U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Meeting Nos.: 50-387/89-08
50-388/89-08

Docket Nos.: 50-387
50-388

License Nos.: NPF-14
NPF-22

Licensee: Pennsylvania Power and Light Company
2 North Ninth Street
Allentown, Pennsylvania 18101

Facility Name: Susquehanna Steam Electric Station

Meeting At: USNRC, Region I, King of Prussia, Pennsylvania

Meeting Conducted: March 21, 1989

Reviewed By: _____ 3-30-89
for Francis I. Young, Senior Resident Inspector Date
Susquehanna Steam Electric Station

Approved By: _____ 3-30-89
A. Randy Blough, Chief Date
Reactor Projects Section No. 3B
Division of Reactor Projects

Meeting Summary:

A management meeting was held at NRC Region I on March 21, 1989, to discuss (1) the licensee's review and lessons learned from the 1988 refueling outage at Unit 2, and (2) the licensee's plans, including scheduled activities and management controls to be applied, for upcoming refueling outages at Units 1 and 2.

Results:

Licensee presentations were thorough and were responsive to NRC Region I needs for information. Based on this presentation, it appears that the licensee has performed appropriate review of the 1988 Unit 2 outage and is prepared to apply the resultant lessons learned to future outages.

4b

DETAILS

1.0 Purpose and Attendees

The meeting was held to discuss (1) the licensee's review and lessons learned from the 1988 Unit 2 refueling outage and (2) the licensee's plans, including scheduled activities and management controls to be applied, for the 1989 refueling outages at both units.

The meeting was attended by those persons listed in Attachment 1.

2.0 Meeting Summary

After brief opening remarks by the NRC Region I Reactor Projects Section Chief and the licensee's Senior Vice President - Nuclear, the licensee presented detailed discussions on: licensee management values; outage lessons learned; 1989 management initiatives; 1989 outage plans, scheduled activities, and management controls; and nuclear safety during outages. Attachment 2 contains copies of the overhead projector transparencies used by the licensee. Each presentation led to detailed, open discussions among the various NRC and licensee participants.

The meeting lasted about two and one-half hours.

3.0 Conclusion

The licensee was well-prepared for the meeting and their presentations were responsive to NRC information needs. The meeting provided a forum for frank exchange of information. Based on the licensee's presentations, it appeared that the licensee has performed an appropriately detailed review of the 1988 Unit 2 refueling outage and is prepared to apply the resultant lessons learned to future outages.

Attachments:
1. Meeting Attendees
2. Licensee Presentation Materials

ATTACHMENT 1

Outage Lessons Learned Meeting - March 21, 1989 Attendees

Pennsylvania Power and Light Company

H. W. Keiser, Senior Vice President - Nuclear
R. G. Byram, Plant Superintendent - SSES
A. M. Male, Manager - Nuclear Plant Engineering
J. R. Miltenberger, Manager - Nuclear Safety Assessment
H. G. Stanley, Assistant Superintendent - Outages
E. A. Heckman, Licensing Group Supervisor
F. S. Gruscavage, Site Supervisor - Nuclear Safety Assessment
D. F. Roth, Senior Compliance Engineer
R. L. Doty, Supervisor - Radiological & Environmental Services
F. G. Butler, Manager - Nuclear Design

Atlantic Electric

L. Fink, Project Supervisor

United States Nuclear Regulatory Commission

J. T. Wiggins, Chief, Reactor Projects Branch No. 3, Division of Reactor Projects (DRP)
A. R. Blough, Chief, Reactor Projects Section, 3B, DRP
F. I. Young, Senior Resident Inspector - SSES
J. R. Stair, Resident Inspector - SSES
T. T. Martin, Director, Division of Reactor Safety (DRS)
N. J. Blumberg, Chief, Operations Section, DRS
B. Clayton, Regional Coordinator, Office of the Executive Director for Operations
M. Thadani, Project Manager, Office of Nuclear Reactor Regulation

ATTACHMENT 2

OUTAGE MANAGEMENT ATTRIBUTES

- OUTAGES PLANNED INDEPTH AND WELL EXECUTED
- DYNAMIC OUTAGE MANAGEMENT PROGRAM
- STRONG MANAGEMENT TEAM
- FUNDAMENTAL VALUE: LEARN FROM OUR EXPERIENCES
- MATERIAL CONDITION IS EXCELLENT
- INVOLVEMENT OF ENTIRE ORGANIZATION
- COMPREHENSIVE INDEPENDENT PRE-OUTAGE ASSESSMENTS

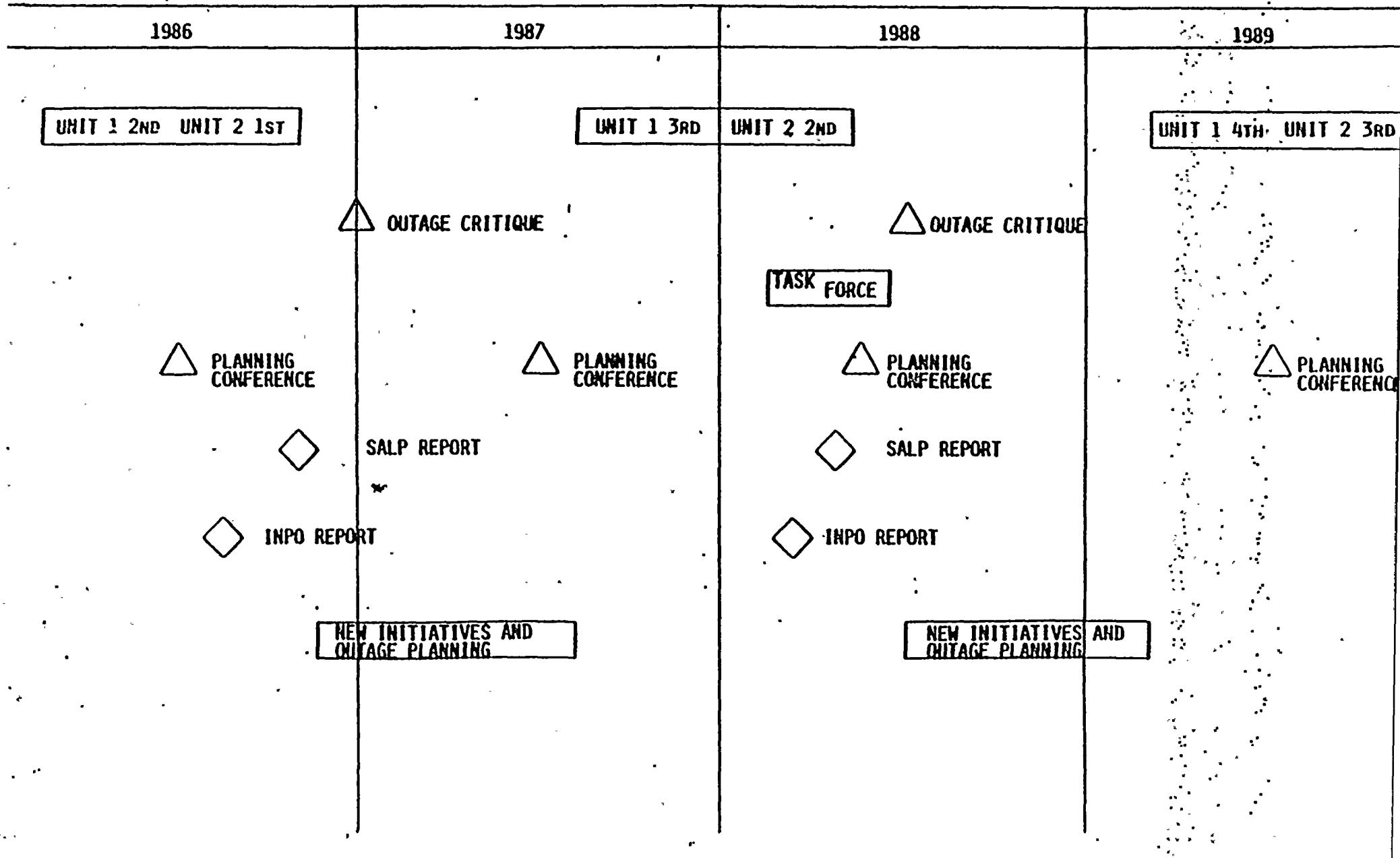
NUCLEAR DEPARTMENT VALUES

MISSION: TO ACHIEVE EXCELLENCE IN THE OPERATION, MAINTENANCE AND SUPPORT OF SUSQUEHANNA AND BY SO DOING, BE RECOGNIZED AS ONE OF THE BEST NUCLEAR UTILITY ORGANIZATIONS IN THE UNITED STATES.

