><br><br>The following technical assistance contracts are generic in nature and will be applicable to the three Category "A" Technical Activities (A-3, A-4, and A-5) related to PWR steam generators.<br>A. SANDIA - Provide statistical analysis of steam generator tube failures in operating reactors in order to establish the bases for the sampling plan for inservice inspection. Completed.<br>B. BNL - Provide necessary computer code and perform parametric evaluation of effects of tube failures concurrent with MSLB. Completed.<br>C. BNL - Provide technical consultation and assistance to review information in areas of water chemistry and corrosion analysis, stress and/or burst strength calculations. Completed.<br>D. PNL - Provide cost/benefit evaluation of ISI plans. Completed.<br>E. PNL - Evaluate environmental consequences of multiple tube failures concurrent with MSLB. Completed. | <b>* POTENTIAL PROBLEMS</b><br><br>The ACRS letter dated October 18, 1983 stated that the proposals should be recommended industry actions and not new requirements.<br><br><br><br><br><br><br><br><br><br><b>* STATUS SUMMARY</b><br><br>The NRC has formed a Task Force under the Division of Licensing to prepare its proposed requirements regarding steam generator tube integrity. These requirements will include new concerns resulting from the Ginna tube failure (such as loose parts in the secondary system and plant response to SG tube failures) and also corrosion related failure mechanisms. The recommendations prepared by the staff under USI A.3, 4, 5 were primarily concerned with corrosion mechanisms such as wastage and denting. Consequently, as discussed with the Commission on June 30, 1982, the requirements from the USI program will be incorporated in the overall set of requirements being developed to address tube failures.<br><br>The proposed requirements were discussed with the Steam Generator Owners' Group on July 29, 1982; comments from the group were received September 30, 1982.<br><br>Science Applications, Inc. performed a Value/Impact analysis of the recommendations and issued their final draft report on September 23, 1982. This report was sent to all PWR vendors and licensees for comment.<br><br>The report has been transmitted to CRGR and meetings were held on September 14, 1983 and October 24, 1983. An ACRS meeting was held on October 13, 1983. A Commission briefing was held on September 10, 1984. Additional information was sent to the Commission in SECY-84-138, dated November 5, 1984. The Commission approved SECY-84-138 with the exception that a revised generic letter to PWR licensees be prepared by February 12, 1985, for Commission approval. |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
|  | <b>* ACRS INTERFACE INFORMATION</b><br><br>The current status of this program was discussed with the ACRS Metal Components Subcommittee on January 28, 1983 and September 12, 1983. A meeting with the full ACRS was held on October 13, 1983.   | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>FIN NO.</th> <th>CONTRACTOR</th> <th>OBLIGATED</th> <th>EXPENDED</th> </tr> </thead> <tbody> <tr> <td>2314</td> <td>PNL</td> <td>\$75,000</td> <td>\$75,000</td> </tr> <tr> <td>B2315</td> <td>PNL</td> <td>\$95,000</td> <td>\$95,000</td> </tr> </tbody> </table>  | FIN NO.  | CONTRACTOR | OBLIGATED | EXPENDED      | 2314   | PNL  | \$75,000 | \$75,000 | B2315       | PNL    | \$95,000 | \$95,000 |                  |         |   |
| FIN NO.  | CONTRACTOR   | OBLIGATED   | EXPENDED   |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
| 2314   | PNL  | \$75,000  | \$75,000   |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |
| B2315  | PNL  | \$95,000  | \$95,000   |            |           |               |        |  |          |          |             |        |          |          |                  |         |   |



# WEST., CE & B&W STEAM GENERATOR TUBE INTEGRITY (A-3, A-4, & A-5)



**FINAL REPORT AND SCHEDULE SUPERCEDED BY TASK REPORT — SEE STATUS SUMMARY**

# SYSTEMS INTERACTIONS IN NUCLEAR POWER PLANTS (A-17)

AS OF WEEK ENDING FEBRUARY 15, 1985

## SCHEDULED COMPLETION

1978 ANNUAL REPORT Phase I - 09-79

CURRENT 06-30-86

### KEY PERSONNEL

#### TASK MANAGER

DALE THATCHER X29648

*Dale Thatcher*

#### NRR ANALYST

JUDY BUTTS X24822

### TASK REVIEWERS

NAME BRANCH

E. CHELLIAH RRAB/DST

C. MORRIS RRAB/DST

F. COFFMAN RRAB/DST

### • PROBLEM DESCRIPTION

The design of a nuclear power plant is accomplished by groups of engineers and scientists organized into engineering disciplines and into scientific disciplines. The reviews performed by the designers include interdisciplinary reviews to assure the functional compatibility of the plant structures, systems, and components. Safety reviews and accident analyses provide further assurance that system functional requirements will be met. These reviews include failure mode analyses.

The NRC review and evaluation of safety systems is accomplished in accordance with the Standard Review Plan (SRP) which assigns primary and secondary review responsibilities to organizational units arranged by plant systems or by disciplines. Each element of the SRP is assigned to an organizational unit for primary responsibility and, where appropriate, to other units for secondary responsibilities.

Thus, the design and analyses by the plant designers, and the subsequent review and evaluation by the NRC staff take into consideration the interdisciplinary areas of concern and account for systems interaction to a large extent. Furthermore, many of our regulatory criteria are aimed at controlling the risks from systems interactions. Examples include the single failure criterion and separation criteria.

Nevertheless, there is some question regarding the interaction of various plant systems, both as to the supporting roles such systems play and as to the effect one system can have on other systems, particularly with regard to whether actions or consequences could adversely affect the presumed redundancy and independence of safety systems.

The problem to be resolved by this task is to identify where the present design, analysis, and review procedures may not acceptably account for potentially adverse systems interaction and to recommend the regulatory action that should be taken.

### • RES INTERFACE INFORMATION

The Division of Risk Analysis has been consulted during the development and execution of this plan.

### • ACRS INTERFACE INFORMATION

A meeting with the combined ACRS Subcommittees on Reliability and Risk Assessment and Extreme External Phenomena was held on 03/13/83 to describe the status of the program.

A meeting with the ACRS Subcommittee on Probabilistic Assessment was held on July 8, 1983. Subsequently, the ACRS wrote a letter critical of the staff program.

A meeting was held on November 18, 1983 with the full committee for the purpose of discussing the revised staff program.

An ACRS Subcommittee meeting was held on November 14, 1984 for the purpose of discussing the status of the A-17 program. It is anticipated that an additional ACRS meeting will be requested by the staff to discuss the draft technical resolution.

### • TECHNICAL ASSISTANCE CONTRACTS

LLNL - LLNL performed a systems interaction review of a portion of the Indian Point-3 plant using the Digraph Matrix method.

BNL - BNL performed a systems interaction review of a portion of the Indian Point-3 plant using Fault Tree combined with a Failure Mode and Effect Analysis.

ORNL - ORNL reviewed a number of information sources (including LERs) to gather information on experienced and hypothesized system interaction events. From this information, an evaluation was made to establish trends and patterns among the events.

ORNL - ORNL is also investigating search methods which could be used to uncover system interaction events. A draft letter report was submitted January 17, 1985.

ORNL - ORNL is estimating potential risk significance and cost for resolution of adverse systems interactions.

### FIN NO. CONTRACTOR OBLIGATED EXPENDED

|          |      |          |          |
|----------|------|----------|----------|
| # A-0446 | LLNL | \$1,000K | \$1,000K |
| # A-3725 | BNL  | \$1,000K | \$1,000K |
| # B-0789 | ORNL | \$ 840K  | \$ 800K  |

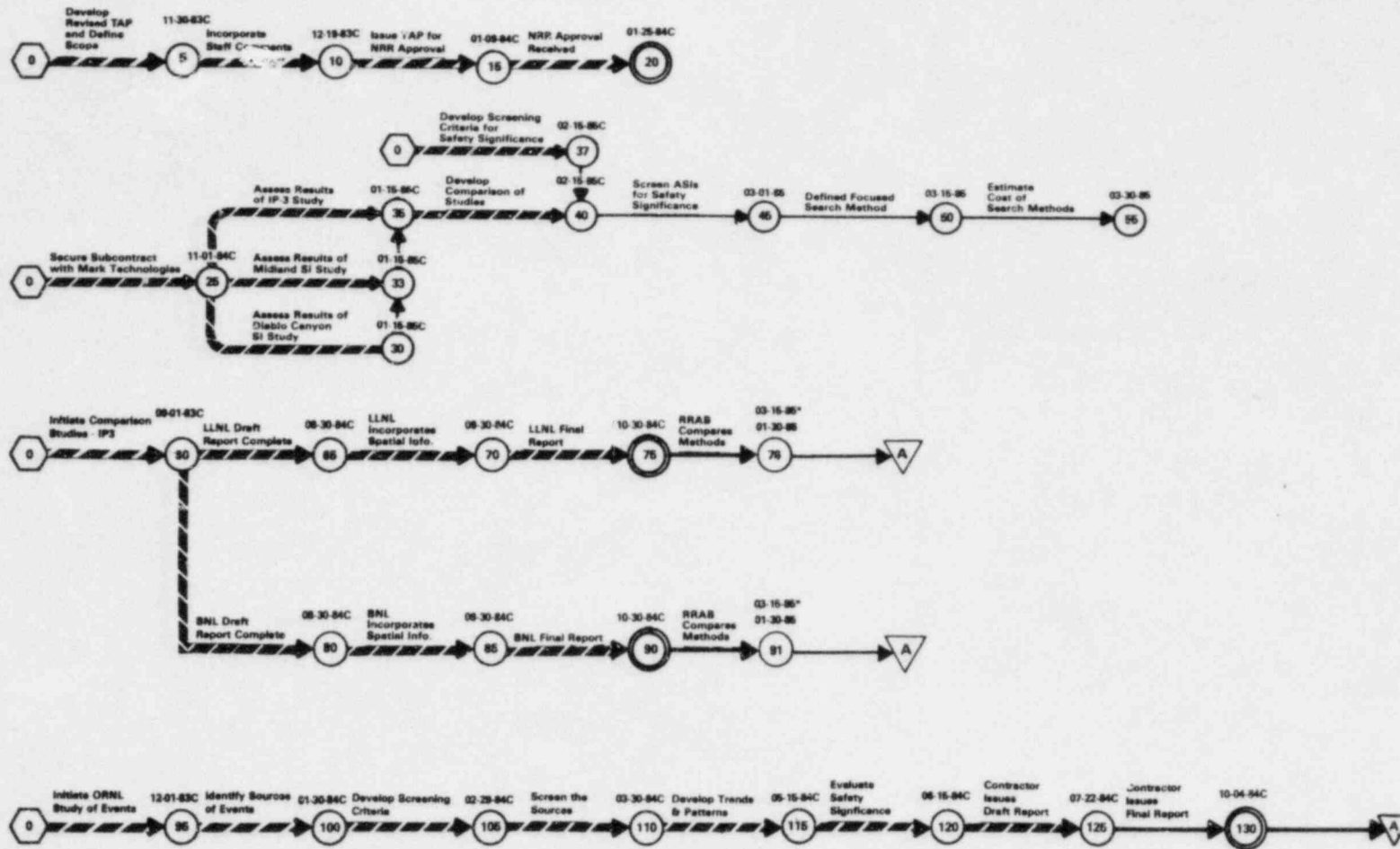
### • POTENTIAL PROBLEMS

### • STATUS SUMMARY

Responsibility for resolution of USI A-17 was transferred to the Generic Issues Branch of the Division of Safety Technology in September 1983 and a full-time Task Manager was assigned. The Task Action Plan has subsequently been revised and has been approved by the Director, NRR. The ORNL final report on events has been completed. ORNL will be reviewing potential search methods for use in uncovering adverse systems interaction events and, in addition, ORNL will be assessing the potential safety significance of the adverse systems interaction events.

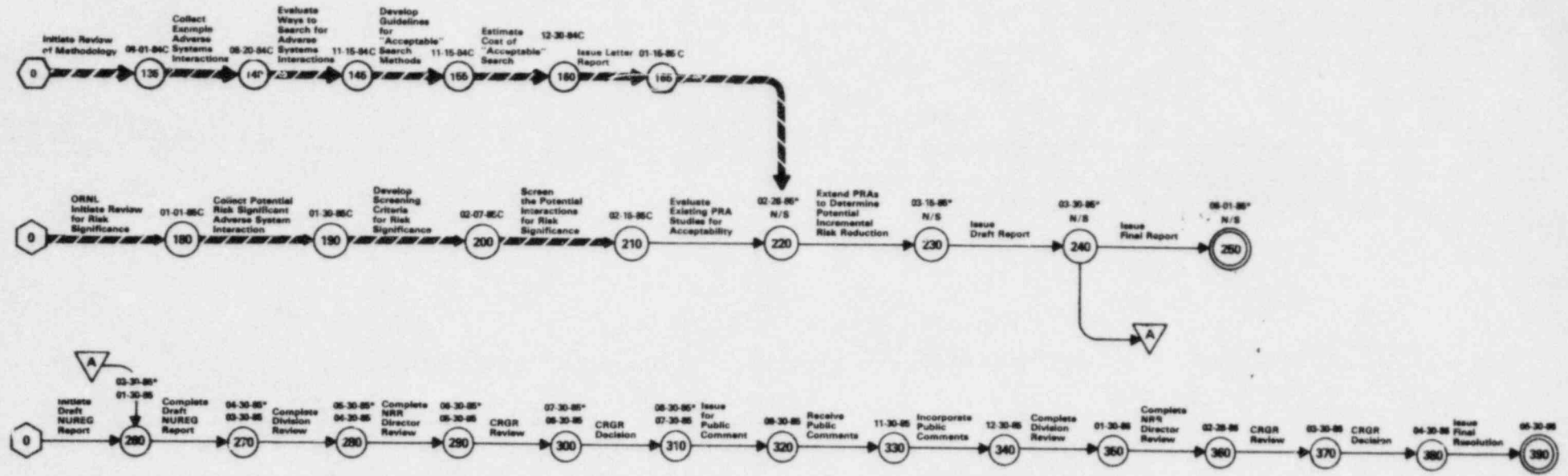
Brookhaven and Livermore have completed their studies of Indian Point 3 and the staff is reviewing the results.

# SYSTEMS INTERACTIONS IN NUCLEAR POWER PLANTS (A-17) Continued



\* Schedule Change This Report.

# SYSTEMS INTERACTIONS IN NUCLEAR POWER PLANTS (A-17) Continued



N/S = Not Scheduled  
 \* Schedule Change This Report

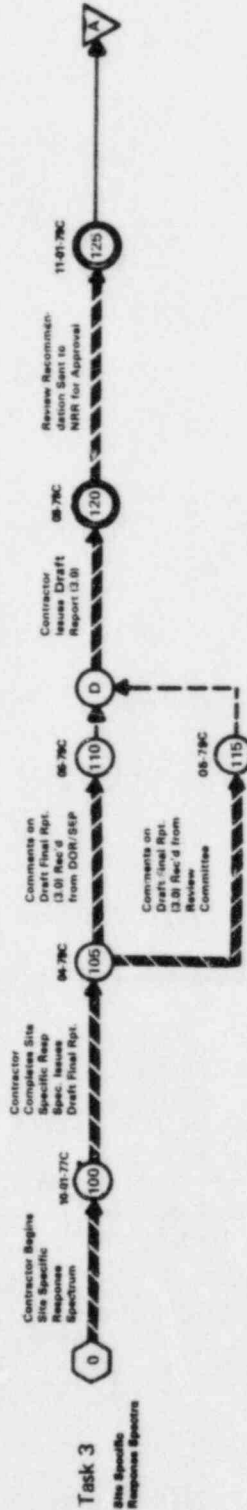
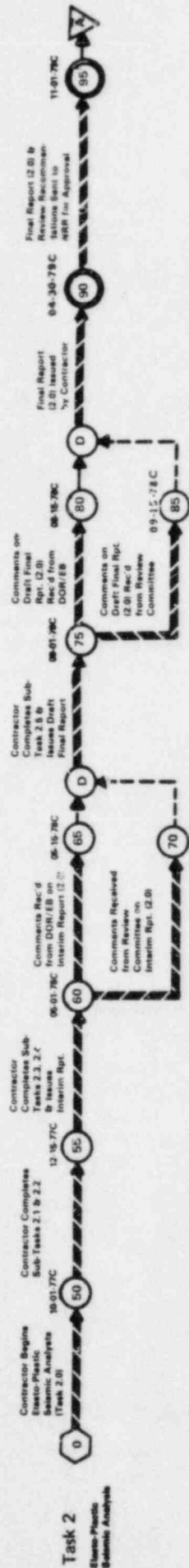
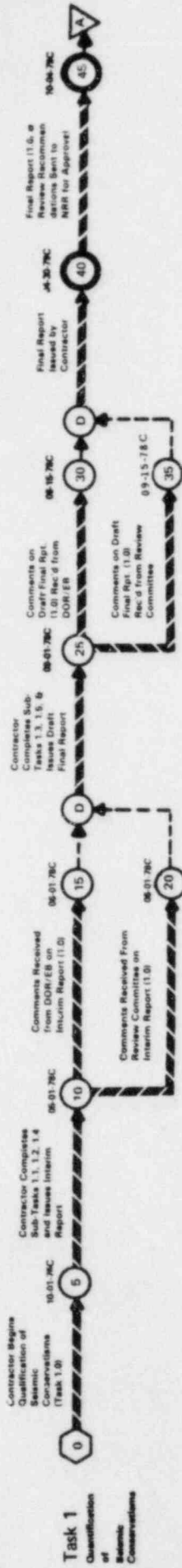
# SEISMIC DESIGN CRITERIA - SHORT TERM PROGRAM (A-40)