- HIGH STANDARDS: THE FOUNDATION OF EXCELLENCE
- EMPLOYEES: OUR MOST VALUABLE ASSET
- IMPROVEMENT: FROM EVENTS AND EMPLOYEES
- TEAMWORK: OUR ORGANIZATIONAL CLIMATE
- PERFORMANCE: THE MEASUREMENT OF SUCCESS
- RISING EXPECTATIONS: THE CHALLENGE OF THE FUTURE

- PLANNING
- PEOPLE: MAJOR THEME FOR 1988
- TWO EXAMPLES OF EMPLOYEE INVOLVEMENT
  - UNIT 2 2ND REFUEL TASK FORCE
  - MAINTENANCE OER
- 1989 INITIATIVES

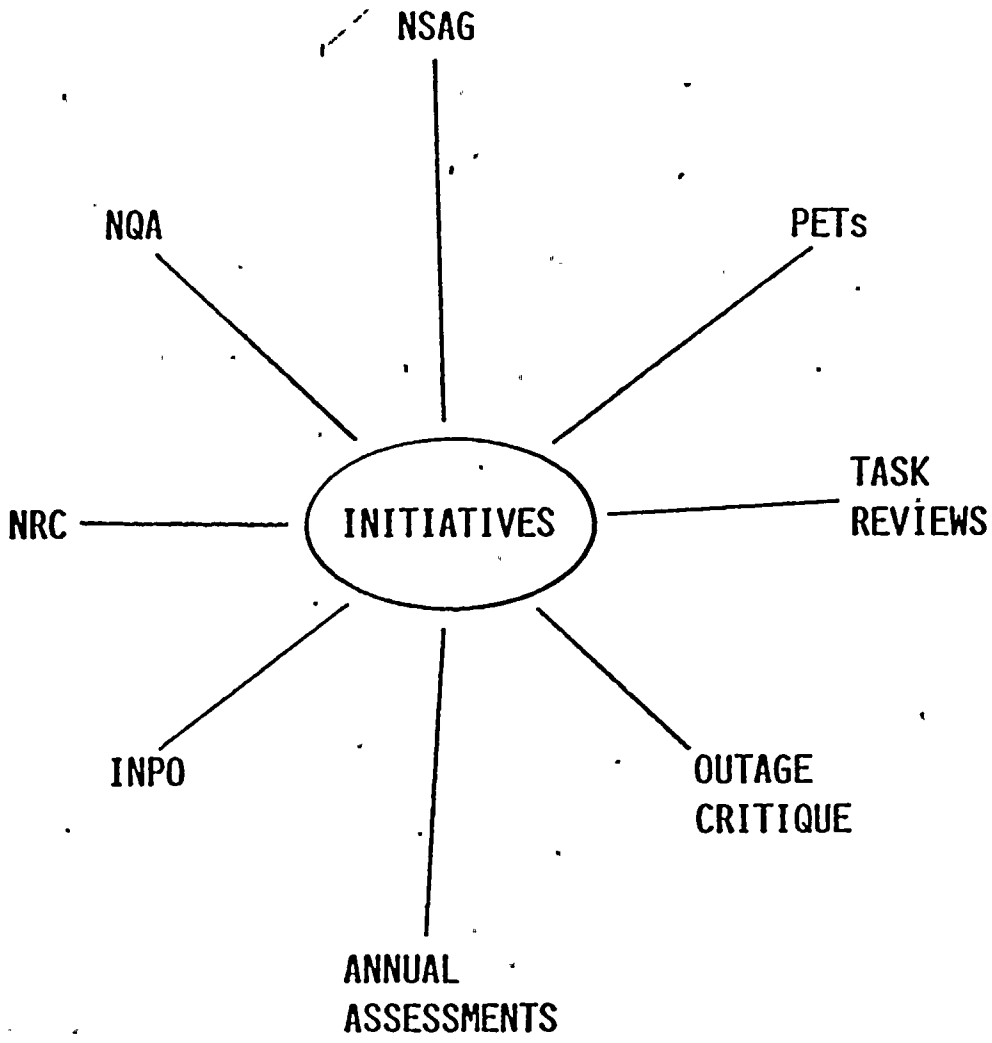
PLANNING CYCLE



SOURCES OF INFORMATION

- INTERNAL
  - DEFICIENCY CONTROL PROGRAMS
    - SOOR
    - NCR
    - LER
  - NQA
    - SURVEILLANCES
    - AUDITS
  - NSAG
    - ROUTINE REVIEWS
    - SPECIAL REVIEWS
  - PERFORMANCE ENHANCEMENT TEAMS
  - OUTAGE CRITIQUES
  - TASK SPECIFIC REVIEWS
  - ANNUAL ASSESSMENTS
    - SRC
    - NUCLEAR SERVICES

- EXTERNAL
  - NRC
    - INSPECTIONS
    - SALP
  - INPO
    - SOERs
    - ROUTINE
    - OUTAGE
    - ASSISTANCE
  - INSURANCE COMPANIES


NSAG
NQA
PETs
NRC
INITIATIVES
TASK
REVIEWS
INPO
OUTAGE
CRITIQUE
ANNUAL
ASSESSMENTS

- PLANNING

- PEOPLE: MAJOR THEME FOR 1988
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PEOPLE:MAJOR THEME FOR 1988

E M P L O Y E E I N V O L V E M E N T

&

E M P L O Y E E D E V E L O P M E N T

1988 EMPLOYEE INVOLVEMENT/DEVELOPMENT INITIATIVES

- MANAGEMENT/SUPERVISORY TRAINING
- DEPARTMENT PERFORMANCE ENHANCEMENT TEAM
- TASK SPECIFIC PERFORMANCE ENHANCEMENT TEAMS
- ORGANIZATIONAL EFFECTIVENESS REVIEWS

MANAGEMENT/SUPERVISORY TRAINING PROGRAM

- LEADERSHIP SKILL TRAINING

- ALL DEPARTMENT SUPERVISION (SR. V.P. TO FOREMEN)

- SENIOR MANAGEMENT PILOT PROGRAM

- SENIOR MANAGEMENT CLASS LEADS
  - 17 GROUPS

- 275 DEPARTMENT SUPERVISORS

- INSTRUCTORS WERE EXPERTS IN THEIR FIELD

- CURRICULUM
  - DEPARTMENT MISSION AND VALUES
  - COMMUNICATION
  - COACHING
  - INTERPERSONNEL SKILLS
  - TEAM WORK & EMPLOYEE INVOLVEMENT

- PLANNING

- PEOPLE: MAJOR THEME FOR 1988

  - TWO EXAMPLES OF EMPLOYEE INVOLVEMENT

    - UNIT 2 2ND REFUEL TASK FORCE

    - MAINTENANCE QER

  - 1989 INITIATIVES

UNIT 2 2ND REFUEL TASK FORCE

OBJECTIVE: COMPREHENSIVE ANALYSIS OF ACTIVITIES THAT DID NOT MEET MANAGEMENT EXPECTATIONS.

SCOPE: FORTY TWO UNIQUE ACTIVITIES

METHODOLOGY:

- o DEVELOP STATION ROOT CAUSE PROCESS AND APPLY TO SCOPE.
- o EMPHASIS ON GENERIC CAUSAL FACTORS.

TASK FORCE COMPOSITION

I&C SUPERVISOR - LEADER

SR. ENGINEER - QC

SR. ENGINEER - OPERATIONS

ASST. FOREMAN - I&C

SR. ENGINEER - NSAG

UNIT SUPERVISOR

UNIT COORDINATOR

ASST. FOREMAN - MAINTENANCE

CONSTRUCTION SUPERVISOR

SR. HEALTH PHYSICIST

SR. COMPLIANCE ENGINEER

MAINTENANCE PLANNING & SCHEDULING SUPERVISOR

RESULTS

- SAME WORK MANAGEMENT STRATEGY
  - OUTAGE VS NON-OUTAGE
- ACCOUNTABILITY
  - WORK GROUP/FUNCTION
  - INDIVIDUAL
- COMMUNICATION OF MANAGEMENT EXPECTATIONS TO THE INDIVIDUAL WORKER
- ADOPTION OF ROOT CAUSE METHODOLOGY AS STANDARD
- RESPONSIVENESS TO ENGINEERING ISSUES

- PLANNING
- PEOPLE: MAJOR THEME FOR 1988
  - o TWO EXAMPLES OF EMPLOYEE INVOLVEMENT
    - UNIT 2 2ND REFUEL TASK FORCE
    - MAINTENANCE OER
  - o 1989 INITIATIVES

BACKGROUND

MAINTENANCE OPERATIONAL EFFECTIVENESS REVIEW

- O OVER THE YEARS, MAINTENANCE AT SUSQUEHANNA HAS BEEN PERFORMED BY THREE SEPARATE ORGANIZATIONS.
  - PLANT STAFF
  - E&S CONSTRUCTION
  - GPA CONTRACTOR (CATALYTIC)
- O QUALITY OF MAINTENANCE WORK BY ALL GROUPS IS EXCELLENT.
  - MATERIAL CONDITION OF PLANT
  - OPERATING RECORD OF UNITS
- O INDIVIDUAL ORGANIZATIONS EACH HAVE A UNIQUE CULTURE, PROVIDING THEM WITH DIFFERENT SETS OF POSITIVE ATTRIBUTES.
  - ORGANIZATIONS ARE INDIVIDUALLY EFFECTIVE
- O FUNCTIONAL EFFICIENCY OF THREE ORGANIZATIONS WAS AN OBVIOUS OPPORTUNITY FOR STUDY AND ENHANCEMENT.

MAINTENANCE OPERATIONAL EFFECTIVENESS REVIEW

OBJECTIVE: IDENTIFY OPPORTUNITIES FOR IMPROVING EFFICIENCIES IN OUR MAINTENANCE FUNCTION.

SCOPE: MAJOR SITE GROUPS PERFORMING PHYSICAL MAINTENANCE.

METHODOLOGY: EXTENSIVE AND COMPREHENSIVE CUSTOMER/WORKER INTERVIEWS.

THOROUGH REVIEW OF FUNCTIONAL ANALYSIS REPORTS.

IDENTIFY ORGANIZATIONAL EFFICIENCY IMPROVEMENTS.

COMPOSITION OF TEAM

- I&C SUPERVISOR
- RESIDENT ENGINEERING SUPERVISOR
- P&A SUPERVISOR
- MAINTENANCE SERVICES SUPERVISOR
- ASST. FOREMAN - MECH MAINTENANCE
- SUPV.-FIELD COST AND SCHEDULE
- CONSTRUCTION PRODUCTION SUPERVISOR
- CONSTRUCTION FOREMAN
- CONSTRUCTION SUPERVISOR - RESOURCES & TRAINING
- SUPERVISOR OF MAINTENANCE - SUNBURY
- CONSTRUCTION SUPERVISOR

RESULTS

- SINGLE MAINTENANCE MANAGER
- ORGANIZE BY FUNCTION
- RETAIN OUTAGE ORGANIZATIONAL STRATEGY FOR NON-OUTAGE
- RECOGNIZE LIMITATIONS ON CHANGE IMPOSED BY A TWO REFUEL OUTAGE YEAR
- PHASED IMPLEMENTATION OVER FIVE YEARS
  - ORGANIZATIONAL
  - PROCESS
  - SUPPORT
- PHASE I COMPLETED JANUARY 15, 1989
- COMPLETION OF OER AND RESULTANT CHANGES ARE THE FIRST STEP OF A MULTI-YEAR EFFORT TO DEVELOP A MAINTENANCE FUNCTION THAT IS A LEADER IN OUR INDUSTRY.

- PLANNING
- PEOPLE: MAJOR THEME FOR 1988
- TWO EXAMPLES OF EMPLOYEE INVOLVEMENT
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  - MAINTENANCE OER
- 1989 INITIATIVES

1989 INITIATIVES

- REINFORCE ACCOUNTABILITY
  - ESTABLISHED OUTAGE TEAM FOR CONSECUTIVE OUTAGES
  - IMPLEMENTED PHASE I OF MAINTENANCE OER
- PROMULGATION OF MANAGEMENT EXPECTATIONS
  - WROTE/REVISED STATION POLICIES
  - IDENTIFIED INDIVIDUAL EXPECTATIONS
  - EXTENSIVE DISSEMINATION AND TRAINING
  - EXAMPLES
    - PROCEDURE ADHERENCE
    - DEFENSE IN DEPTH
    - CONTAMINATION CONTROL
    - STATUS CONTROL
- ADJUST EXISTING WORK PROCESSES
  - STATUS CONTROL
  - MAINTENANCE PLANNING
  - PANEL ACCESSIBILITY
- ENHANCE THE CORRECTIVE ACTION AND ENGINEERING RESOLUTION PROCESS
  - ROOT CAUSE METHODOLOGY
  - ROOT CAUSE TRAINING
  - IMPLEMENTED ECO

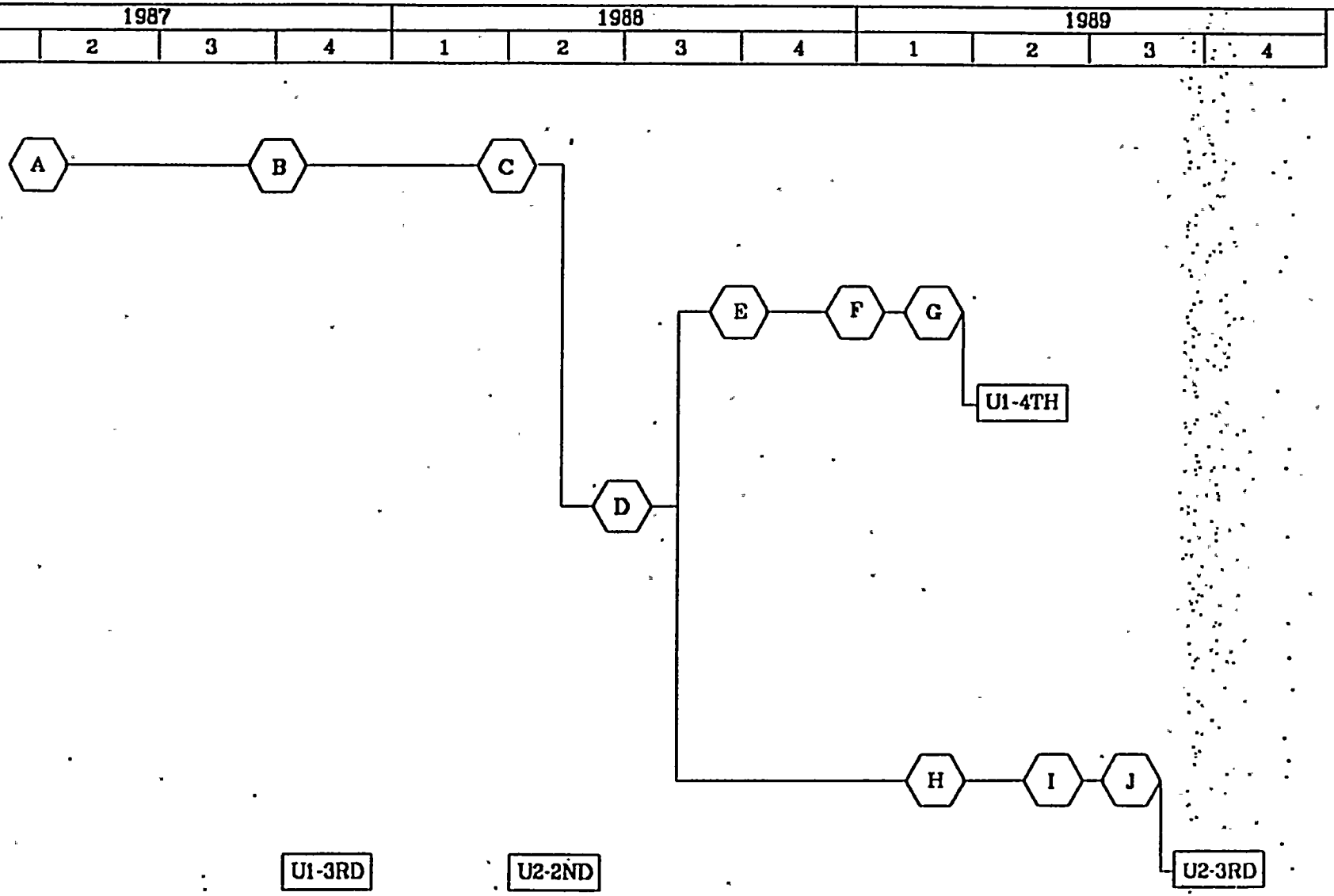
OUTAGE MANAGEMENT ATTRIBUTES

- OUTAGES PLANNED INDEPTH AND WELL EXECUTED
- DYNAMIC OUTAGE MANAGEMENT PROGRAM
- STRONG MANAGEMENT TEAM
- FUNDAMENTAL VALUE: LEARN FROM OUR EXPERIENCES
- MATERIAL CONDITION IS EXCELLENT
- INVOLVEMENT OF ENTIRE ORGANIZATION
- COMPREHENSIVE INDEPENDENT PRE-OUTAGE ASSESSMENTS

1989 OUTAGE REVIEW

- HOW WE PREPARE FOR OUTAGES
- IMPROVEMENTS FOR 1989 OUTAGES
- DESCRIPTION OF 1989 OUTAGES

OUTAGE PLANNING MILESTONES



REFUELING OUTAGE SCHEDULE DEVELOPMENT
MAJOR GUIDELINES

1) TECHNICAL SPECIFICATION REQUIREMENTS

   A. ECCS
   B. CORE COOLING
   C. CORE CIRCULATION
   D. CORE ALTERATIONS
   E. SECONDARY CONTAINMENT
   F. PRIMARY CONTAINMENT