AS OF WEEK ENDING FEBRUARY 15, 1985

| KEY PERSONNEL  | TASK REVIEWERS   | G. BAGCHI  | EQB/DE  | SCHEDULED COMPLETION |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
|--|--|--|---|----------------------|----------|-----------|--------|----------|---------|---|----------|----------|--|--|--|--|--|--|---|--------------------|----------------|-----------------|---------|------------|--|
| <b>TASK MANAGER</b><br>SYED SHAUKAT X24216<br><br><i>Syed K. Shaikat</i><br><br><b>NRR ANALYST</b><br>JUDY BUTTS X24822  | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>NAME</th> <th>BRANCH</th> </tr> </thead> <tbody> <tr> <td>N. CHOKSHI</td> <td>SGEB/DE</td> </tr> <tr> <td>L. REITER</td> <td>GSB/DE</td> </tr> <tr> <td>P. SOBEL</td> <td>GSB/DE</td> </tr> </tbody> </table> | NAME   | BRANCH  | N. CHOKSHI           | SGEB/DE  | L. REITER | GSB/DE | P. SOBEL | GSB/DE  | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>T. CHENG</th> <th>SEPBI/DL</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> | T. CHENG | SEPBI/DL |  |  |  |  |  |  | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>1978 ANNUAL REPORT</th> <th>PHASE I - 1979</th> <th>PHASE II - 1981</th> </tr> </thead> <tbody> <tr> <td>CURRENT</td> <td># 01-20-85</td> <td> </td> </tr> </tbody> </table> | 1978 ANNUAL REPORT | PHASE I - 1979 | PHASE II - 1981 | CURRENT | # 01-20-85 |  |
| NAME   | BRANCH   |  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| N. CHOKSHI   | SGEB/DE  |  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| L. REITER  | GSB/DE   |  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| P. SOBEL   | GSB/DE   |  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| T. CHENG   | SEPBI/DL   |  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
|  |  |  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
|  |  |  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
|  |  |  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| 1978 ANNUAL REPORT   | PHASE I - 1979   | PHASE II - 1981  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| CURRENT  | # 01-20-85   |  |   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| <p>• <b>PROBLEM DESCRIPTION</b></p> <p>The seismic design process required by current NRC criteria includes the following sequence of events:</p> <ol style="list-style-type: none"> <li>Define the magnitude or intensity of the earthquake which will produce the maximum vibratory ground motion at the site (the safe shutdown earthquake or SSE).</li> <li>Determine the free-field ground motion at the site that would result if the SSE occurred.</li> <li>Determine the motion of site structures by modifying the free-field motion to account for the interaction of the site structures with the underlying foundation soil.</li> <li>Determine the motion of the plant equipment supported by the site structures.</li> <li>Compare the seismic loads, in appropriate combination with other loads, on structures, systems, and components important to safety, with the allowable loads.</li> </ol> <p>While this seismic design sequence includes many conservative factors, certain aspects of the sequence may not be conservative for all plant sites. At present, it is believed that the overall sequence is adequately conservative. The objective of this program is to investigate selected areas of the seismic design sequence to determine their conservatism for all types of sites, to investigate alternate approaches to parts of the design sequence, to quantify the overall conservatism of the design sequence, and to modify the NRC criteria in the Standard Review Plan if changes are found to be justified. In this manner, this program will provide additional assurance that the health and safety of the public is protected, and if possible, reduce costly design conservatisms by improving (1) current seismic design requirements, (2) NRR's capability to quantitatively assess the overall adequacy of seismic design for nuclear plants in general.</p> | <p>• <b>RES INTERFACE INFORMATION</b></p> <p>None.</p>   | <p>• <b>TECHNICAL ASSISTANCE CONTRACTS</b></p> <p>Lawrence Livermore National Laboratory (LLNL), under contract to RES, reviewed all reports by 04-30-79. LLNL report on recommendations for changes to the seismic design criteria was completed on 12-29-79. (NUREG/CR-1161).</p> <p>LLNL has performed the value/impact analysis on proposed requirements developed from the A-40 technical findings. LLNL report was completed and issued in August 1984 as NUREG/CR-3480.</p> | <p>• <b>POTENTIAL PROBLEMS</b></p> <p>None.</p> |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| <p>• <b>ACRS INTERFACE INFORMATION</b></p> <p>None.</p>  | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>FIN NO.</th> <th>CONTRACTOR</th> <th>OBLIGATED</th> <th>EXPENDED</th> </tr> </thead> <tbody> <tr> <td>A-0441</td> <td>LLNL</td> <td>\$136 K</td> <td>\$136 K</td> </tr> </tbody> </table>                     | FIN NO.  | CONTRACTOR                                      | OBLIGATED            | EXPENDED | A-0441    | LLNL   | \$136 K  | \$136 K | <p>• <b>STATUS SUMMARY</b></p> <p># The CRGR package is under review by the Acting Director of Engineering and expected to be forwarded to CRGR by March 1, 1985.</p>   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| FIN NO.  | CONTRACTOR   | OBLIGATED  | EXPENDED  |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |
| A-0441   | LLNL   | \$136 K  | \$136 K   |                      |          |           |        |          |         |   |          |          |  |  |  |  |  |  |   |                    |                |                 |         |            |  |

# SEISMIC DESIGN CRITERIA - SHORT TERM PROGRAM (A-40)

Phase 1

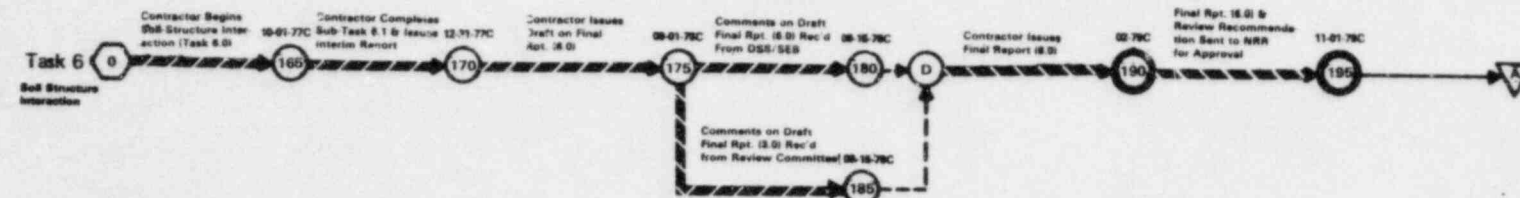
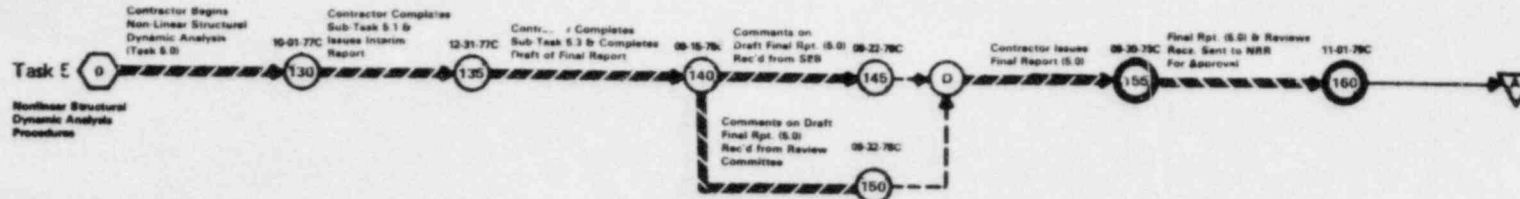


**Task 4 Deleted**  
Seismic After Shock

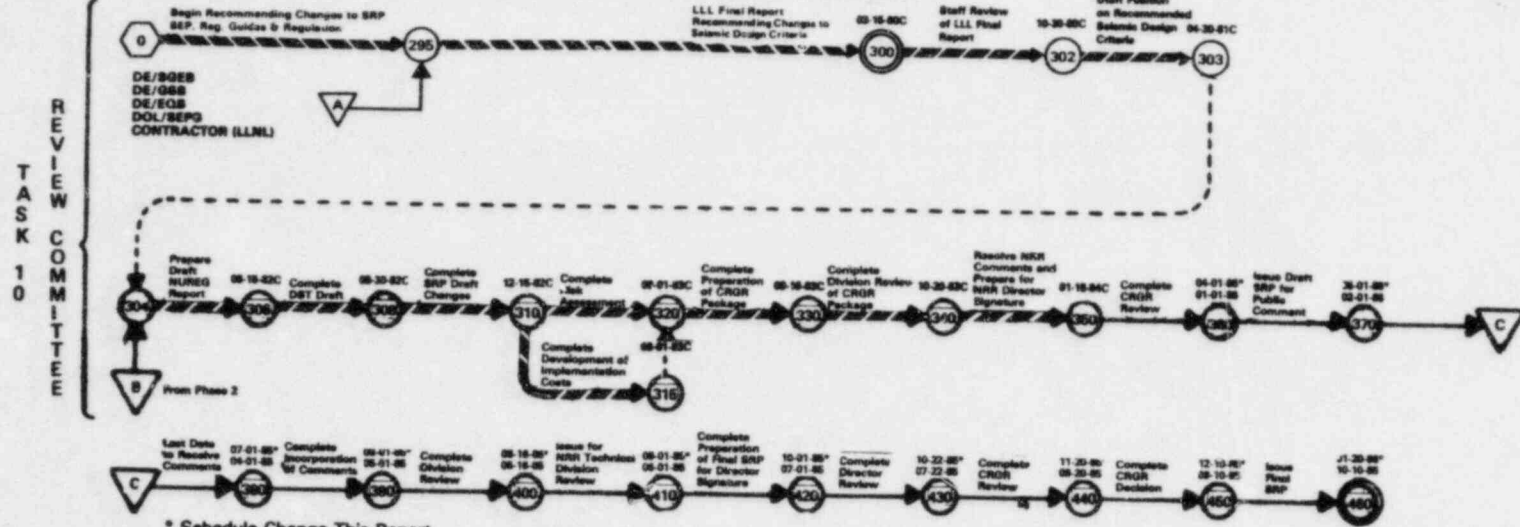
# SEISMIC DESIGN CRITERIA - SHORT TERM PROGRAM (A-40)

CONTINUED

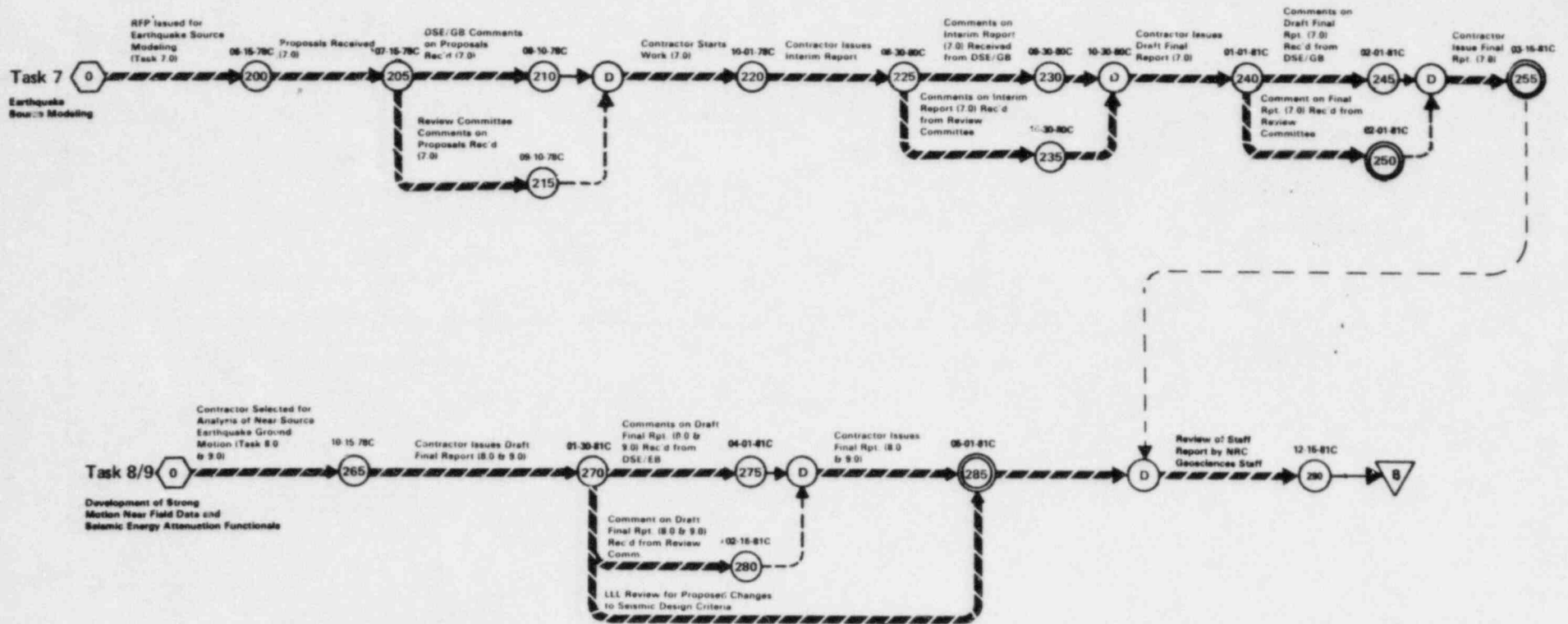
(Phase 1 Cont.)



**Reviews, Comments and Recommendations on Task 1.0 - 6.0 By Review Committee**



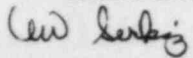
# SEISMIC DESIGN CRITERIA - SHORT TERM PROGRAM (A-40) CONTINUED





# CONTAINMENT EMERGENCY SUMP PERFORMANCE (A-43)

AS OF WEEK ENDING FEBRUARY 15, 1985

| KEY PERSONNEL   | TASK REVIEWERS  | SCHEDULED COMPLETION  |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
|---|---|---|--|---------|------------|-----------|----------|---------------|---------|-----------------|------------|-------|--------|-----------|-----------|-------|--------|-----------|-----------|---------------|--|--|--|-------|--------|-----------|-----------|-------|--------|-----------|-----------|---------------|--|--|--|-------|--------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|---------------|--|--|--|-------|--------|---------|-----------|---------|-----------|
| <b>TASK MANAGER</b><br>ALECK W. SERKIZ X24217<br>  | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>NAME</th> <th>BRANCH</th> </tr> </thead> <tbody> <tr> <td>S. DIAB</td> <td>RSB/DEI</td> </tr> <tr> <td>P. NORIAN</td> <td>GIB/DST</td> </tr> <tr> <td>W. BUTLER</td> <td>CSB/DSI</td> </tr> </tbody> </table>  | NAME  | BRANCH   | S. DIAB | RSB/DEI    | P. NORIAN | GIB/DST  | W. BUTLER     | CSB/DSI | <b>ORIGINAL</b> | April 1982 |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| NAME  | BRANCH  |   |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| S. DIAB   | RSB/DEI   |   |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| P. NORIAN   | GIB/DST   |   |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| W. BUTLER   | CSB/DSI   |   |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| <b>NRR ANALYST</b><br>JUDY BUTTS X24822   |   | <b>CURRENT</b>  | 03-31-85   |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| <p><b>• PROBLEM DESCRIPTION</b></p> <p>Following a Loss of Coolant Accident (LOCA) in a PWR, water flowing from the break in the primary system would collect on the floor of containment. During the injection mode, water for core cooling and containment spray is drawn from a large supply tank. When the water reached a low level in the tank, pumps are realigned to draw from the containment. This is called the recirculation mode wherein water is drawn from the containment floor or sump and pumped to the primary system or containment spray headers. This program addresses the safety issue of adequate sump or suppression pool function in the recirculation mode. It is the objective of this program to develop improved criteria for design, testing, and evaluation which will provide better assurance that emergency sumps will function to satisfy system requirements.</p> <p>The principal concerns are somewhat interrelated but are best discussed separately. One deals with the various kinds of insulation used on piping and components inside of containment. The concern being that break-initiated debris from the insulation could cause blockage of the sump or otherwise adversely affect the operation of the pumps, spray nozzles, and valves of the safety systems.</p> <p>The second deals with the hydraulic performance of the sump as related to the hydraulic performance to safety systems supplied therefrom. Preoperational tests have been performed on a number of plants to demonstrate operability in the recirculation mode. Adverse flow conditions have been encountered requiring design and procedural modifications to eliminate them. These conditions, air entrainment, cavitation, and vortex formation, are aggravated by blockage. If not avoided or suppressed, they could result in pump failure during the long term cooling phase following a LOCA.</p> <p>The concerns relative to debris, blockage, and hydraulic performance also apply to boiling water reactors during recirculation from the suppression pools, and will also be addressed.</p> | <p><b>• RES INTERFACE INFORMATION</b></p> <p>None; USI A-43 being managed by the Generic Issues Branch (GIB).</p>   | <p><b>• TECHNICAL ASSISTANCE CONTRACTS</b></p> <p>FIN No. A1257, "Containment Emergency Sump Performance", and FIN No. A1296, "Technical Assistance for Resolution of USI A-43", are being funded by RES and NRR respectively. This work is managed by the GIB Task Manager and these combined efforts are expected to be concluded in FY 84.</p>   | <p><b>• POTENTIAL PROBLEMS</b></p> <p>Further reviews by CRGR could lead to additional assessments and schedule slippages.</p> |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
|   | <p><b>• ACRS INTERFACE INFORMATION</b></p> <p>The ACRS full Committee was briefed on the resolution status of A-43 and the comments received on 08/31/83. Committee members raised questions regarding BWR recirculation pump bearings and seals ingesting particulates and the effect thereof. In addition, the Committee cautioned against hasty or generalized application of the leak-before-break concept to other issues without a very thorough analysis and review.</p> | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>FIN NO.</th> <th>CONTRACTOR</th> <th>OBLIGATED</th> <th>EXPENDED</th> </tr> </thead> <tbody> <tr> <td colspan="4"><b>FY 81:</b></td> </tr> <tr> <td>A1237</td> <td>Sandia</td> <td>\$225,000</td> <td>\$101,000</td> </tr> <tr> <td>A1296</td> <td>Sandia</td> <td>\$120,000</td> <td>\$ 75,100</td> </tr> <tr> <td colspan="4"><b>FY 82:</b></td> </tr> <tr> <td>A1237</td> <td>Sandia</td> <td>\$327,000</td> <td>\$327,000</td> </tr> <tr> <td>A1296</td> <td>Sandia</td> <td>\$400,000</td> <td>\$281,000</td> </tr> <tr> <td colspan="4"><b>FY 83:</b></td> </tr> <tr> <td rowspan="4">A1296</td> <td rowspan="4">Sandia</td> <td>Qtr 1</td> <td>\$425,000</td> </tr> <tr> <td>Qtr 2</td> <td>\$440,000</td> </tr> <tr> <td>Qtr 3</td> <td>\$457,000</td> </tr> <tr> <td>Qtr 4</td> <td>\$505,000</td> </tr> <tr> <td colspan="4"><b>FY 84:</b></td> </tr> <tr> <td rowspan="2">A1296</td> <td rowspan="2">Sandia</td> <td>Oct. 83</td> <td>\$505,000</td> </tr> <tr> <td>Nov. 83</td> <td>\$505,000</td> </tr> </tbody> </table> |  | FIN NO. | CONTRACTOR | OBLIGATED | EXPENDED | <b>FY 81:</b> |         |                 |            | A1237 | Sandia | \$225,000 | \$101,000 | A1296 | Sandia | \$120,000 | \$ 75,100 | <b>FY 82:</b> |  |  |  | A1237 | Sandia | \$327,000 | \$327,000 | A1296 | Sandia | \$400,000 | \$281,000 | <b>FY 83:</b> |  |  |  | A1296 | Sandia | Qtr 1 | \$425,000 | Qtr 2 | \$440,000 | Qtr 3 | \$457,000 | Qtr 4 | \$505,000 | <b>FY 84:</b> |  |  |  | A1296 | Sandia | Oct. 83 | \$505,000 | Nov. 83 | \$505,000 |
| FIN NO.   | CONTRACTOR  | OBLIGATED   | EXPENDED   |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| <b>FY 81:</b>   |   |   |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| A1237   | Sandia  | \$225,000   | \$101,000  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| A1296   | Sandia  | \$120,000   | \$ 75,100  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| <b>FY 82:</b>   |   |   |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| A1237   | Sandia  | \$327,000   | \$327,000  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| A1296   | Sandia  | \$400,000   | \$281,000  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| <b>FY 83:</b>   |   |   |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| A1296   | Sandia  | Qtr 1   | \$425,000  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
|   |   | Qtr 2   | \$440,000  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
|   |   | Qtr 3   | \$457,000  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
|   |   | Qtr 4   | \$505,000  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| <b>FY 84:</b>   |   |   |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
| A1296   | Sandia  | Oct. 83   | \$505,000  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
|   |   | Nov. 83   | \$505,000  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |
|   |   | <p><b>• STATUS SUMMARY</b></p> <p>The regulatory analysis has been revised to reflect comments received from the 07/11/84 CRGR meeting and a followup meeting with CRGR will be scheduled soon.</p>   |  |         |            |           |          |               |         |                 |            |       |        |           |           |       |        |           |           |               |  |  |  |       |        |           |           |       |        |           |           |               |  |  |  |       |        |       |           |       |           |       |           |       |           |               |  |  |  |       |        |         |           |         |           |

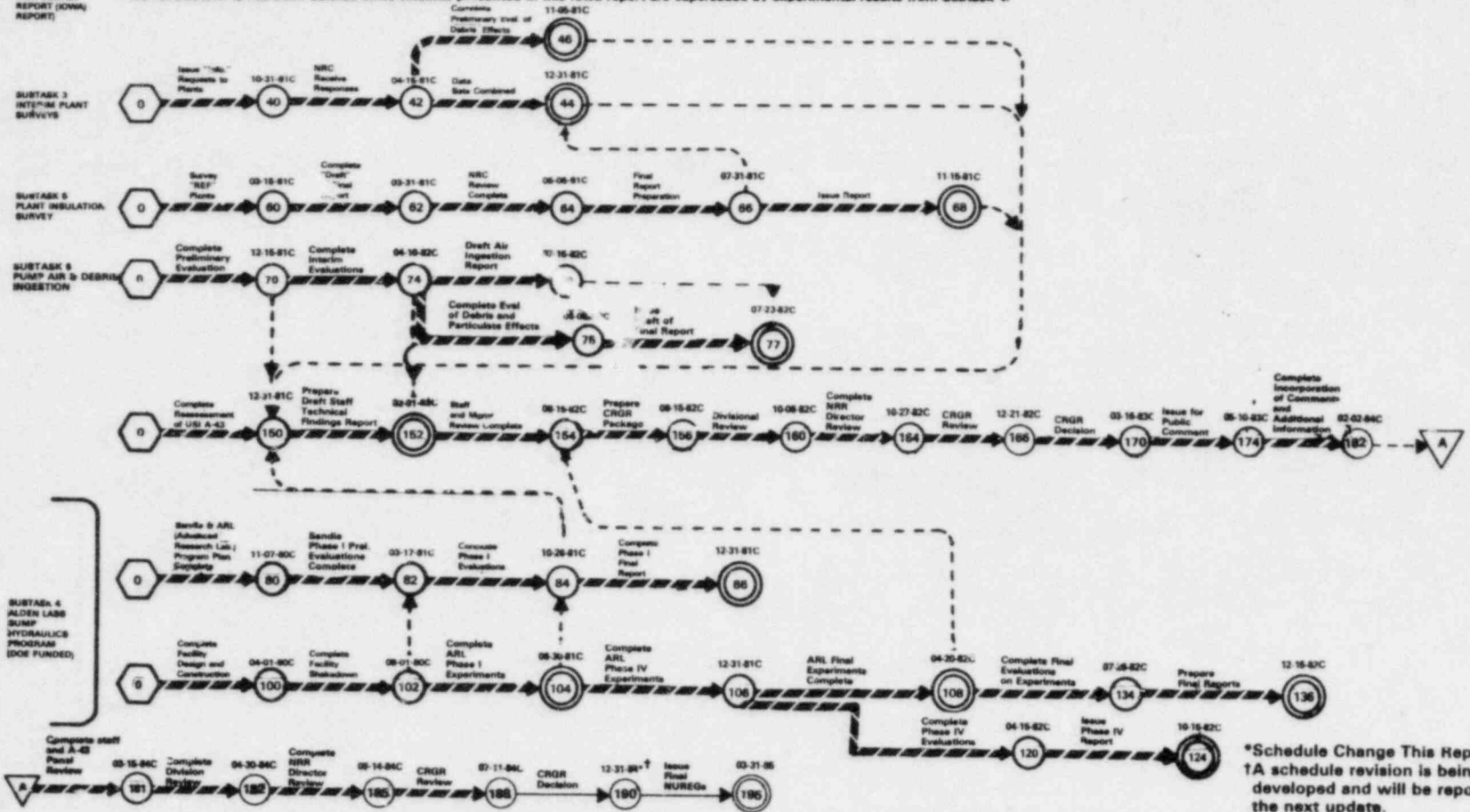
# CONTAINMENT EMERGENCY SUMP PERFORMANCE (A-43)

SUBTASK 1  
PWR RECIRCULATION  
TESTS REPORT

SUBTASK 2  
PWR VORTEX  
REPORT (ONNA  
REPORT)

NOTE: The sub-task 1 report is no longer necessary since the background presented therein has been summarized in NUREG-0897, Resolution of USI A-43, "Containment Emergency Sump Performance," which is in the final preparation stage.

NOTE: Subtask 2, has been deleted since findings presented in this lower report are superseded by experimental results from Subtask 4.



# STATION BLACKOUT (A-44)

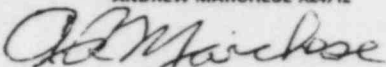
AS OF WEEK ENDING FEBRUARY 15, 1986

| KEY PERSONNEL  | TASK REVIEWERS   | D. LANGFORD   | RSB/DSI                            | SCHEDULED COMPLETION |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
|--|--|---|------------------------------------|----------------------|-----------|----------|--------|-----------|---------|--|-----------|----------|--------|--|--|--|--|--|---|----------|-----------|---------|----------|
| <b>TASK MANAGER</b><br>ALAN RUBIN X28303<br><br><i>Alan Rubin</i><br><br><b>NRR ANALYST</b><br>JUDY BUTTS X24822   | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">NAME</th> <th style="width:50%;">BRANCH</th> </tr> </thead> <tbody> <tr> <td>R. ANAND</td> <td>ASB/DSI</td> </tr> <tr> <td>L. ENGLE</td> <td>ORB/DL</td> </tr> <tr> <td>O. CHOPRA</td> <td>PSB/DSI</td> </tr> </tbody> </table>  | NAME  | BRANCH                             | R. ANAND             | ASB/DSI   | L. ENGLE | ORB/DL | O. CHOPRA | PSB/DSI | <table border="1" style="width:100%; border-collapse: collapse;"> <tbody> <tr> <td style="width:50%;">A. BUSLIK</td> <td style="width:50%;">RRAB/DST</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table> | A. BUSLIK | RRAB/DST |        |  |  |  |  |  | <table border="1" style="width:100%; border-collapse: collapse;"> <tbody> <tr> <td style="width:50%;">ORIGINAL</td> <td style="width:50%;">JUNE 1982</td> </tr> <tr> <td>CURRENT</td> <td>01-30-86</td> </tr> </tbody> </table> | ORIGINAL | JUNE 1982 | CURRENT | 01-30-86 |
| NAME   | BRANCH   |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| R. ANAND   | ASB/DSI  |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| L. ENGLE   | ORB/DL   |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| O. CHOPRA  | PSB/DSI  |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| A. BUSLIK  | RRAB/DST   |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
|  |  |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
|  |  |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
|  |  |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| ORIGINAL   | JUNE 1982  |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| CURRENT  | 01-30-86   |   |                                    |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| <p><b>• PROBLEM DESCRIPTION</b></p> <p>Electric power for safety systems at nuclear power plants is supplied by two redundant and independent divisions. Each of these electrical divisions includes an offsite alternating current (A.C.) source, an onsite A.C. source (usually diesel-generators), and a direct current (D.C.) source. Appendix A to 10 CFR 50 defines a total loss of offsite power as an anticipated occurrence, and as such, it is required that an independent emergency onsite power supply be provided at nuclear power plants.</p> <p>The unlikely, but possible loss of A.C. power (that is, the loss of A.C. power from the offsite source and from the onsite source) is referred to as a station blackout. In the event of a station blackout, the capability to cool the reactor core would be dependent on the availability of systems which do not require A.C. power supplies, and on the ability to restore A.C. power in a timely manner. The concern is that the occurrence of a station blackout may be a relatively high probability event and that the consequences of this event may be unacceptable, for example, severe core damage may result.</p> | <p><b>• RES INTERFACE INFORMATION</b></p> <p>RES is providing technical assistance for the resolution of A-44.</p>   | <p><b>• TECHNICAL ASSISTANCE CONTRACTS</b></p> <p>ORNL FIN 80744 8740K - Evaluate expected frequency and duration of offsite (preferred) power losses at nuclear power plants. Estimate the reliability and evaluate the dominant factors affecting the reliability of emergency A.C. power supplies.</p> <p>Perform statistical correlation and trend analysis of diesel generator data.</p> <p>NUREG/CR-2989, "Reliability of Emergency AC Power Systems at Nuclear Power Plants," was published in July 1983.</p> <p># NUREG/CR-3092, "Collection and Evaluation of Complete and Partial Losses of Offsite Power at Nuclear Power Plants," was published in February 1985.</p> <p>SNL FIN A1302 6300K - Evaluate the risks posed by station blackout accidents and assess the effectiveness of safety improvements in reducing those risks.</p> <p>Evaluate risk reduction and costs of various fixes and to provide input for value/impact analysis.</p> <p>NUREG/CR-3228, "Station Blackout Accident Analyses (Part of NRC Task Action Plan A-44)," was published in May 1983.</p> | <p><b>• POTENTIAL PROBLEMS</b></p> |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| <p><b>• ACRS INTERFACE INFORMATION</b></p> <p>Station Blackout is related to a number of ACRS concerns regarding the reliability of power systems. This task will be coordinated with the committee as the task progresses.</p> <p>A presentation on staff recommendations to resolve USI A-44 was made to the ACRS Subcommittee on AC/DC Power Systems Reliability on May 10, 1983.</p> <p>A presentation was made to the full ACRS on July 7, 1985.</p>  | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:15%;">FIN NO.</th> <th style="width:25%;">CONTRACTOR</th> <th style="width:20%;">OBLIGATED</th> <th style="width:40%;">EXPENDED*</th> </tr> </thead> <tbody> <tr> <td># 80744</td> <td>ORNL</td> <td>\$740K</td> <td>\$707K</td> </tr> <tr> <td>A1302</td> <td>SNL</td> <td>\$300K</td> <td>\$294K</td> </tr> </tbody> </table> <p># *As of November 30, 1984.</p> | FIN NO.   | CONTRACTOR                         | OBLIGATED            | EXPENDED* | # 80744  | ORNL   | \$740K    | \$707K  | A1302  | SNL       | \$300K   | \$294K | <p><b>• STATUS SUMMARY</b></p> <p>The staff's proposed recommendations to resolve A-44 based on the technical findings, were reviewed by NRR and RES divisions. This review resulted in the recommendation to proceed with proposed rulemaking, in conjunction with a new Regulatory Guide, to resolve A-44. The proposed technical resolution has been reviewed by the Director, NRR, and forwarded to CRGR. Meetings were held with CRGR in March and April 1984 to review the proposed resolution. CRGR recommended that the proposed rule, the proposed Regulatory Guide and the draft staff NUREG-1032 be issued for public comment after making modifications to reflect CRGR comments.</p> <p># The technical basis and recommendations were revised based on updated data on loss of offsite power experienced at nuclear power plants. These revisions are included in the proposed rulemaking package to be sent to the Commission. NUREG-1032, "Evaluation of Station Blackout Accidents at Nuclear Power Plants, Technical Findings Related to USI A-44," is being prepared to be issued for public comment.</p> |  |  |  |  |   |          |           |         |          |
| FIN NO.  | CONTRACTOR   | OBLIGATED   | EXPENDED*                          |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| # 80744  | ORNL   | \$740K  | \$707K                             |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |
| A1302  | SNL  | \$300K  | \$294K                             |                      |           |          |        |           |         |  |           |          |        |  |  |  |  |  |   |          |           |         |          |



# SHUTDOWN DECAY HEAT REMOVAL REQUIREMENTS (A-45)

AS OF WEEK ENDING FEBRUARY 15, 1986

| KEY PERSONNEL   |  | TASK REVIEWERS |          | SCHEDULED COMPLETION |  |
|---|--|----------------|----------|----------------------|--|
| <b>TASK MANAGER</b>   |  | <b>NAME</b>    |          | <b>ORIGINAL</b>      |  |
| ANDREW MARCHESE X24712  |  | <b>BRANCH</b>  |          | 10-30-85             |  |
|  |  | T. MARSH       | RSB/DSI  | <b>CURRENT</b>       |  |
| <b>NRN ANALYST</b>  |  | F. ROSA        | ICSB/DSI | 02-28-86             |  |
| JUDY BUTTS X24822   |  | M. SRINIVASAN  | PSB/DSI  |                      |  |
|   |  | E. McPEEK      | SSPB/DL  |                      |  |
|   |  | D. DIANNI      | ORB-4/DL |                      |  |
|   |  | M. CUNNINGHAM  | DRA/RES  |                      |  |
|   |  | R. FRAHM       | RRAB/DST |                      |  |
|   |  | P. HEARN       | ASB/C/SI |                      |  |

## • PROBLEM DESCRIPTION

Task A-45 was approved as a USI by the NRC in December 1980. Although many improvements to the steam generator auxiliary feedwater system were required of the reactor manufacturers by the NRC following the TMI-2 accident, the staff feels that providing an alternative means of decay heat removal could substantially increase the plants' capability to deal with a broader spectrum of transients and accidents and potentially could, therefore, significantly reduce the overall risk to the public. Consequently, Task A-45 will investigate alternative means of decay heat removal in PWR plants, including but not limited to using existing equipment where possible. This Unresolved Safety Issue will also investigate the need and possible design requirements for improving reliability of decay heat removal systems in boiling water reactors (BWRs).