2) MODIFICATIONS

   A. SYSTEM IMPACT/ACCESS
   B. WORK PACKAGE DEVELOPMENT
   C. DURATION
   D. RETEST REQUIREMENTS

3) ESTABLISHED THRU VESSEL CRITICAL PATH ACTIVITIES

   A. SHUTDOWN
   B. CAVITY FLOODING
   C. CORE & INVESSEL WORK
   D. VESSEL RESTORATION

4) WATER RELATED PROBLEMS

   A. VESSEL CLARITY
   B. WATER MANAGEMENT
   C. FUEL POOL COOLING

5) DIVISIONAL WORK

A. RHR
B. CS
C. ELECTRICAL SYSTEMS

6) SURVEILLANCE SPECIFIC

A. LLRT'S
B. MAJOR INTEGRATED TESTS
C. LOGIC FUNCTIONALS
D. DG TESTING

7) MAINTENANCE WORK DOCUMENTS

A. WA'S
B. PM'S
C. BULK SURVEILLANCES

8) PERMITS

A. SYSTEM PERMITS
B. INDIVIDUAL PERMITS

9) OVERALL SCHEDULE EVALUATION

A. CRITICAL PATH
B. BULKS
C. MANPOWER

HP PLANNING

- DEDICATED HP SCHEDULER/PLANNER
- SCHEDULE CAN BE SORTED BY HP CONTROL POINT
- ALARA CONCERNS ARE FACTOR INTO OUTAGE SCHEDULE
- STAGING OF SHIELDING
- INCREASED DECON ACTIVITIES

We plan schedule windows & perform
ALARA: FLUSHES
SHIELDING
RTC

PRE-OUTAGE PERFORMANCE INDICATOR LISTING

1. OUTAGE DOCUMENT PLANNING CURVE

2. PRE-OUTAGE DOCUMENT PLANNING CURVE

3. PRE-OUTAGE MANHOUR BURNOFF CURVE

4. PERSONNEL ACCESS PROCESSING PLANNING CURVE

5. WA MATERIAL PROCUREMENT TREND CURVE

6. MOD MATERIAL PROCUREMENT TREND CURVE

7. OUTAGE PLANNING ACTIVITY PROGRESS PLOTS (P/2)

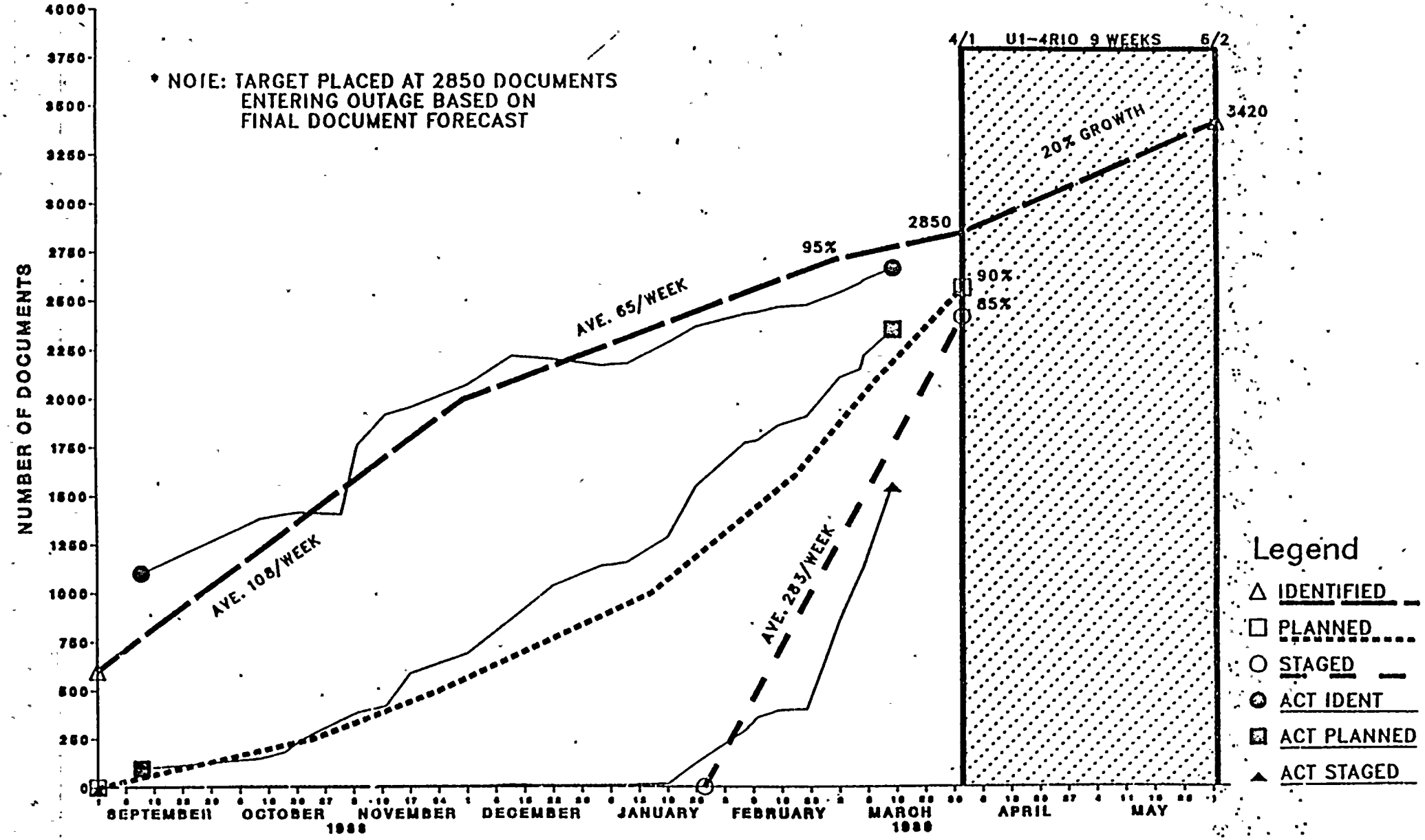
8. OUTAGE PLANNING MILESTONE INDICATORS

9. OUTAGE RESOURCE PLAN OVERVIEW PLOT

10. INDIVIDUAL WORK GROUP RESOURCE PLOTS

11. DOCUMENT PLANNING STATISTICS (VARIOUS TABULAR REPORTS)

UNIT 1 FOURTH REFUELING & INSPECTION OUTAGE
WORK DOCUMENT TREND FORECASTS



STATUS: MAR 15, 1989

IMPROVEMENTS FOR UPCOMING OUTAGES

MISSION OF OUTAGE MANAGEMENT

- o SCHEDULE CONTROL
- o SCOPE CONTROL
- o COMMUNICATION PLAN FOR PREPARATION AND CONDUCT
- o INTEGRATE LINE MANAGEMENT PLANS & SCHEDULES
- o LEVELIZE RESOURCES
- o CONTINUOUSLY EVALUATE OUTAGE OBJECTIVES
- o KEEPS ALL LEVELS OF MANAGEMENT INFORMED

THE KEY CONCEPT OF THE NEW MAINTENANCE ORGANIZATION IS CLEAR ACCOUNTABILITY OF THE LINE ORGANIZATION FOR OUTAGE AND NON-OUTAGE WORK. THIS IS ACCOUNTABILITY FOR SAFETY, PRODUCTION, SCHEDULE AND COST. WE HAVE COMMITTED THE PLANT STAFF MANAGEMENT RESOURCES TO IMPLEMENT THIS CONCEPT.

FUNCTIONAL TEAM ORGANIZATION

- LINE MANAGEMENT ACCOUNTABILITY
- INTEGRATION OF VARIOUS WORK GROUPS UNDER SINGLE LINE MANAGER
- SCHEDULING
- ENGINEERING SUPPORT
- ALARA SPECIALIST ASSIGNED