The overall purpose of Task A-45 is to evaluate the adequacy of current licensing design requirements, in order to ensure that nuclear power plants do not pose an unacceptable risk due to failure to remove shut-down decay heat. The objective will be to develop a comprehensive and consistent set of shutdown cooling requirements for existing and future LWRS, including the study of alternative means of shutdown decay heat removal and of diverse "dedicated" systems for this purpose.

The main objectives of the program are as follows:

- Determine the safety adequacy of decay heat removal systems in existing power plants for achieving both hot shutdown and cold shutdown conditions.
  - Evaluate the feasibility of alternative measures for improving decay heat removal systems, including diverse alternatives dedicated to the decay heat removal function.
  - Assess the value and impact of the most promising alternative measures.
  - Develop a plan for implementing any new licensing requirements for decay heat removal systems.
- The interrelation and relative timing of each of the program activities are shown on the schedule network.

## • RES INTERFACE INFORMATION

Close coordination and cooperation will be required on Task A-45 between NRR and RES. RES assistance will be required from the Divisions of Risk Analysis and Accident Evaluation. The Division of Risk Analysis will provide technical input from their Sandia Lab "History Program on Alternate Decay Heat Removal Concepts, technical evaluations relative to reliability and risk assessment for shutdown decay heat removal systems, and input from Task A-44, "Station Blackout," relative to shutdown cooling systems. The Division of Accident Evaluation will provide technical input relative to the transient response of existing and improved shutdown decay heat removal systems to transient events and small LOCAs. This will also include performing (in-house, contractors) detailed thermal-hydraulics analyses where required to support existing and improved decay heat removal systems behavior under transient and accident conditions.

## • ACRS INTERFACE INFORMATION

- The Task Manager participated in briefing the Full Committee on November 2, 1984 on the results of an NRC team visit through five European countries to discuss their approach to decay heat removal systems and plant protection against sabotage.
- Task Manager briefed the full committee on August 9, 1984 on the overall status of USI A-45.
  - ACRS Subcommittee on Decay Heat Removal Systems (DHRS) met on January 22, 1986, and Task Manager provided the subcommittee with an update of the USI A-45 program.
  - Further meetings with the full committee and subcommittee on DHRS will be held as the work on USI A-45 progresses and certain pre-determined milestones are completed.

## • TECHNICAL ASSISTANCE CONTRACTS

Implemented a technical assistance contract on May 10, 1982 with Sandia (FIN A1308) to provide overall project management, technical direction and integration for the entire Task A-45 program, including selection and management of subcontractors.

### FIN NO. CONTRACTOR OBLIGATED EXPENDED

| FIN NO.  | CONTRACTOR        | OBLIGATED | EXPENDED |
|--|-------------------|-----------|----------|
| #A1308   | Sandia            | \$4,650   | \$4,136  |
| * Includes the following funding which has been committed to support subcontracting: |                   |           |          |
|  | UCLA              | \$226K    |          |
|  | ORNL              | \$431K    |          |
|  | B&R               | \$ 92K    |          |
|  | LANL              | \$107K    |          |
|  | ASAI              | \$146K    |          |
|  | SAI               | \$256K    |          |
|  | AE Support        | \$384K    |          |
|  | DHR Tech. Support | \$108K    |          |

## • POTENTIAL PROBLEMS

- # The following are the major scheduler problems that have recently confronted the USI A-45 program:
  - Plant visits (9 sites) have taken longer to arrange than estimated
  - Individual plant fault tree and event tree analyses are requiring more detail (support systems, containment systems, recovery actions) and taking longer to complete (based on updated plant information) than originally estimated
  - Information required to perform an integrated special emergency evaluation (fire, flood, seismic and sabotage) has increased significantly and has been difficult to obtain
  - Time for Sandia to place supporting subcontracts (based on competitive bids) has taken longer than anticipated
  - Staff review of interim milestone reports has required more time than originally estimated
  - Additional Commission, ACRS, and staff comments and concerns have added to the scope of the A-45 program.

## SCHEDULED COMPLETION

|          |          |
|----------|----------|
| ORIGINAL | 10-30-85 |
| CURRENT  | 02-28-86 |

## • STATUS SUMMARY

# Plant visits for the purpose of obtaining missing information relative to DHR system analyses have taken place at Point Beach, Turkey Point, Quad Cities, Arkansas Nuclear No. 1, Trojan, Cooper and St. Lucie. Arranging for the site visits is taking longer than originally estimated.

Responses have been prepared to: (1) Chairman Peledino's memorandum of August 21, 1984 requesting that we address ACRS comments contained in a memorandum to W. J. Dircks, dated August 14, 1984, and (2) Commissioner Roberts' questions on the A-45 program contained in his memorandum to W. J. Dircks, dated September 7, 1984.

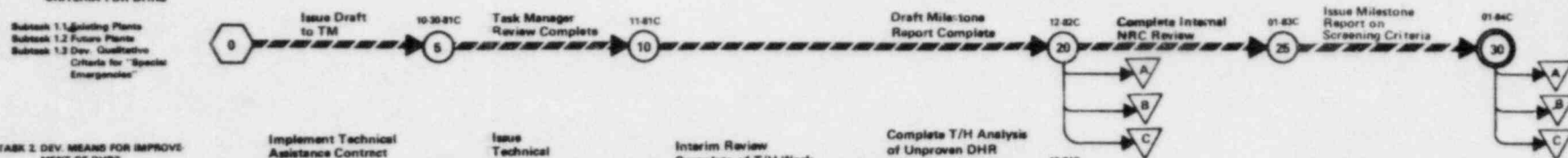
# During this reporting period, a foreign trip report was issued on January 16, 1986 in connection with visits to certain European countries to discuss decay heat removal systems and related sabotage issues.

# Because of the above scheduler problems, the near-term A-45 plan of approach is as follows:

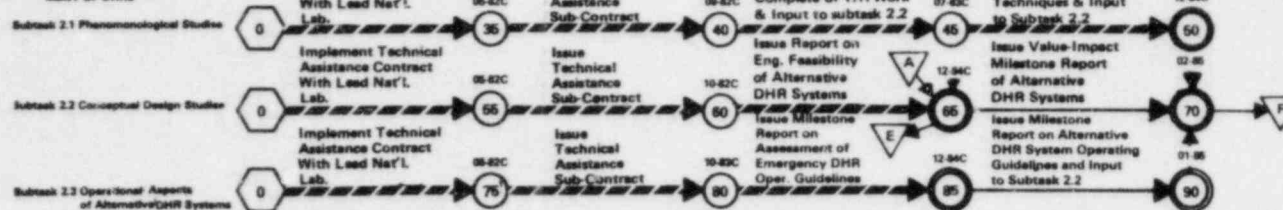
- Hold existing schedule
- Develop A-45 resolution package based on two plant analyses
- Complete balance of plant analyses on adjusted schedule (5 month extension)
- Modify resolution package as necessary based on results of additional plant analyses.

# SHUTDOWN DECAY HEAT REMOVAL REQUIREMENTS (A-45)

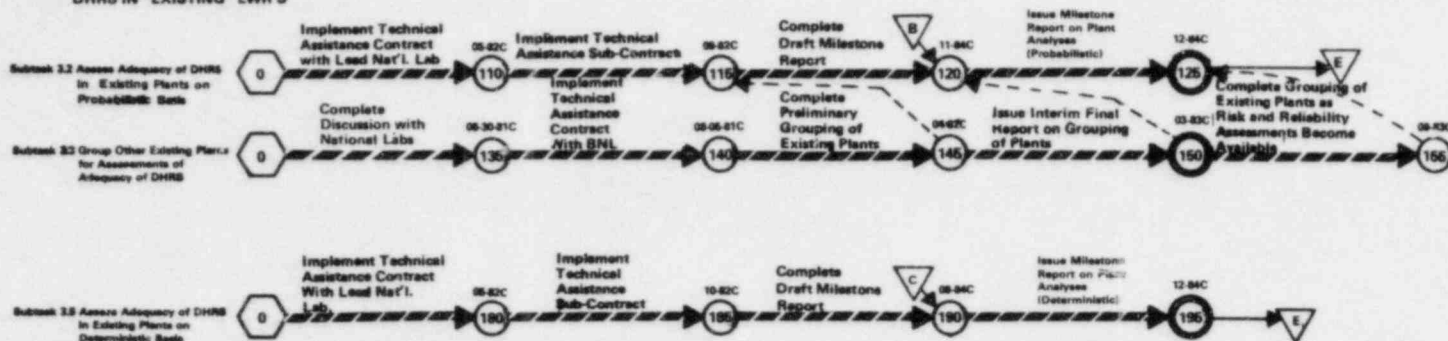
## TASK 1. DEVELOP SCREENING CRITERIA FOR DHR'S



## TASK 2. DEV. MEANS FOR IMPROVEMENT OF DHR'S



## TASK 3. ASSESS ADEQUACY OF DHR'S IN "EXISTING" LWR'S

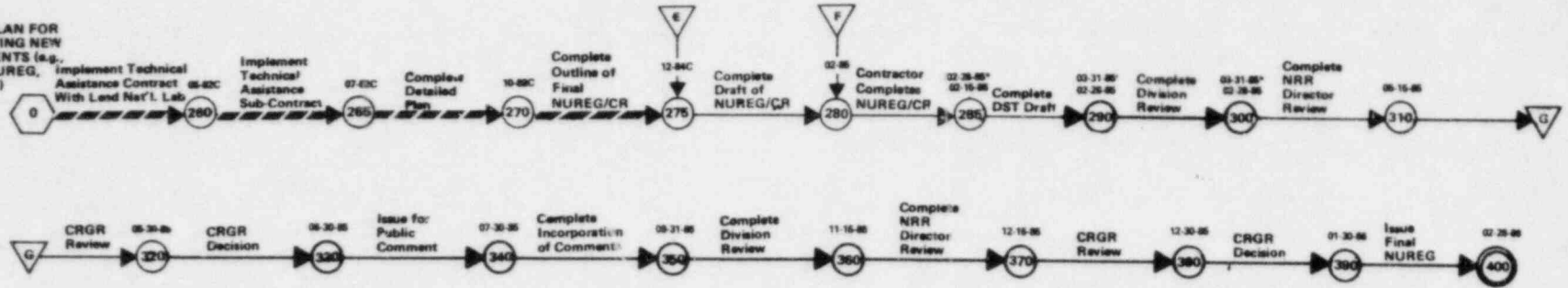


\* Schedule Change This Report

# SHUTDOWN DECAY HEAT REMOVAL REQUIREMENTS (A-45)

CONTINUED

**TASK 4. DEVELOP PLAN FOR IMPLEMENTING NEW REQUIREMENTS (e.g., PREPARE NUREG, REG. GUIDE)**



\* Schedule Change This Report.

# SEISMIC QUALIFICATION OF EQUIPMENT IN OPERATING PLANTS (A-46)

AS OF WEEK ENDING FEBRUARY 15, 1985

## KEY PERSONNEL

### TASK MANAGER

T.Y. CHANG X27486

### NRR ANALYST

JUDY BUTTS X24822

## TASK REVIEWERS

NAME BRANCH

ARNOLD LEE EQB/DE

PEI-YING CHEN SEPB/DL

JOHN KNOX PSB/DSI

FRANK SKOPEC RAB/DSI

KULIN DESAI RSB/DSI

HAROLD POLK SGB/DE

GUSTAAF GIESE-KOCH GSB/DE

GERALD WEIDENHAMER MSEB/RES

## SCHEDULED COMPLETION

ORIGINAL 12-15-83

CURRENT 12-30-85

### • PROBLEM DESCRIPTION

Task A-46 was approved as a USI by the NRC December, 1980.

The design criteria and methods for the seismic qualification of mechanical and electrical equipment in nuclear power plants have undergone significant change during the course of the commercial nuclear power program. Consequently, the margins of safety provided in existing equipment to resist seismically induced loads and perform the intended safety functions may vary considerably. The seismic qualification of the equipment in operating plants must, therefore, be reassessed to ensure the ability to bring the plant to a safe shutdown condition when subject to a seismic event. The objective of this Unresolved Safety Issue is to establish an explicit set of guidelines that could be used to judge the adequacy of the seismic qualification of mechanical and electrical equipment at all operating plants in lieu of attempting to backfit current design criteria for new plants. This guidance will concern equipment required to safely shutdown the plant, as well as equipment whose function is not required for safe shutdown, but whose failure could result in adverse conditions which might impair shutdown functions. Also, explicit guidelines will be established for use in requalifying equipment whose seismic qualification was found to be inadequate.

A breakdown of the tasks is as follows:

- Task 1 Identification of Seismic Sensitive Systems and Equipment
- Task 2 Assessment of Adequacy of Existing Seismic Qualification
- Task 3 Development and Assessment of In-Situ Testing Methods to Assist in Qualification of Equipment
- Task 4 Seismic Qualification of Equipment Using Seismic Experience Data
- Task 5 Development of Methods to Generate Generic Floor Response Spectra
- Task 6 Document Results of USI A-46 and Prepare Final Report

### • RES INTERFACE INFORMATION

Part of a RES contract with Southwest Research Institute (SWRI) is concerned with developing methodology to correlate various seismic qualification tests and is designated Task 2 for A-46. This work is essentially complete. SWRI issued related reports in June and November 1983.

### • ACRS INTERFACE INFORMATION

The status of A-46 was presented to the ACRS Subcommittee in March 1983. In March and July 1983, respectively, the Seismic Qualification Utility Group (SQUG) also made two separate presentations to the ACRS Subcommittee and Full Committee on their pilot program to establish the feasibility of using seismic experience data in conventional power plants to demonstrate the adequacy of similar equipment installed in operating nuclear power plants. The ACRS, in their comments, indicated that the SQUG approach was in line with the ACRS recommendations made in January 1983 and should be encouraged. However, ACRS believes that more work is required to establish the operability of equipment during and after an earthquake, and more data will be required to support conclusions drawn concerning the seismic resistance of the equipment investigated. The status of A-46 was presented to the ACRS Subcommittee again in March and April 1984, and to the ACRS Full Committee in May 1984.

### • TECHNICAL ASSISTANCE CONTRACTS

Tasks 1 and 5 were performed by Brookhaven National Laboratory and are essentially complete. NUREG/CR-3367 on Task 1 was issued in June 1983. NUREG/CR-3286 on Task 5 was issued in September 1983. A draft guideline on Task 1 was issued in September 1983.

Task 3 was performed by Idaho National Engineering Laboratory and is now complete. NUREG/CR-3876 on Task 3 was issued in June 1984.

Task 4 has been studied independently by Lawrence Livermore National Laboratory (LLNL) and by the Seismic Qualification Utility Group (SQUG). Results of the LLNL study were published in NUREG/CR-3017 dated August 1983. In addition, Sandia National Laboratories (SNL) is providing assistance in (1) editing and publishing SSRAP report, and (2) resolving public comments.

| FIN NO. | CONTRACTOR | OBLIGATED | EXPENDED     |
|---------|------------|-----------|--------------|
| A0423   | LLNL       | \$75K     | \$75K        |
| A6474   | INEL       | \$285K    | \$283K (est) |
| A3397   | BNL        | \$324K    | \$320K       |
| # A1318 | SNL        | \$ 50K    | \$ 14K       |

### • POTENTIAL PROBLEMS

None

### • STATUS SUMMARY

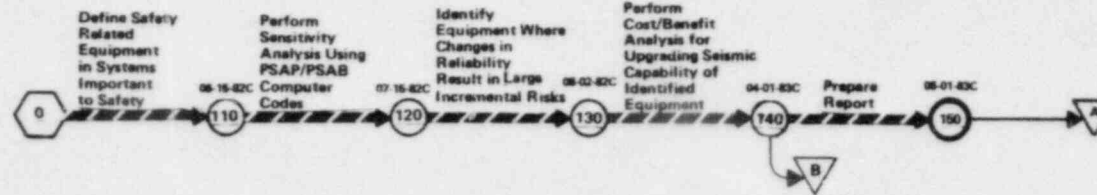
Work on all tasks is essentially completed by the contractors with the exception of Task 4. The SQUG formed an independent Senior Seismic Review and Advisory Panel (SSRAP) in June 1983 to make recommendations for use of seismic experience data. The NRC staff has been working very closely with the SQUG and the SSRAP and will continue to do so. This activity is an important element in the resolution of A-46. The A-46 schedule was approved by NRC management on July 18, 1983. SSRAP issued its report in February 1984 and then updated it in August 1984.

# The USI A-46 CRGR package was approved by the Director of NRR on October 31, 1984 and sent to CRGR for review on November 1, 1984. A meeting was held with CRGR on December 3, 1984. The CRGR decided they did not have enough information to make a decision. The CRGR package is being revised and additional information incorporated prior to re-submitting for CRGR review.

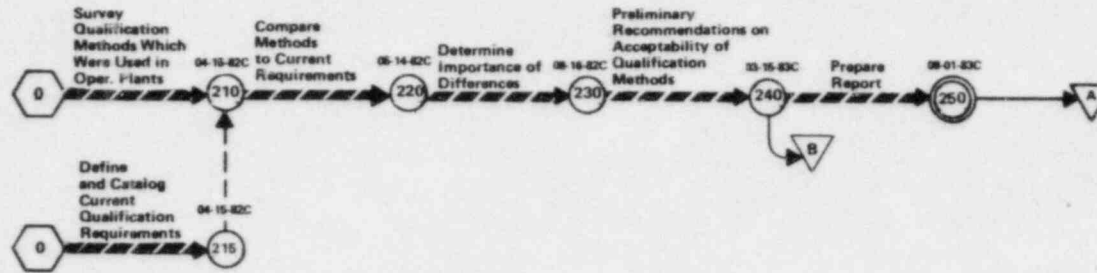


# SEISMIC QUALIFICATION OF EQUIPMENT IN OPERATING PLANTS (A-46)

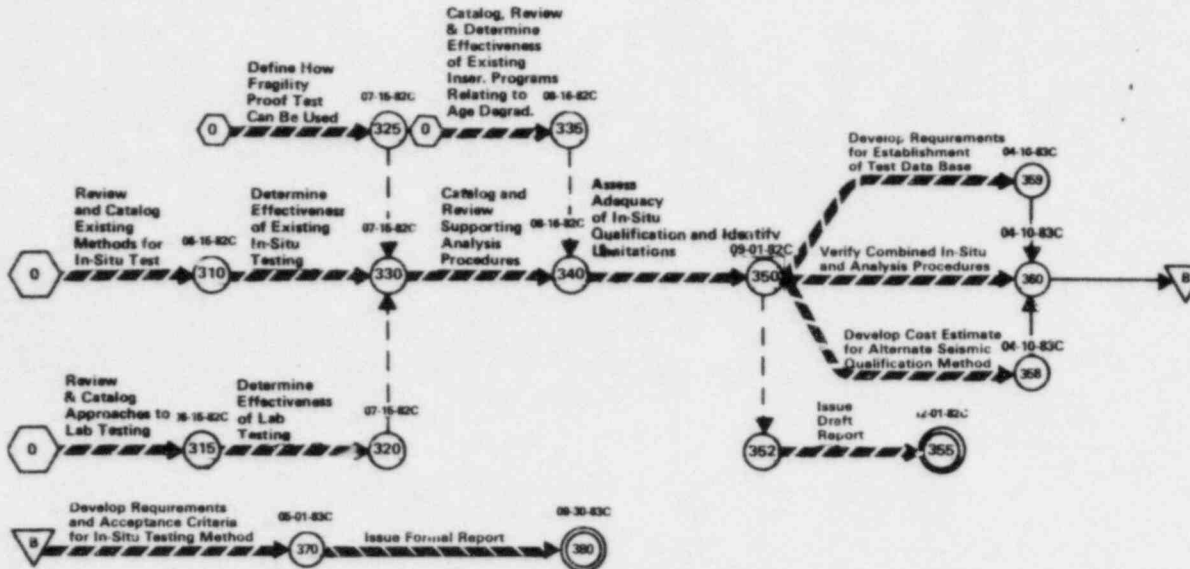
**Task 1:**  
Identification of Seismic-Sensitive Systems & Equipment



**Task 2:**  
Assessment of Adequacy of Existing Seismic Qualification.

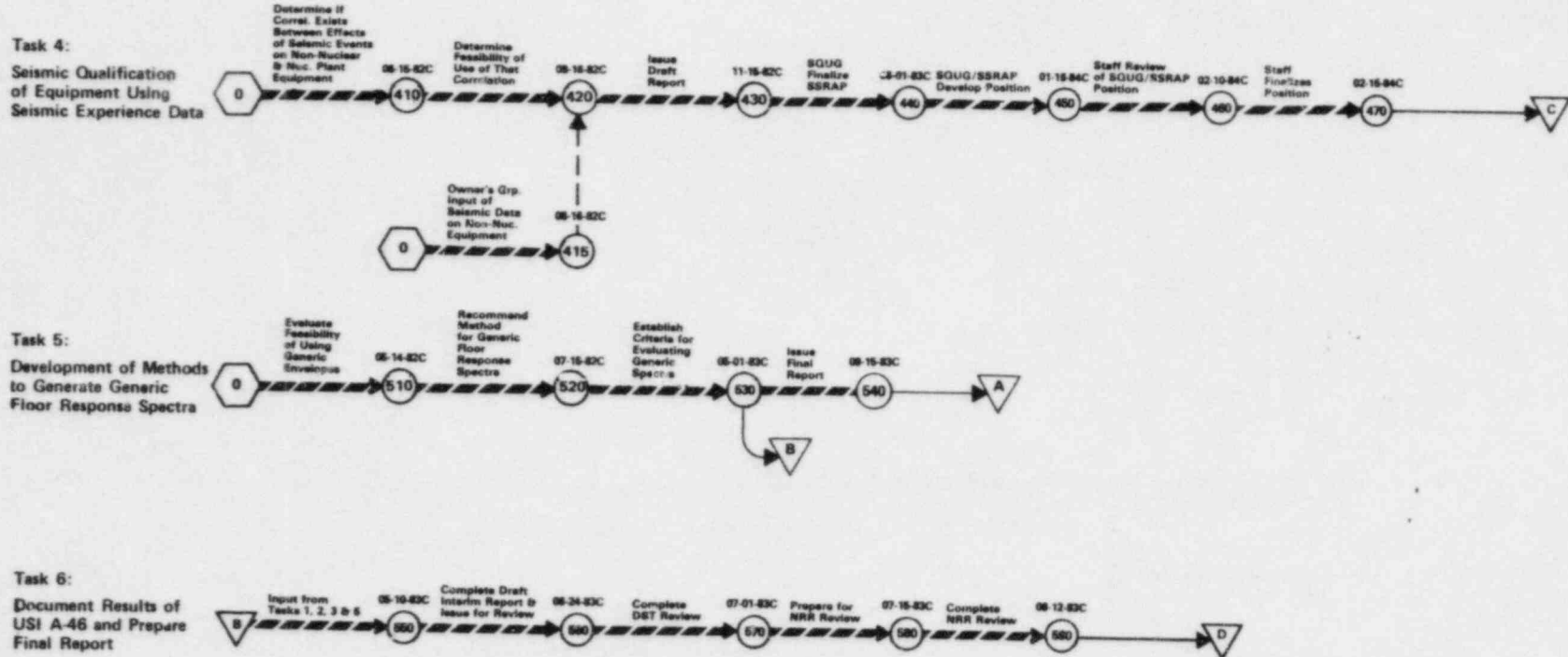


**Task 3:**  
Development and Assessment of In-Situ Testing Methods to Assist in Qualification of Equipment



# SEISMIC QUALIFICATION OF EQUIPMENT IN OPERATING PLANTS (A-46)

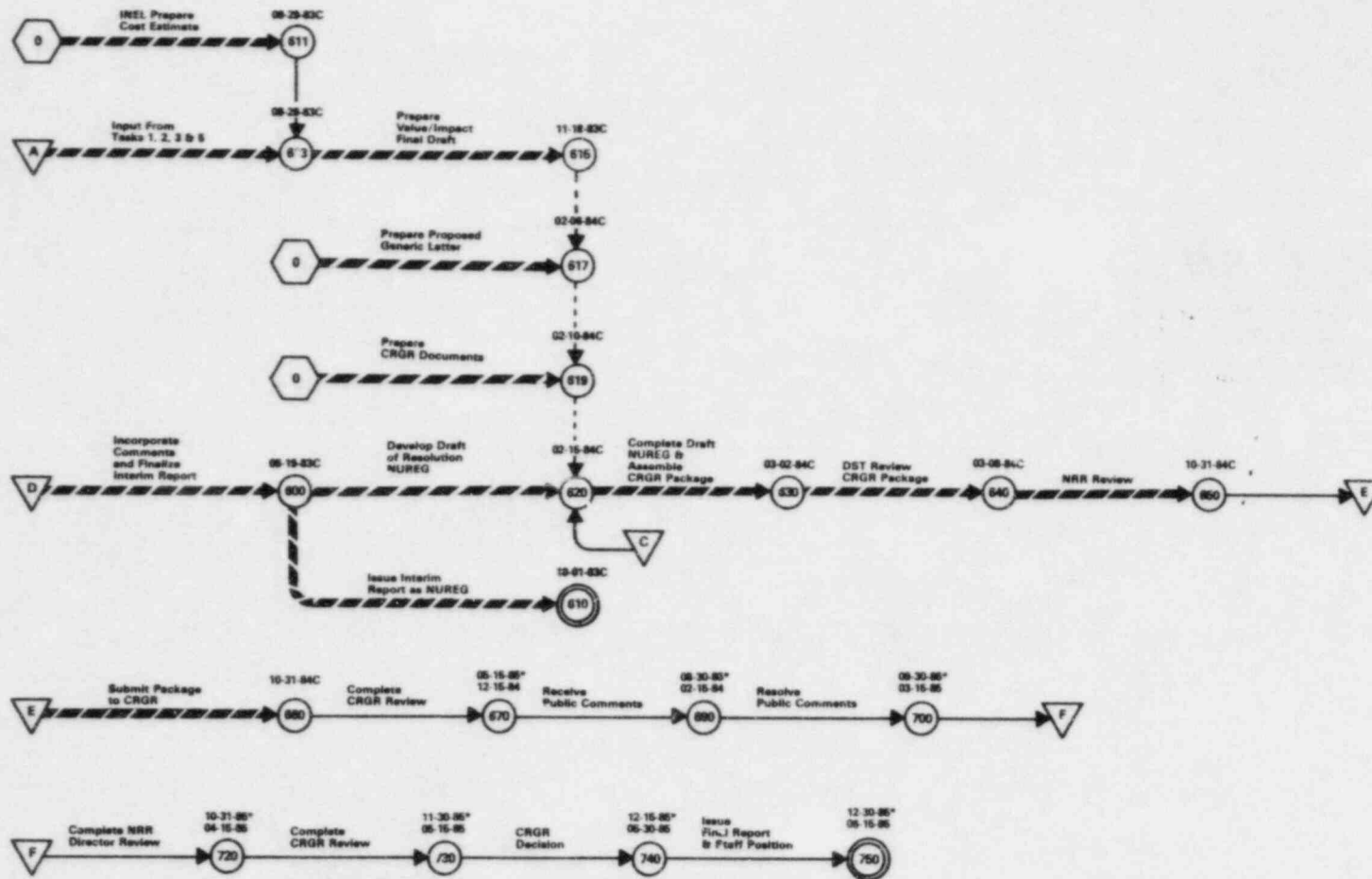
## CONTINUED



# SEISMIC QUALIFICATION OF EQUIPMENT IN OPERATING PLANTS (A-46)

CONTINUED

Task 6  
(Continued)



\* Schedule Change This Report.

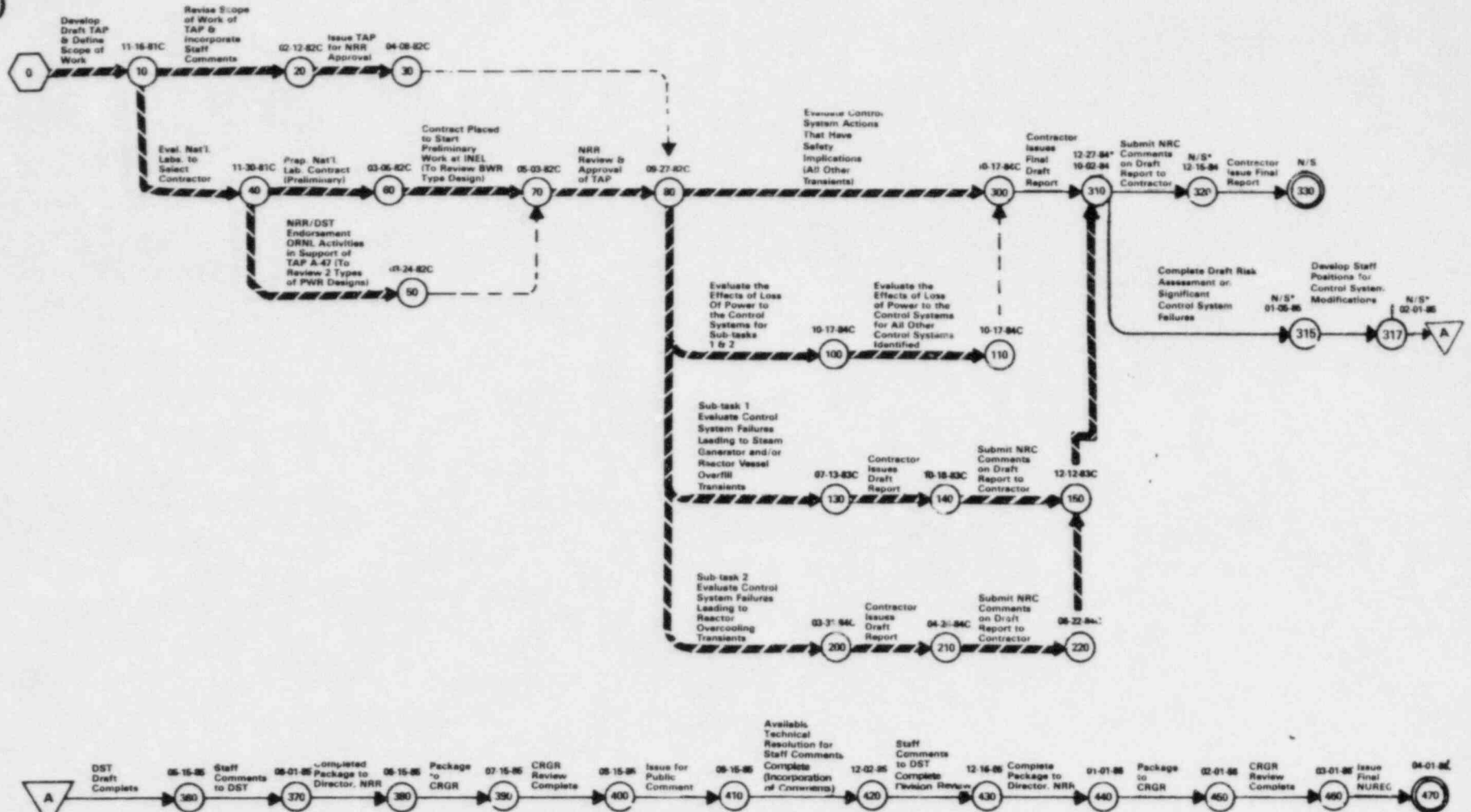
# SAFETY IMPLICATIONS OF CONTROL SYSTEMS (A-47)