UNIT 1 FOURTH REFUEL & INSPECTION OUTAGE
RESOURCE PLAN OVERVIEW

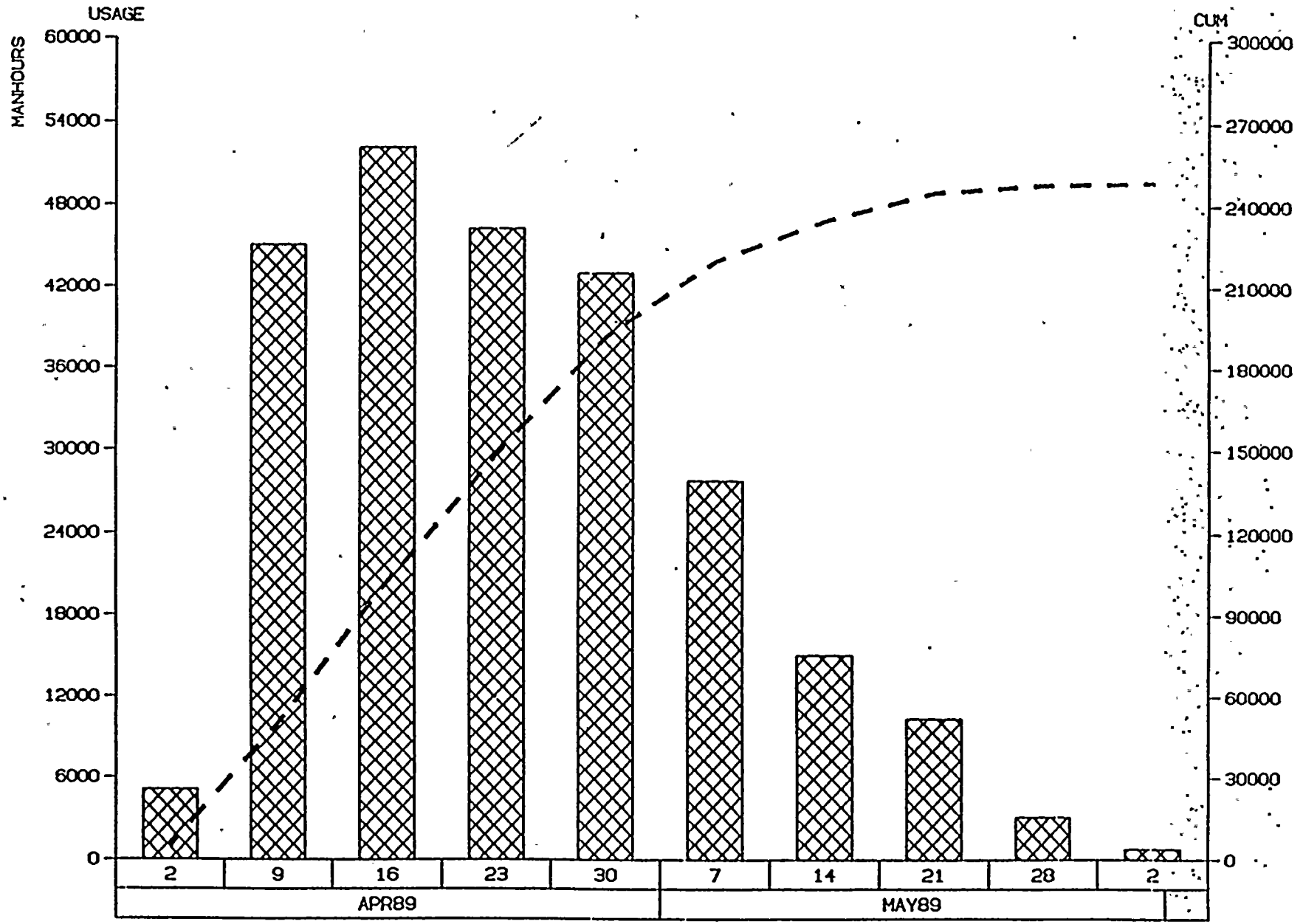
	CURRENT RESOURCE PLAN	TARGET	DELTA
TURBINE/GENERATOR	19,000	16,300	2,700
SNUBBERS	20,900	20,900	0
ISI	17,240	14,500	2,740
VALVES	60,790	61,500	(710)
HEAT EXCHANGER	3,430	6,300	(2,870)
CONDENSER	5,900	5,500	400
CIRC WATER	10,160	11,400	(1,240)
MAJOR EQUIPMENT	4,760	8,700	(3,940)
EXPENSE MINOR MODS	7,040	11,500	(4,460)
RPV/CRD/818'	15,300	13,800	1,500
OTHER	59,010	59,600	(590)
SUBTOTAL O&M	223,530	230,000	(6,470)
CAPITAL	22,580	50,000	(27,420)
TOTAL	246,110	280,000	(33,890)

sjd/trb1495i

ATTACHMENT 1

** TOTAL **

ALL DIRECT RESOURCES



WEEKLY	5084	45058	52119	46256	42998	27751	15054	10354	3100	780
CUMUTVE	5084	50142	102261	148517	191515	219265	234320	244674	247773	248554

MANHOURS
USAGE

CUMULATIVE MANHOURS
CUM

USAGE
RESOURCE 99.00

CUMULATIVE USAGE
RESOURCE 99.00

ESF ACTUATION PREVENTION PLAN

- SPECIALTY SCHEDULES TO PREVENT ESF ACTUATIONS

  RPS
  MSIV
  SDC (LOSS OF DECAY HEAT REMOVAL)
  818' RAD MONITOR

- COMMUNICATION PLAN WITH ALL SITE PERSONNEL TO STRESS THE EXPECTATIONS OF INCREASED AWARENESS AND "TAKE TWO" TO STOP AND THINK OF WHAT WE ARE DOING.

COMMUNICATIONS PLAN

PLANT MANAGEMENT WILL CONDUCT A SERIES OF MEETINGS ONE WEEK PRIOR TO EACH OUTAGE THAT COVERS STATION POLICY, AND MANAGEMENT EXPECTATIONS. ALL STATION PERSONNEL WILL ATTEND. THIS COMMUNICATION WILL COVER THE FOLLOWING TOPICS:

- PERSONAL SAFETY
- ALARA
- CONTAMINATION CONTROL
- NUCLEAR SAFETY
- PROCEDURE ADHERANCE
- STATUS CONTROL
- VERIFICATION
- PROBLEM IDENTIFICATION AND CORRECTIVE ACTION
- ESF ACTUATIONS

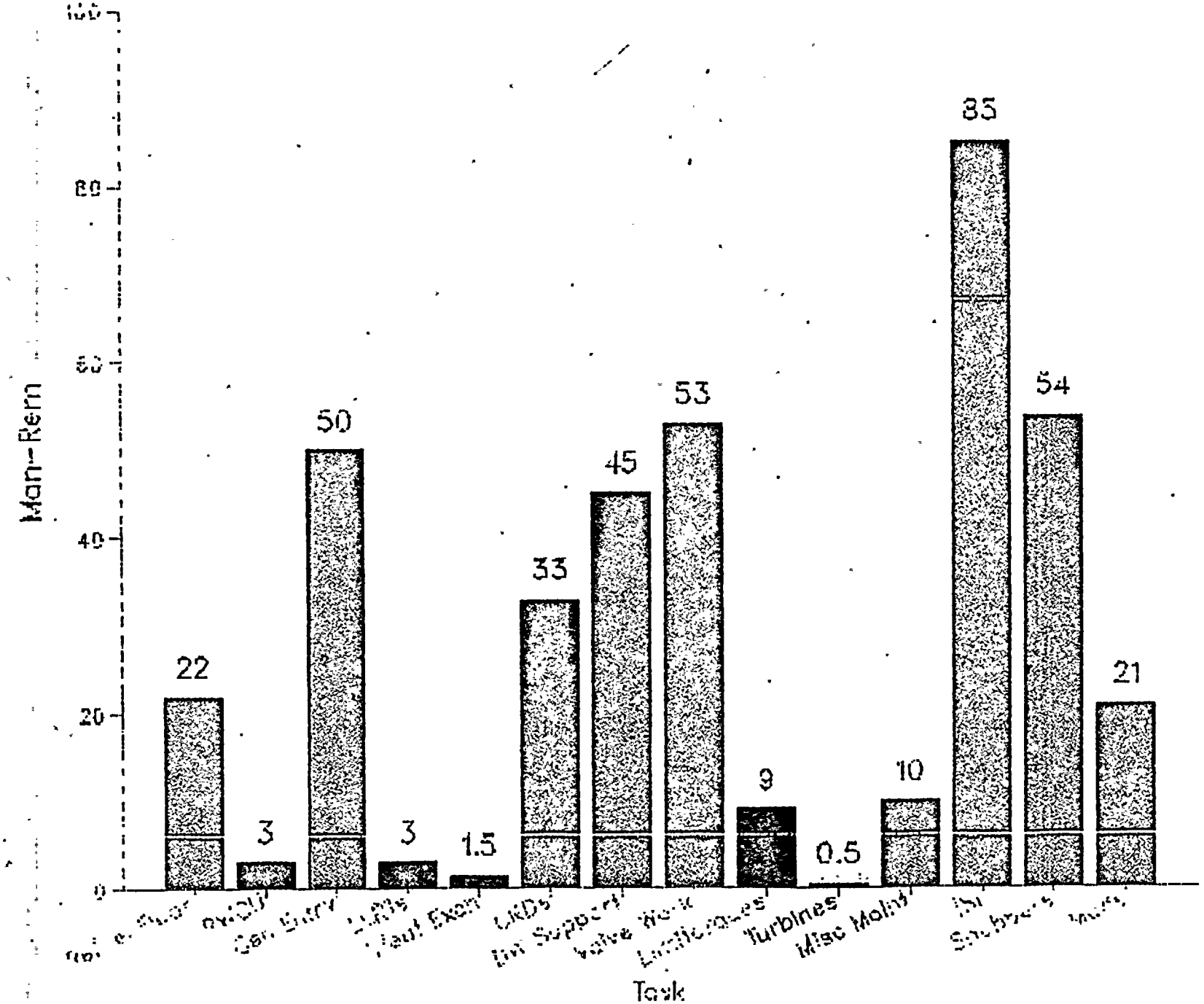
RADIOLOGICAL SHUTDOWN PLAN

- PREVENT AIRBORNE ACTIVITY IN TURBINE BUILDING AFTER BREAKING VACUUM.
- PREVENT AIRBORNE ACTIVITY ON 818' WHEN REMOVING THE VESSEL HEAD.
- OPERATION OF RHR IN SHUTDOWN COOLING TO PREVENT HIGH RAD LEVELS.
- PREVENT AIRBORNE ACTIVITY WHEN MAIN TURBINE HOODS ARE REMOVED.
- MINIMIZE REACTOR VESSEL CONDUCTIVITY SPIKE DURING SHUTDOWN.