AS OF WEEK ENDING FEBRUARY 15, 1985

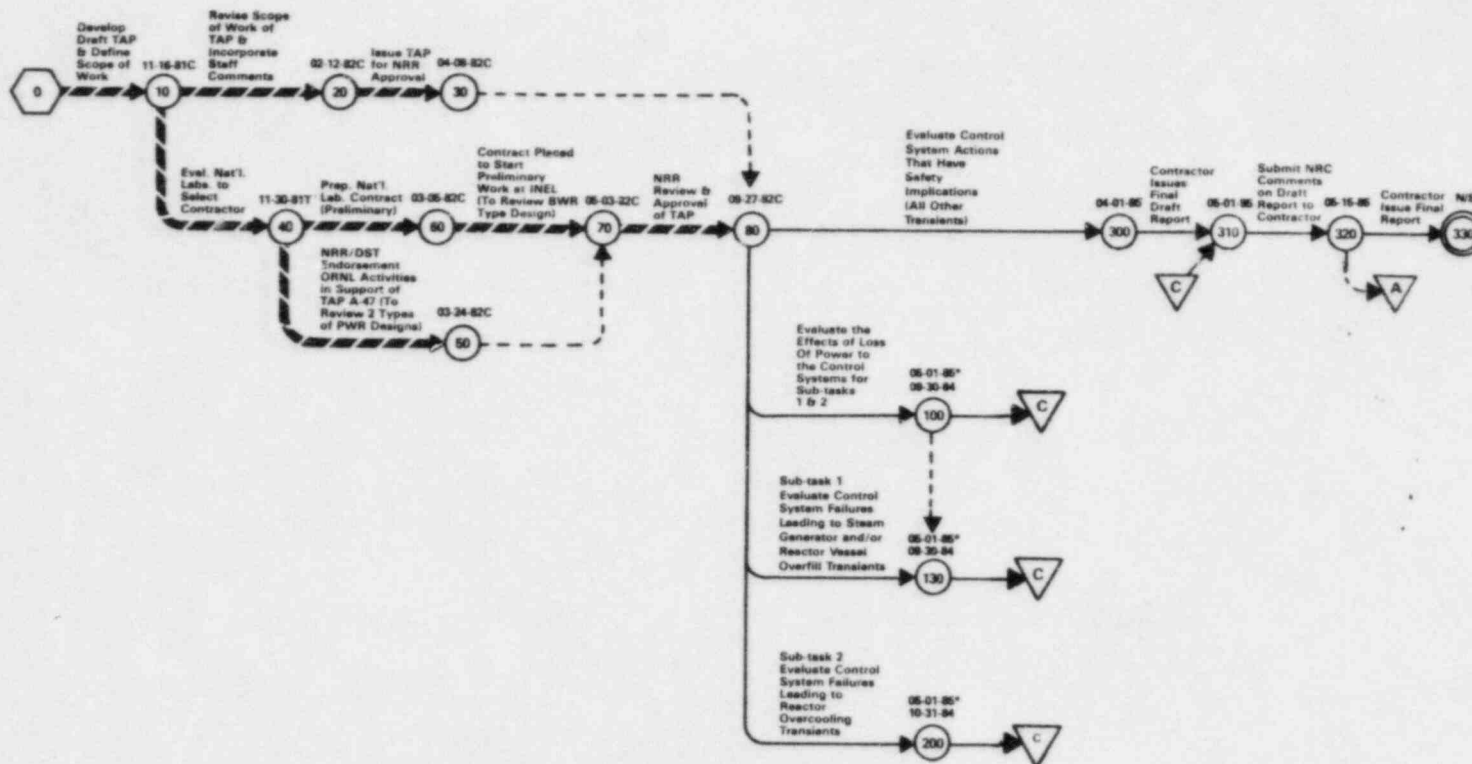
| KEY PERSONNEL   | TASK REVIEWERS   | S. DIAB<br>RSB/DSI | SCHEDULED COMPLETION |            |            |        |      |             |             |                   |      |             |             |   |  |
|---|--|--------------------|----------------------|------------|------------|--------|------|-------------|-------------|-------------------|------|-------------|-------------|---|--|
| <p><b>TASK MANAGER</b><br/>ANDREW SZUKIEWICZ X24713</p> <p><i>[Signature]</i></p> <p><b>NRR ANALYST</b><br/>JUDY BUTTS X24822</p> <p><b>• PROBLEM DESCRIPTION</b></p> <p>Task A-47 was approved as a USI by the NRC in December 1980.</p> <p>This issue concerns the potential for accidents or transients being made more severe as a result of control system failures or malfunctions. These failures or malfunctions may occur independently or as a result of the accident or transient under consideration and would be in addition to any control system failures that may have initiated the event. Although it is generally believed that control system failures are not likely to result in loss of safety functions which could lead to serious events or result in conditions that safety systems are not able to cope with, in-depth studies have not been performed to support this belief. The potential for an accident that would affect a particular control system and the effects of the control system failures will differ from plant to plant. Therefore, it is not likely that it will be possible to develop generic answers to these concerns, but rather plant-specific reviews will be required. The purpose of this Unresolved Safety Issue is to define generic criteria that may be used for plant-specific reviews. A specific subtask of this issue will be to study the steam generator overfill transient in PWRs and the reactor overfill transient in BWRs to determine and define the need for preventive and/or mitigating design measures to accommodate this transient.</p> <p><b>• RES INTERFACE INFORMATION</b></p> <p>Close coordination will be required on Task A-47 between NRR and RES. RES assistance will be required from the Division of Facilities Operations and the Division of Risk Analysis. The Division of Facilities Operations will provide input from their research programs (currently being developed in conjunction with A-47) on control system interactions. The Division of Risk Analysis will provide input on their current on-going ORNL program ("Evaluation of Pressurized Thermal Shock"). Other research activities are being evaluated to determine their significance to A-47 and may be identified later.</p> <p><b>• ACRS INTERFACE INFORMATION</b></p> <p>The ACRS Subcommittee on Electrical Power Systems (Dr. Kerr) met on the issue on 1/23/81 to initiate an approximate six month study at the request of Chairman Ahearne.</p> <p>Status of the activities identified in TAP A-47 was discussed with the ACRS Subcommittee on December 21, 1982 and November 16, 1983.</p> | <p><b>NAME</b>      <b>BRANCH</b></p> <hr/> <p>D. BASDEKAS      DFO/RES</p> <hr/> <p>J. CALVO      ICSB/DSI</p> <hr/> <p>E. CHELLIAH      RRAB/DST</p> <hr/> <p><b>• TECHNICAL ASSISTANCE CONTRACTS</b></p> <p>During the week of July 29, 1981, meetings were held with INEL, EGB&amp;G (Idaho Falls), Battelle Northwest and Lawrence Livermore Labs for the purpose of discussing the A-47 objectives and to assess the type of activities that could best be conducted by these organizations. Similar meetings with ORNL and Sandia Labs were held July 9, 1981. A Technical Assistance (T.A.) contract with ORNL (FIN B-0467) was established through NRR/RES. RES will conduct a review of two different types of PWR designs (one B&amp;W plant, Oconee, and one CE plant, Calvert Cliffs), and perform the activities identified in Tasks 1, 2, 3 and 4 of Task Action Plan A-47. A separate T.A. contract to perform the review on one BWR type design, Browns Ferry, and one PWR type design, (Westinghouse) H.B. Robinson, was established with INEL (FIN A-6477). The technical assistance contracts will perform the following tasks:</p> <ol style="list-style-type: none"> <li>1. Evaluate Control System Failures Leading to Steam Generator and/or Reactor Overfill Transients</li> <li>2. Evaluate Control System Failures Leading to Reactor Overcooling Transients</li> <li>3. Evaluate (All Others) Control System Actions That Have Safety Implications</li> <li>4. Evaluate the Effects of Loss of Power to the Control Systems</li> </ol> <table border="1" data-bbox="1089 875 1570 1040"> <thead> <tr> <th>FIN NO.</th> <th>CONTRACTOR</th> <th>OBLIGATED*</th> <th>EXPENDED**</th> </tr> </thead> <tbody> <tr> <td>A-6477</td> <td>INEL</td> <td>\$1,385,000</td> <td>\$1,335,000</td> </tr> <tr> <td>B-0467 and B-0816</td> <td>ORNL</td> <td>\$3,850,000</td> <td>\$2,950,000</td> </tr> </tbody> </table> <p>* through FY 84<br/>** through June 1984</p> <p><b>• POTENTIAL PROBLEMS</b></p> <p>Availability of the B&amp;W simulator for the Calvert Cliffs-1 evaluation is rescheduled to begin in March 1985.</p> <p><b>• STATUS SUMMARY</b></p> <ul style="list-style-type: none"> <li># Draft Report on the Safety Implications of Control Systems of a B&amp;W PWR design was submitted by ORNL in October 1984.</li> <li># PNL Risk Assessment Draft Report on Control System Failures for the General Electric Design was submitted for staff review on November 2, 1984.</li> <li># PNL Risk Assessment Draft Report on Control System Failures for the Westinghouse Design was submitted for draft review on December 28, 1984.</li> <li># PNL Risk Assessment Draft Report on Control System Failures for the Babcock &amp; Wilcox Design was submitted for staff review on January 15, 1985.</li> </ul> | FIN NO.            | CONTRACTOR           | OBLIGATED* | EXPENDED** | A-6477 | INEL | \$1,385,000 | \$1,335,000 | B-0467 and B-0816 | ORNL | \$3,850,000 | \$2,950,000 | <p><b>S. DIAB</b>      <b>RSB/DSI</b></p> <hr/> <p>M. CHIRAMAL      PSU/AEOD</p> <hr/> <p>J. T. BEARD      ORAB/DL</p> <hr/> <p>W. KENNEDY      PTRB/DHFS</p> <hr/> | <p><b>ORIGINAL</b>      <u>01-30-86</u></p> <p><b>CURRENT</b>      <u>04-01-86</u></p> |
| FIN NO.   | CONTRACTOR   | OBLIGATED*         | EXPENDED**           |            |            |        |      |             |             |                   |      |             |             |   |  |
| A-6477  | INEL   | \$1,385,000        | \$1,335,000          |            |            |        |      |             |             |                   |      |             |             |   |  |
| B-0467 and B-0816   | ORNL   | \$3,850,000        | \$2,950,000          |            |            |        |      |             |             |                   |      |             |             |   |  |

**B&W-PWR  
PLANT REVIEW  
(OCONEE)**

**SAFETY IMPLICATIONS OF CONTROL SYSTEMS (A-47)**



\* Schedule Change This Report.

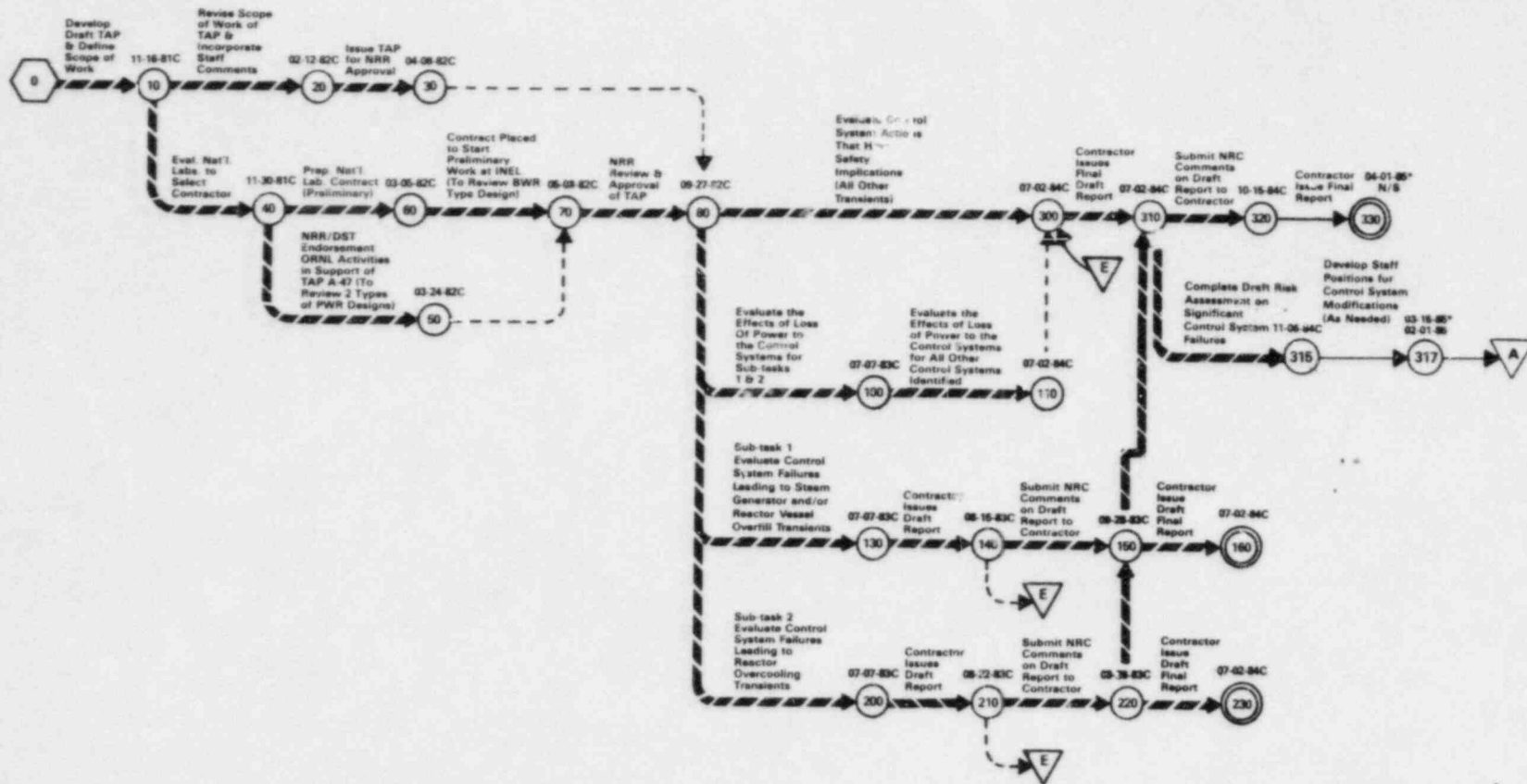


NOTE: This schedule is contingent on the availability of the BG&E simulator for ORNL use, per agreement between RES and BG&E. Simulator studies are to begin in March 1985.

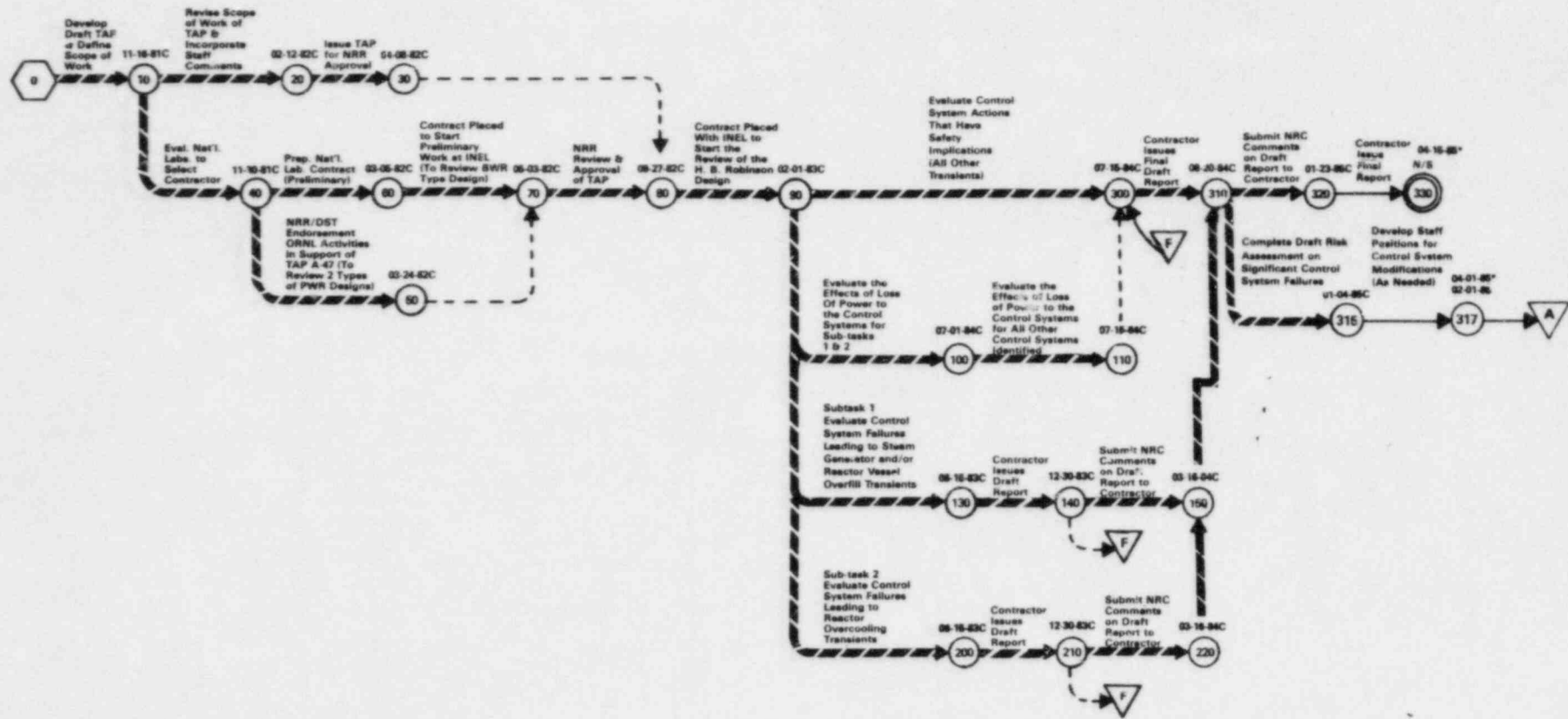
\* Schedule Change This Report.  
N/S = Not Scheduled.

**GE-BWR  
PLANT REVIEW  
(BROWNS FERRY)**

**SAFETY IMPLICATIONS OF CONTROL SYSTEMS (A-47)  
CONTINUED**



\* Schedule Change This Report.  
N/S = Not Scheduled.