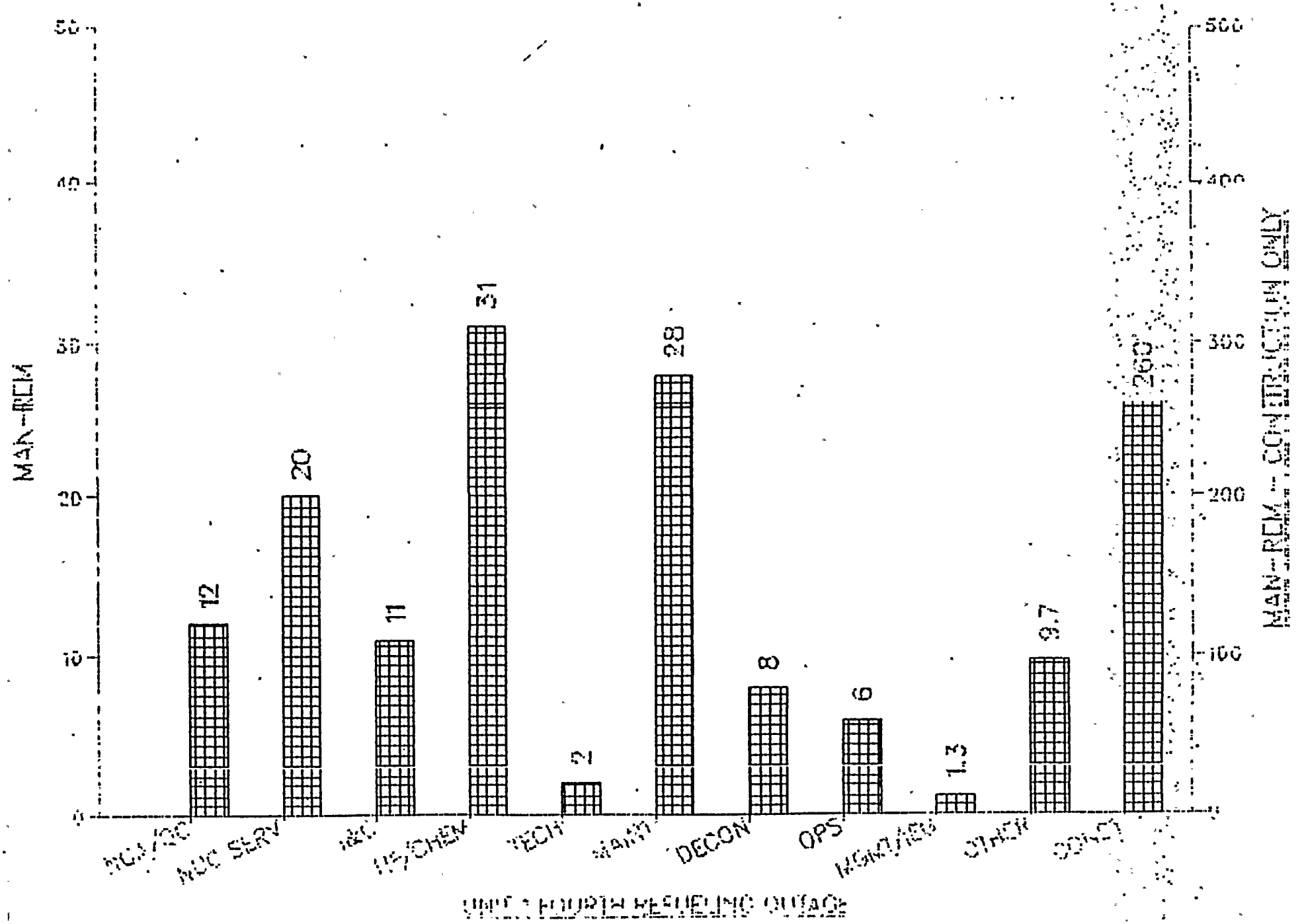
HP IMPROVEMENTS

- INCREASED PERMANENT MANPOWER
  - FIRST LINE SUPERVISOR
  - HP SPECIALIST
  - TECHNICIANS
- IMPROVED QUALITY OF CONTRACT TECHNICIANS
- INCREASED USAGE OF PERSONNEL CONTAMINATION MONITORS
- INCREASED USAGE OF REAL TIME AIRBORNE RADIOACTIVITY MONITORS
- LEVELIZED RESOURCES INSIDE CONTAINMENT

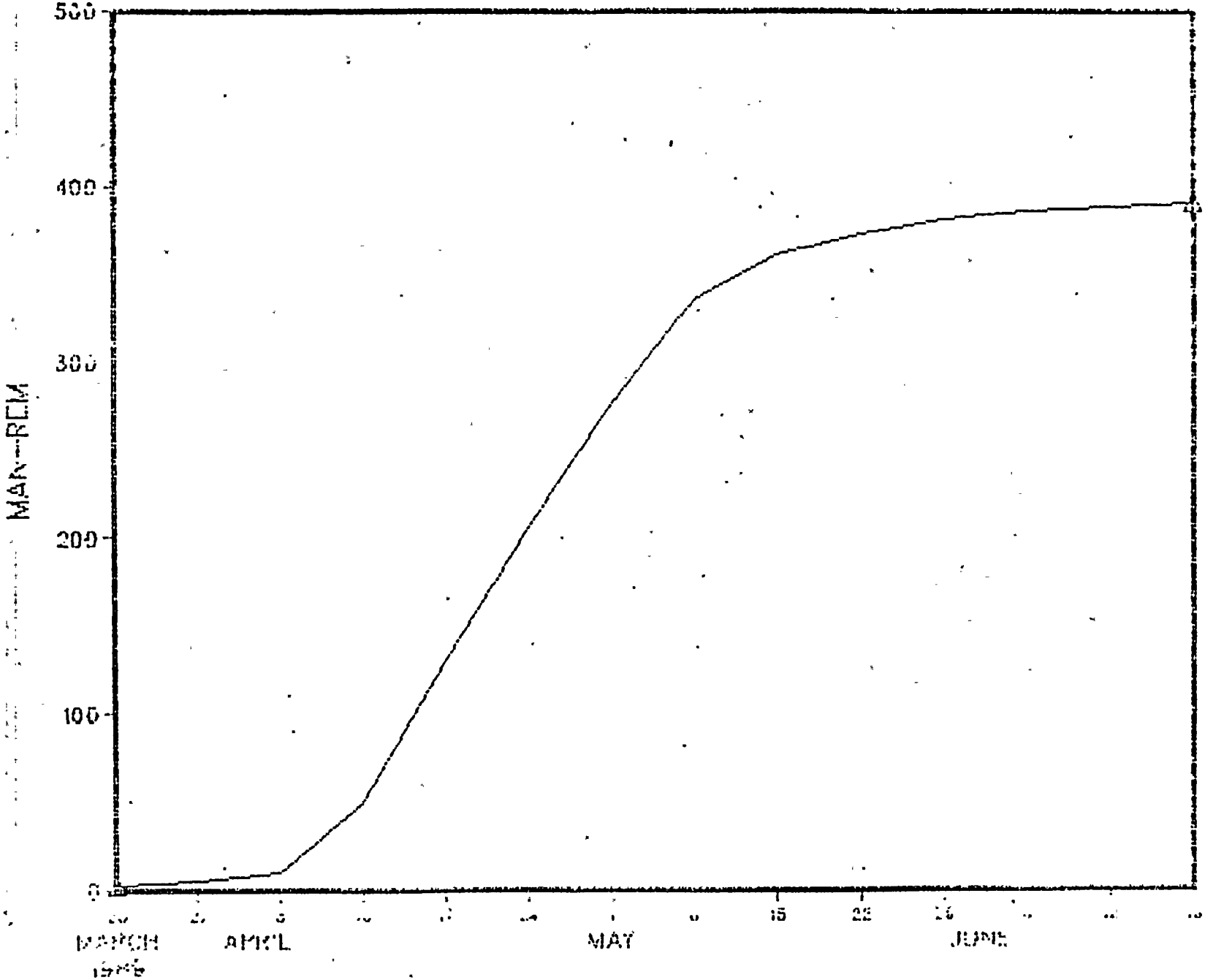
UNIT 1 FOURTH REFUELING AND INSPECTION OUTAGE
MAN-REM GOALS BY TASK



SSES - MAN-REM GOALS BY WORK GROUP



UNIT 1 FOURTH REFUELING AND INSPECTION OUTAGE
MAN—REM



DESCRIPTION OF UPCOMING OUTAGES

U1-4R&IO APRIL 1 - JUNE 2, 1989

U2-3R&IO SEPTEMBER 9 - NOVEMBER 10, 1989

MAJOR SCOPE ACTIVITIES FOR THE OUTAGE INCLUDE:

1) REACTOR VESSEL:

U1 4R&IO	U2 3R&IO
228 NEW FUEL BUNDLES	204 NEW FUEL BUNDLES
OFF-LOAD SCHEME	OFF-LOAD SCHEME
24 CRD'S	24 CRD'S
15 LPRM STRINGS	20 LPRM STRINGS

2) BULK SURVEILLANCES:

APPROXIMATELY 350 SURVEILLANCES WILL BE PERFORMED ON BOTH UNIT'S INCLUDING AN INTEGRATED LEAK RATE TEST.

3) INSERVICE INSPECTIONS:

- o APPROXIMATELY 500 (UNIT 1) AND 450 (UNIT 2) EXAMINATIONS (INCLUDING VISUAL, SURFACE, VOLUMETRIC, INSPECTION OF 15 CLASS 1,2, AND 3 SYSTEMS).

4) MAJOR PROJECTS/SPECIAL

		U1 4R&IO	U2 3R&IO
o	LOSS OF OFFSITE POWER	X	X
o	APPENDIX R MODS	X	X
o	HEAT EXCHANGER REPLACEMENT		
	- ECCS ROOM COOLERS	X-C	X
	- PIPE TUNNEL COOLERS	X	X
	- RECIRC MG SET LO COOLERS	X-C	X
o	125 VOLT BATTERY REPLACEMENT	X	X
o	CIRC WATER EXPANSION JOINT C/O	X	X
o	T/G MAINTENANCE MODS	X	X
o	DRYWELL COOLING		X
o	GENERATOR SPAN PROTECTION	X	X
o	VALVE UPGRADE PROJECT		X
o	RHR WATERHAMMER CLOSEOUT (HPCI CUT & CAP PANEL L/O & CABLE DETERMS)	X	
o	RECOMBINER PLUG VALVE	X	

NOTE: X-C DENOTES CONTINGENCY WORK

5) MAJOR MAINTENANCE WORK

		U1 4R&IO	U2 3R&IO
o	VALVE INSPECTION, REPAIR OR CHANGEOUT	X	X
o	RCIC TURBINE SHAFT SEAL REWORK	X	
o	HPCI TURBINE INSPECTION	X	X
o	INSTALL VENTS AND DRAINS ON HV151F015A&B (CONTINGENCY)	X	
o	INSPECT AND CLEAN ONE RHR HEAT EXCHANGER		X
o	REMOVE AND REINSTALL 16 MSRV'S FOR TESTING AND MAINTENANCE	X	X
o	VERIFY SEIS DATA BASE	X	X
o	TUBE SHEET COATINGS		X
o	FEEDWATER PUMP ALIGNMENT		X

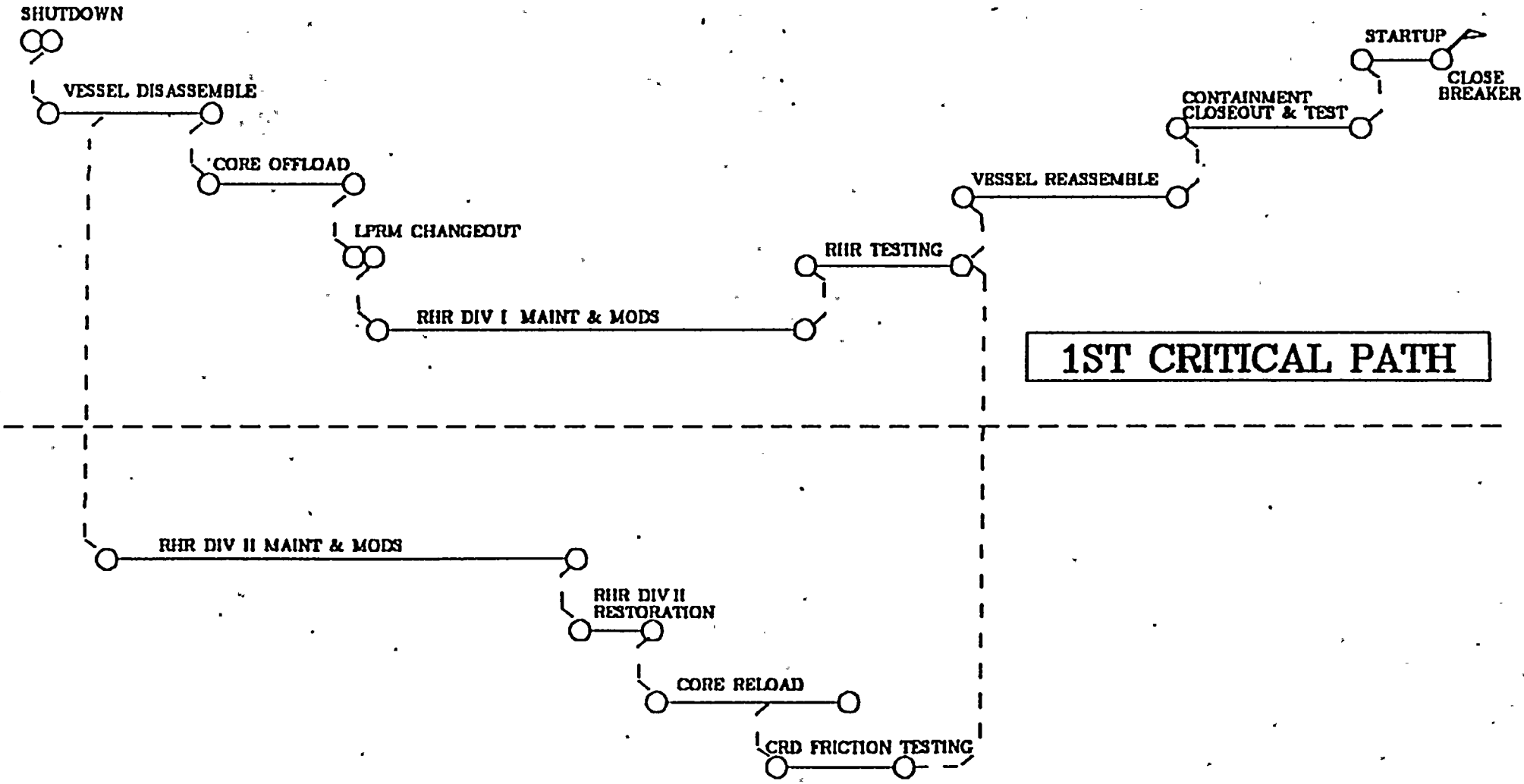
6) BULK WORK

- RELEASE AND COMPLETION OF AN ESTIMATED 3,420 RELATED WORK DOCUMENTS (END OF OUTAGE TOTAL).

- IMPLEMENTATION OF APPROVED MODIFICATIONS. UNIT 1 CONTAINS 55 APPROVED MODS, OF WHICH 8 ARE CLASSIFIED AS CONTINGENCY. UNIT 2 CONTAINS 47 MODS, OF WHICH 3 ARE CLASSIFIED AS CONTINGENCY.

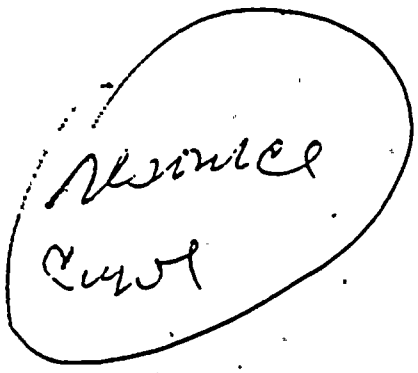
UNIT 1 4R&IO	TITLE: CRITICAL PATHS	CP-1

WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9



RESOURCE PLAN

BOTH OUTAGES



275,000 MHRS DIRECT EXPENSE

50,000 MHRS DIRECT CAPITAL

MAJOR CHALLENGES

- o SCOPE CONTROL
- o MSIV REPAIRS
- o SNUBBER TESTING RESULTS
- o MEETING GOALS OF:

	UNIT 1	UNIT 2
MAN-REM	390	295
LOST TIME ACCIDENTS	0	0
NO LOST TIME ACCIDENTS	0	0
PERSONAL CONTAMINATION REPORTS	60	60
ESF ACTUATIONS	3	3
OVERTIME	35%	35%

SUMMARY

- WE HAVE PREPARED SAFELY WITH ALARA
- WE HAVE MADE IMPROVEMENTS
- WE ARE READY
- INDEPENDENT REVIEW

OUTAGE SAFETY

NUCLEAR SAFETY ASSESSMENT GROUP
(NSAG)

PHILOSOPHIC OVERVIEW

SPECIFIC EXAMPLES

PP&L APPROACH IS DEFENSE IN DEPTH

SAFETY IS BUILT INTO AN OUTAGE BY SCHEDULING KEY ACTIVITIES TO MEET SAFETY REQUIREMENTS:

- o TECHNICAL SPECIFICATIONS
- o PP&L POLICIES

SAFETY IS A LINE FUNCTION.

- o OUTAGE PLANNING
- o OPERATIONS

NSAG PROVIDES AN INDEPENDENT REVIEW AND OVERSIGHT.