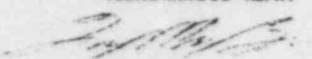


\* Schedule Change This Report.  
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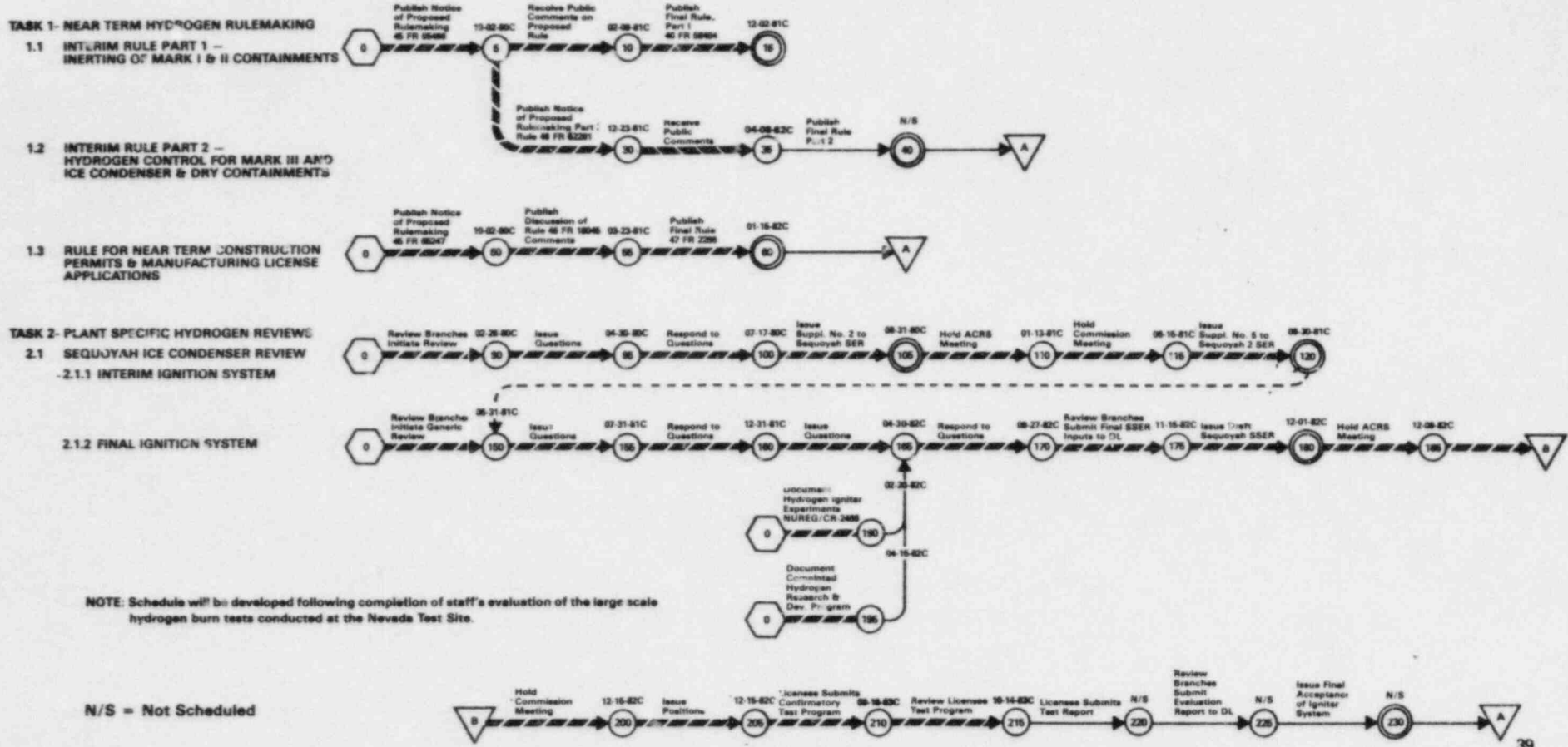


# HYDROGEN CONTROL MEASURES AND EFFECTS OF HYDROGEN BURNS ON SAFETY EQUIPMENT (A-48)

AS OF WEEK ENDING FEBRUARY 15, 1985

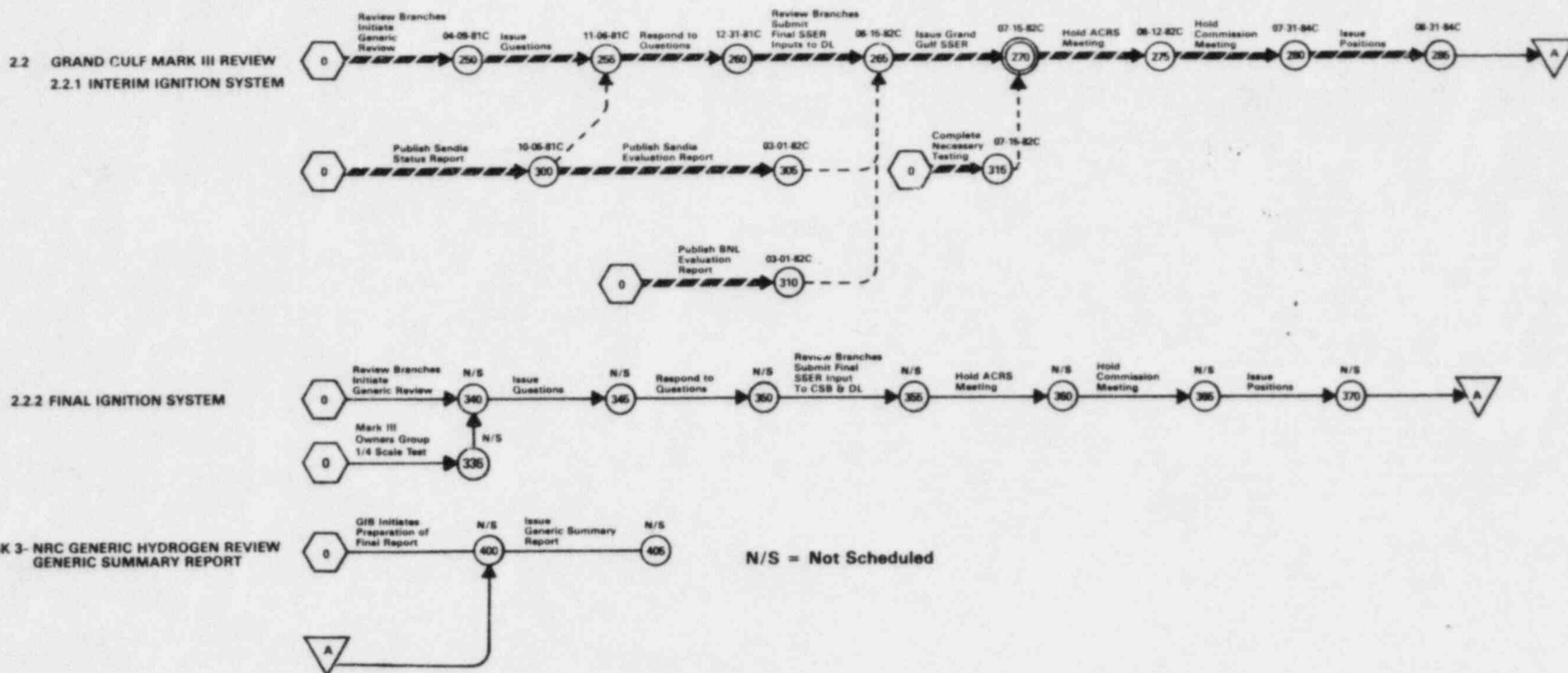
| KEY PERSONNEL  | TASK REVIEWERS   | AS OF WEEK ENDING  | SCHEDULED COMPLETION   |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
|--|--|--|--|----------------|---------------|-----------------|-------------|-------------|-------------|------------|---|---|--------------------|------------|-------------------|--------------|---------------|--------|-----------------|-------------|-----------------|-------------|-------------|-------------|---|----------|-----------------|---------|----------------------|
| <b>TASK MANAGER</b><br>TSUNG MING SU X27477<br><br><b>NRR ANALYST</b><br>JUDY BUTTS X24822  | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>NAME</th> <th>BRANCH</th> </tr> </thead> <tbody> <tr><td>GERALD MAZETIS</td><td>PSRB/DHFS/NRR</td></tr> <tr><td>CHARLES TINKLER</td><td>CSB/DSI/NRR</td></tr> <tr><td>MARC WIGDOB</td><td>RSB/DSI/NRR</td></tr> <tr><td>HUKAM GARG</td><td>EQB/DE/NRR</td></tr> </tbody> </table> | NAME   | BRANCH   | GERALD MAZETIS | PSRB/DHFS/NRR | CHARLES TINKLER | CSB/DSI/NRR | MARC WIGDOB | RSB/DSI/NRR | HUKAM GARG | EQB/DE/NRR  | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>KRYSTOF PARCZEWSKI</th> <th>CEB/DE/NRR</th> </tr> </thead> <tbody> <tr><td>RICHARD CLEVELAND</td><td>RSCB/DST/NRR</td></tr> <tr><td>VERNON ROONEY</td><td>DL/NRR</td></tr> <tr><td>PAT WORTHINGTON</td><td>SAB/DAT/RES</td></tr> <tr><td>MORTON FLEISMAN</td><td>RAB/DRA/RES</td></tr> <tr><td>HAROLD POLK</td><td>SGEB/DE/NRR</td></tr> </tbody> </table> | KRYSTOF PARCZEWSKI | CEB/DE/NRR | RICHARD CLEVELAND | RSCB/DST/NRR | VERNON ROONEY | DL/NRR | PAT WORTHINGTON | SAB/DAT/RES | MORTON FLEISMAN | RAB/DRA/RES | HAROLD POLK | SGEB/DE/NRR | <table border="1" style="width:100%; border-collapse: collapse;"> <tbody> <tr> <td>ORIGINAL</td> <td><u>06 30 85</u></td> </tr> <tr> <td>CURRENT</td> <td><u>Not Scheduled</u></td> </tr> </tbody> </table> | ORIGINAL | <u>06 30 85</u> | CURRENT | <u>Not Scheduled</u> |
| NAME   | BRANCH   |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| GERALD MAZETIS   | PSRB/DHFS/NRR  |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| CHARLES TINKLER  | CSB/DSI/NRR  |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| MARC WIGDOB  | RSB/DSI/NRR  |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| HUKAM GARG   | EQB/DE/NRR   |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| KRYSTOF PARCZEWSKI   | CEB/DE/NRR   |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| RICHARD CLEVELAND  | RSCB/DST/NRR   |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| VERNON ROONEY  | DL/NRR   |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| PAT WORTHINGTON  | SAB/DAT/RES  |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| MORTON FLEISMAN  | RAB/DRA/RES  |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| HAROLD POLK  | SGEB/DE/NRR  |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| ORIGINAL   | <u>06 30 85</u>  |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| CURRENT  | <u>Not Scheduled</u>   |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| <p><b>• PROBLEM DESCRIPTION</b></p> <p>Task A-48 was approved as a USI by the NRC in December 1980.</p> <p>Postulated reactor accidents which result in a degraded or melted core can result in generation and release to the containment of large quantities of hydrogen. The hydrogen is formed from the reaction of the zirconium fuel cladding with steam at high temperatures and/or by radiolysis of water. Experience gained from the TMI-2 accident indicates that we may want to require more specific design provisions for handling larger hydrogen releases than currently required by the regulations particularly for smaller, low pressure containment designs.</p> <p>The scope of this USI is limited to the generic resolution of hydrogen control and equipment qualification for ice condenser and BWR containments, and is based on the licensing case review for these containments.</p> | <p><b>• RES INTERFACE INFORMATION</b></p> <p>There are extensive research programs related to the hydrogen issue sponsored by RES. The results of these research programs will be incorporated into licensing decisions, as appropriate.</p>   | <p><b>• TECHNICAL ASSISTANCE CONTRACTS TO BE DEVELOPED</b></p>   | <p><b>• POTENTIAL PROBLEMS</b></p> <p>The state-of-the-art has substantial uncertainties. Therefore, there is a potential for new findings which may impact the current schedule.</p> <p>The current schedule was developed on the basis of licensing schedules. As of this date, the licensing schedules for Grand Gulf has slipped for more than a year. This slippage will potentially delay the completion date of USI A-48.</p> |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
|  | <p><b>• ACRS INTERFACE INFORMATION TO BE DEVELOPED</b></p>   | <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>FIN NO.</th> <th>CONTRACTOR</th> <th>OBLIGATED</th> <th>EXPENDED</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | FIN NO.  | CONTRACTOR     | OBLIGATED     | EXPENDED        |             |             |             |            | <p><b>• STATUS SUMMARY</b></p> <p>The Task Action Plan (TAP) was approved on 12/03/82, and a detailed schedule has been developed as shown on the following pages.</p> <p>A Commission Paper regarding hydrogen control for Mark III and ice condenser containments was reviewed and endorsed by CRGR on June 1, 1983. The Commission Paper was forwarded to the Commissioners on August 25, 1983. Additional information was provided on December 28, 1983 to justify the staff position on the Commission Paper. On January 18, 1985, the Commission approved issuance of the hydrogen final rule.</p> <p>The results of the large scale hydrogen burn tests conducted at Nevada Test Site show potential challenge to equipment survivability. The staff's preliminary evaluation of the data indicated that the equipment required for safe shut down will survive following a postulated hydrogen burn. Further evaluation of the data is planned.</p> |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
| FIN NO.  | CONTRACTOR   | OBLIGATED  | EXPENDED   |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |
|  |  |  |  |                |               |                 |             |             |             |            |   |   |                    |            |                   |              |               |        |                 |             |                 |             |             |             |   |          |                 |         |                      |

# HYDROGEN CONTROL MEASURES & EFFECTS OF HYDROGEN BURNS ON SAFETY EQUIPMENT (A-48)



# HYDROGEN CONTROL MEASURES & EFFECTS OF HYDROGEN BURNS ON SAFETY EQUIPMENT (A-48)

CONTINUED



# PRESSURIZED THERMAL SHOCK (A-49)

AS OF WEEK ENDING FEBRUARY 15, 1985

## KEY PERSONNEL

### TASK MANAGER

ROY WOODS X24714

*Roy Woods*

### NRR ANALYST

JUDY BUTTS X24822

## TASK REVIEWERS

NAME BRANCH

E. THROM RSB/NRR

C. JOHNSON RES

L. LOIS CPB/DSI

M. VAGINS RES

R. JOHNSON GIB/DST

R. KLECKER MTEB/DE

N. RANDALL MTEB/DE

G. VISSING ORB-4/DL

J. CLIFFORD PTRB/HFS

S. ISRAEL RRAB/DST

## SCHEDULED COMPLETION

ORIGINAL Not Determined

CURRENT 03-31-86

### • PROBLEM DESCRIPTION

This task was designated a USI by the NRC in December 1981.

Neutron irradiation of reactor pressure vessel weld and plate materials decreases the fracture toughness of the materials. The fracture toughness sensitivity to radiation induced change is increased by presence of certain materials such as copper. Decreased fracture toughness makes it more likely that, if a severe overcooling event occurs followed by or concurrent with high vessel pressure, and if a small crack is present on the vessels inner surface, that crack could grow to a size that might threaten vessel integrity.

Severe pressurized overcooling events are improbable since they require multiple failures and improper operator performance. However, certain precursor events have happened that could have potentially threatened vessel integrity if additional failures had occurred and/or if the vessel had been more highly irradiated. Therefore, the possibility of vessel failure due to a severe pressurized overcooling event cannot be ruled out.

### • RES INTERFACE INFORMATION

A major portion of the work is being performed under a contract with Oak Ridge National Laboratory through the Division of Risk Analysis, RES (FIN # B0468).

Other major contributors are:

Primary System Integrity Research Program through the Division of Engineering Technology, RES and

Code Applications Program through the Division of Accident Evaluation, RES

### • ACRS INTERFACE INFORMATION

Meetings have been held and will be scheduled as necessary with the Subcommittee on Metallic Components and with the full ACRS. The latest Subcommittee meeting was held on May 17, 1984

# The latest ACRS Committee meetings on this subject were held on October 12, 1984 and February 7, 1985.

### • TECHNICAL ASSISTANCE CONTRACTS

Contract (B-2510) issued to PNL. PNL will perform sensitivity studies using the VISA code, and investigate vessel failure modes due to PTS.

The following RES contracts are providing technical assistance to the PTS program. These are in addition to the technical assistance contracts which were initiated to specifically address the PTS issue and listed in the table below.

| FIN NO. | LAB         | DESCRIPTION                 |
|---------|-------------|-----------------------------|
| G-1047  | Purdue      | Mixing Calculations         |
| A-4070  | Creare      | Mixing Experiments          |
| A-3286  | BNL         | T-H Calculation Comparisons |
| A-7306  | LASL        | SOLA Mixing Calculations    |
| A-7315  | LASL        | TRAC T-H Calculations       |
| A-4047  | INEL        | RELAP T-H Calculations      |
| B-0468  | ORNL        | Integrated PTS Study        |
| B-0119  | ORNL        | HSST Experiments            |
| B-8900  | ENSA        | Struct. Integrity           |
| B-6290  | NSRDC       | Spectrum Shape              |
| B-7026  | USNA        | Rapid J-R Curve             |
| B-8942  | Gundramming |                             |
| B-2853  | PNL         | Vise Development            |
| B-5886  | HEDL        | Dosimetry                   |
| B-0415  | ORNL        | P. V. Simulation            |
| B-6224  | NBS         | Dosimetry                   |
| B-2285  | PNL         | NDE                         |
| B-2467  | PNL         | NDE                         |
| B-2086  | PNL         | Acoustic                    |

### FIN NO. CONTRACTOR OBLIGATED EXPENDED

|        |      |             |        |
|--------|------|-------------|--------|
| B-2510 | PNL  | \$1031K     | \$811K |
| A-7272 | LANL | \$580K-FY83 | \$580K |
| A-3701 | BNL  | \$200K      | \$200K |

### • POTENTIAL PROBLEMS

#### • STATUS SUMMARY

The Task Action Plan for A-49 was approved and issued on March 26, 1982.

NRC Staff PTS recommendations (SECY-82-485) were approved by the Commission in December 1982. A new rule for PTS resolution was published for public comment on February 7, 1984. The proposed final rule, taking the public comments into account, will be submitted to the Commission for approval during March 1985.

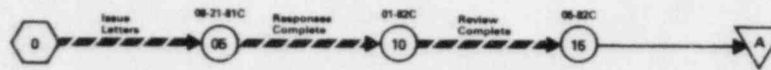
The TAP has been extensively revised (Revision 1) to reflect division of the program into two parts, a short term program, "Development of a PTS Rule" and a long term program that will provide "Guidance and Acceptance Criteria for the Analyses to be Required by the PTS Rule." The revised TAP describes issuance of the new rule, confirmatory studies now underway to support the new rule, and the plant-specific analyses and other requirements that will be included in the new rule.

A status report regarding flux reduction efforts was sent to the Commission on February 25, 1983 (SECY-83-76). The final report was submitted on October 26, 1983 (SECY-83-443).

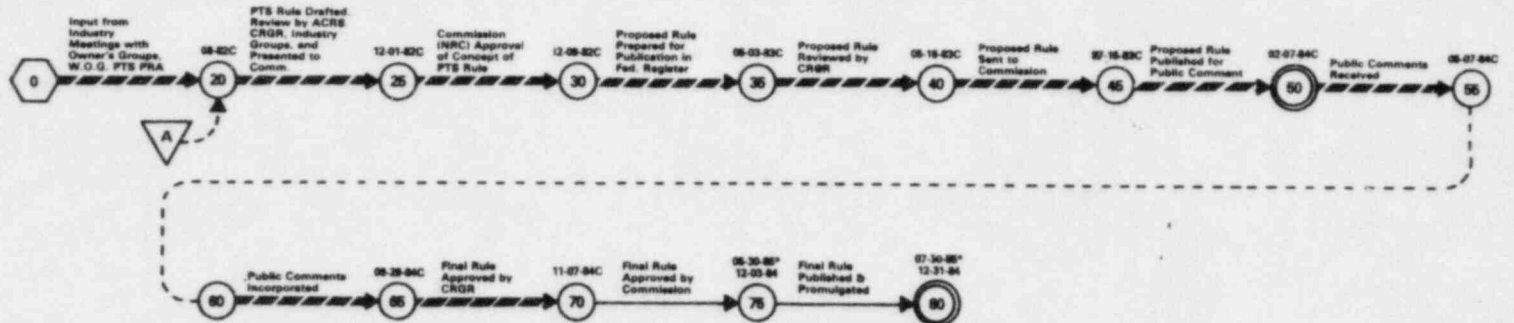
Revision 1 of the TAP as described above was approved on November 22, 1983 by the Director of NRR. Revision 2, containing minor scheduled changes, was submitted to the Director of NRR for approval in March 1984.

# PRESSURIZED THERMAL SHOCK (A-49) SHORT TERM PROGRAM

**TASK A:**  
Review of information requested by August 21, 1981 letters to industry groups and eight selected utilities



**TASK B:**  
Promulgation of a new PTS Rule



**TASK C:**  
Consideration of flux reduction options for lead plants †



\* Schedule Change This Report

† PTS Rule also requires consideration of flux reduction option for all PWRs. This Task (C) is such consideration in the immediate future to prevent preclusion of this option for the oldest (lead) plants.

# PRESSURIZED THERMAL SHOCK (A-49) LONG TERM PROGRAM

**Task 1:**

Development of a Revised Regulatory Guide 1.99

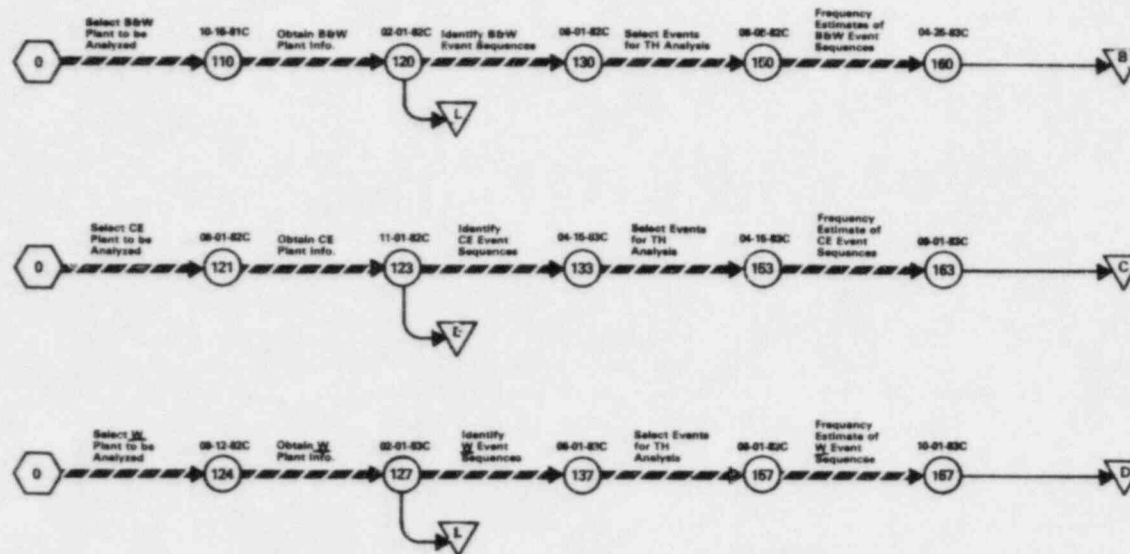
Draft revision of the trend curves in Reg. Guide 1.99, Revision 1, "Effects of Residual Elements on Predicted Radiation Damage to Reactor Vessel Materials": This task is no longer considered to be necessary for completion of A-49. Its scheduled completion is a longer term item than A-49, and adequate guidance regarding this subject is contained within Task (B). A detailed schedule for this task is therefore not presented.

**Task 2:**

Ongoing Program to Improve Procedures and Operator Training

This program is ongoing separate from the A-49 PTS effort and is much broader than PTS, considering PTS as one of the many types of incidents for which procedures and training should be improved, on a combined/integrated basis. Generic Letter 82-33 contains a description of the overall program and schedule. The PTS effort cannot and should not be separated from the overall effort, and so a detailed PTS schedule is not presented here. The ongoing program will be completed and applied to each plant, however, on a schedule compatible with completion of the final PTS resolution for each plant (i.e., before acceptance of plant specific analyses required by the PTS rule, Task (B) above.)

**Task 3:**  
Determination of Event Sequences to be Considered



# PRESSURIZED THERMAL SHOCK (A-49)

## LONG TERM PROGRAM

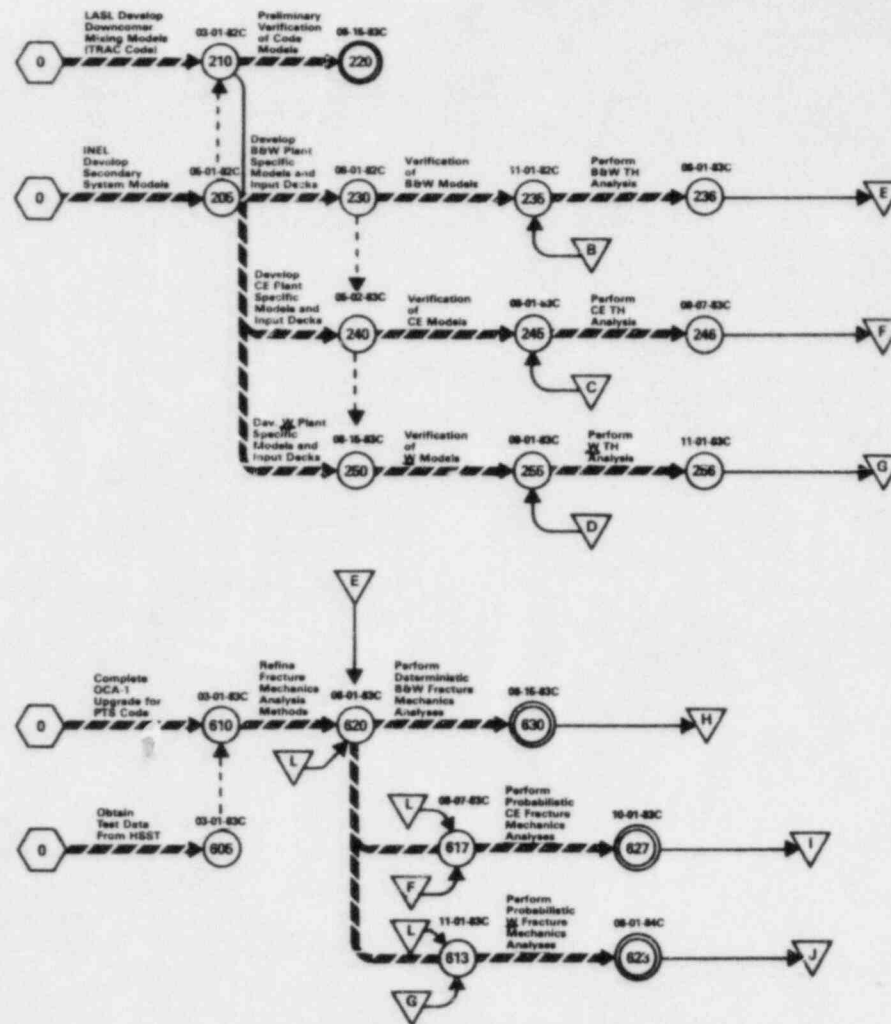
(CONTINUED)

Task 4:  
Transient Model Development  
& Verification

Task 5:  
Calculation of  
P(t) and T(t)

Task 6:  
Improvements in Methods  
and Data for Fracture  
Mechanics and Calculations

Task 7:  
Vessel Failure Analysis

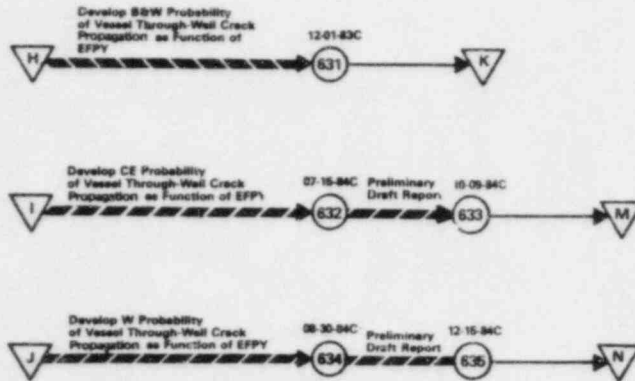


# PRESSURIZED THERMAL SHOCK (A-49)

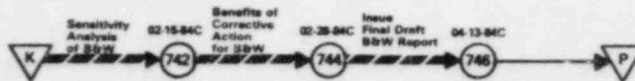
## LONG TERM PROGRAM

### (CONTINUED)

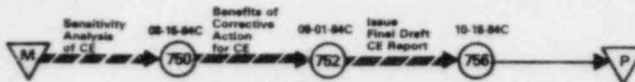
Task 8:  
Integration of Results



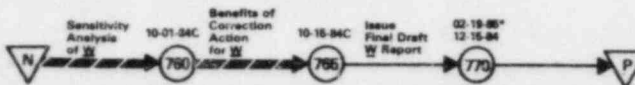
Task 9:  
Plant-Specific Sensitivity Studies, Benefits of Corrective Actions, and Draft Final Report for B&W Plant



Task 10:  
Plant-Specific Sensitivity Studies, Benefits of Corrective Actions, and Draft Final Report for CE Plant



Task 11:  
Plant-Specific Sensitivity Studies, Benefits of Corrective Actions, and Draft Final Report for W Plant

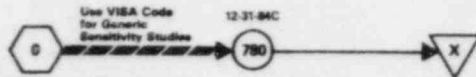


\* Schedule Change This Report.

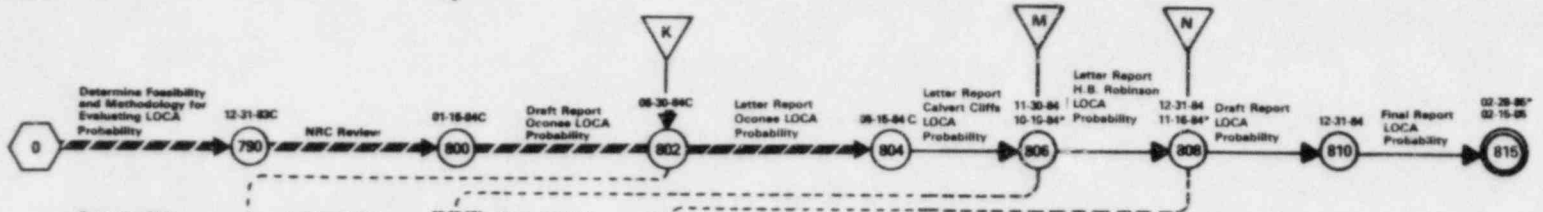


# PRESSURIZED THERMAL SHOCK (A-49) LONG TERM PROGRAM (CONTINUED)

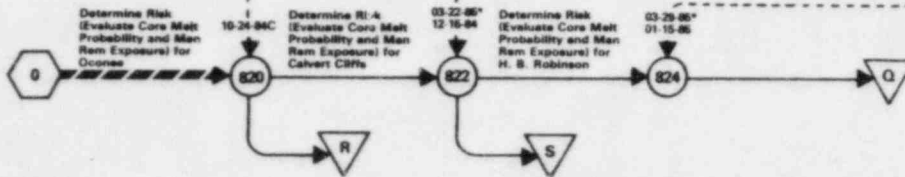
Task 12:  
Generic Sensitivity Studies



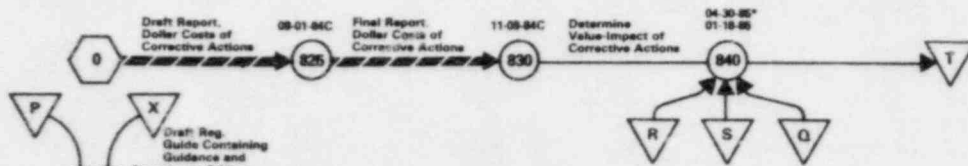
Task 13:  
Determine LOCA Probability



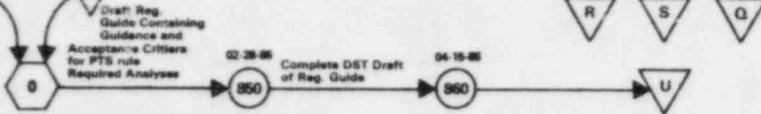
Task 14:  
Determine Risk



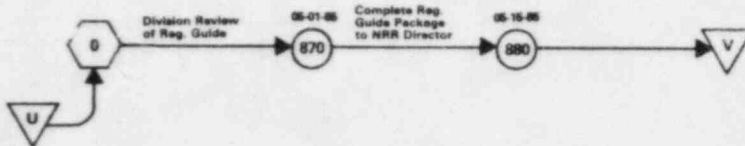
Task 15:  
Value-Impact



Task 16:  
Regulatory Position

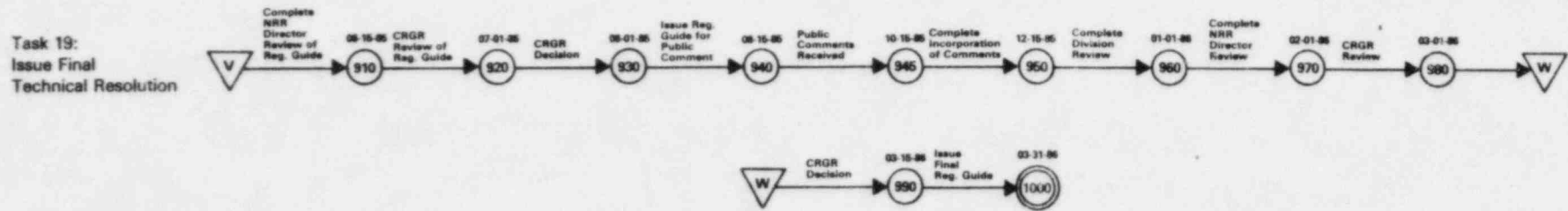
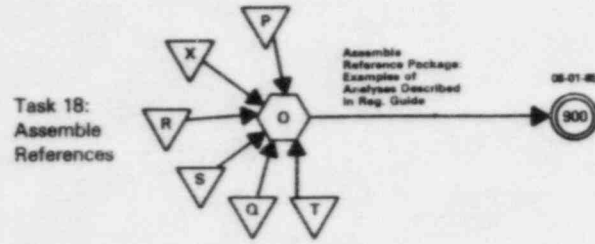


Task 17:  
Internal Review



\* Schedule Change This Report.

# PRESSURIZED THERMAL SHOCK (A-49) LONG TERM PROGRAM (CONTINUED)



|   |  |   |  |   |  |
|---|--|---|--|---|--|
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