- o OUTAGE PLAN
- o OUTAGE EXECUTION

SAFETY LIMITS

	CONDITION 4	CONDITION 5
TEMPERATURE	200°F	140°F
PRESSURE	1325 PSIG	15 PSIG
LEVEL	ABOVE TOP OF ACTIVE FUEL	ABOVE TOP OF ACTIVE FUEL
POWER	SHUTDOWN MARGIN	SHUTDOWN MARGIN
	0.38 K	0.38 K
	0.28 K	0.28 K

CONTAINMENT - SECONDARY CONTAINMENT REQUIRED WHEN POSSIBILITY EXISTS OF RELEASE OF RADIOACTIVITY TO THE PUBLIC.

- WHEN HANDLING IRRADIATED FUEL
- WHEN CORE ALTERATIONS ARE IN PROGRESS
- WHEN OPERATIONS WITH POTENTIAL FOR DRAINING THE REACTOR VESSEL ARE IN PROGRESS (OPDRVs)

BASIC REQUIREMENTS

CORE COOLING

- o MEANS OF REMOVING DECAY HEAT MUST ALWAYS EXIST.
- o MEANS OF CIRCULATING WATER IN THE REACTOR VESSEL MUST ALWAYS EXIST.

MAKEUP WATER

- o MEANS OF ADDING WATER MUST ALWAYS EXIST:
  - ECCS SYSTEM OR SYSTEMS

    OR
  - VOLUME IN CAVITY SPENT FUEL POOL COMPLEX

CONTROL OF REACTIVITY

- o CONTROL RODS
- o SLC SYSTEM
- o SHORTING BARS IN SRMs, ETC.

SECONDARY CONTAINMENT

- o BUILDING MUST BE INTACT
- o SGTS MUST BE OPERATIONAL

FUNDAMENTAL PP&L POLICIES

1. WORK WILL BE DONE BY DIVISIONS

2. CORE COOLING:

   - o REQUIRED SYSTEMS PLUS ONE
   - o ABNORMAL METHODS TESTED PRIOR TO DISABLING THE PRIMARY SYSTEM

3. CORE COVER:

   - o REQUIRED ECCS SYSTEMS PLUS ONE
   - o OPDRVs STRICTLY CONTROLLED
   - o GATES TO REACTOR CAVITY AND TO CASK STORAGE PIT IN PLACE WHEN POSSIBLE
   - o BLANK FLANGES ON OPEN COMPONENTS
   - o DOWNCOMER COVERS REMOVED

4. REACTIVITY CONTROL

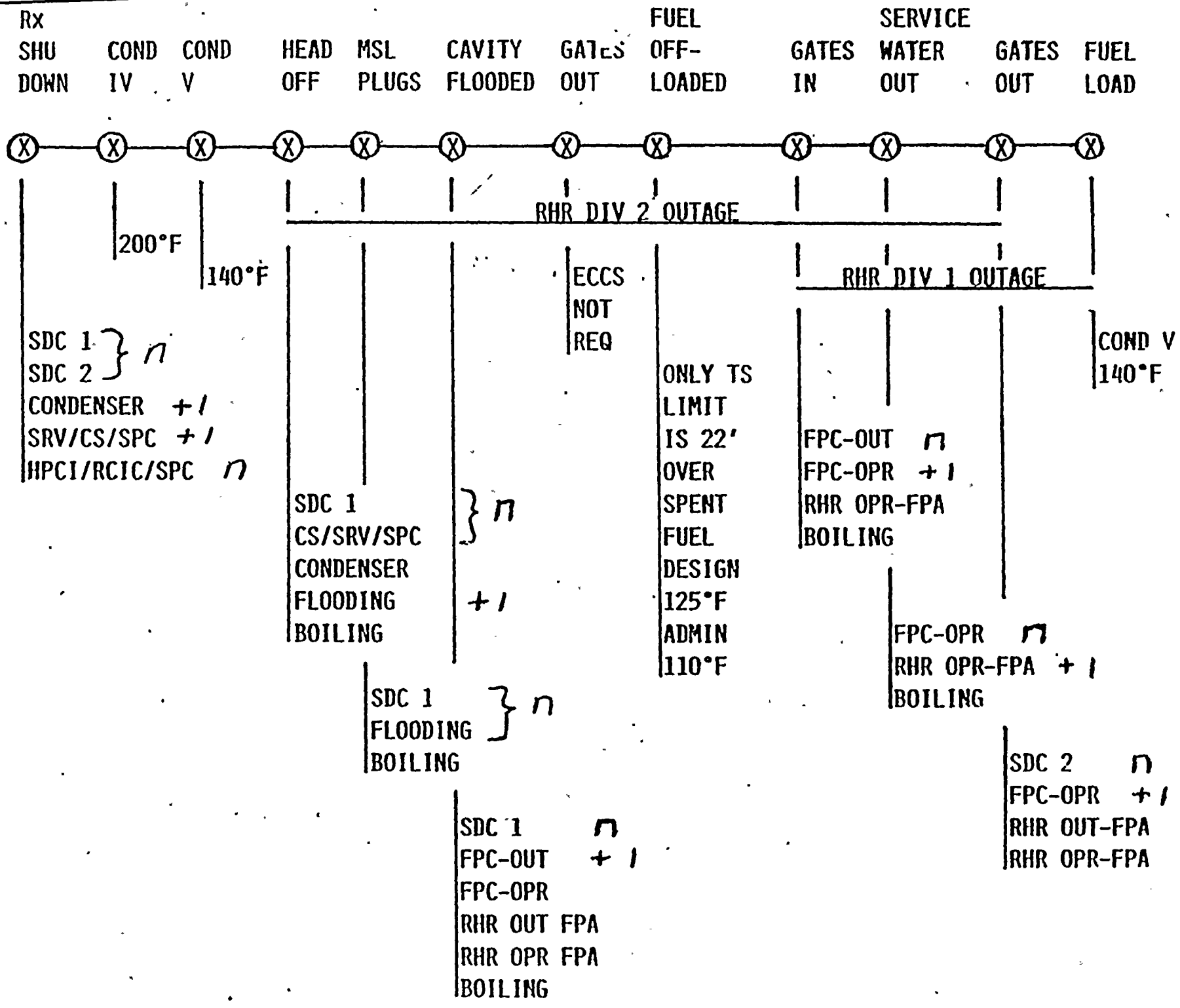
   - o COMPLETE CORE OFFLOAD - NO SHUFFLE
   - o RELOAD PLAN CHECKED STEP BY STEP FOR SHUTDOWN MARGIN
   - o CORE VERIFICATION BEFORE NEW FUEL IS ADDED
   - o COMPREHENSIVE REACTIVITY CONTROL INSTRUCTION

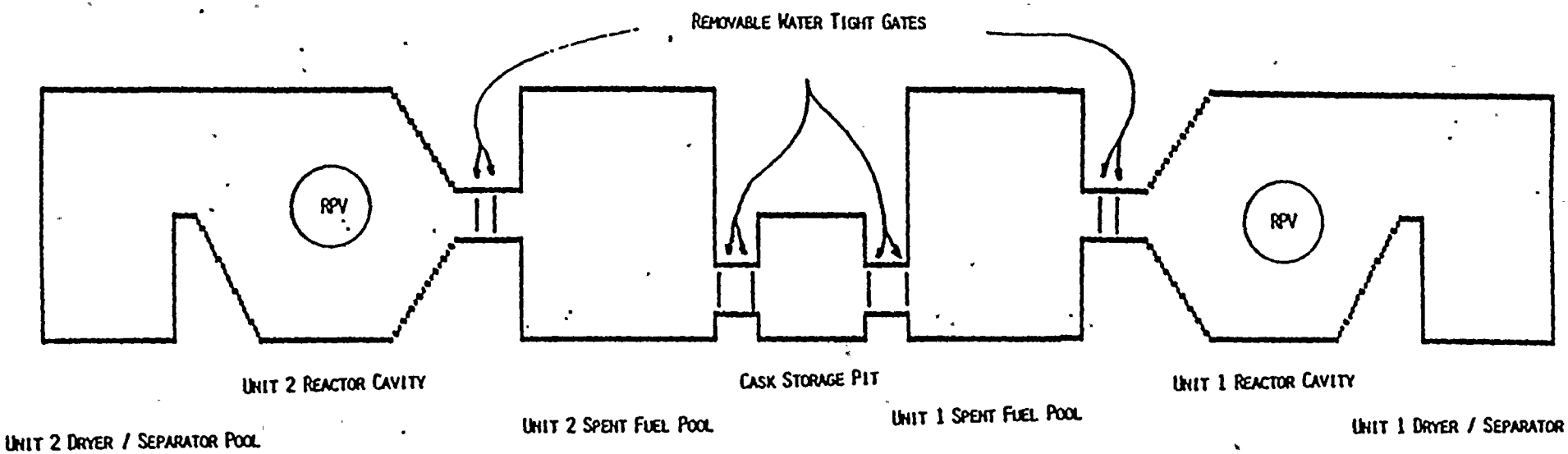
5. NO FUEL HANDLING WHEN MAIN STEAM LINES ARE PRESSURIZED

6. CRITICAL FUNCTIONS SHOWN ON A DETAILED OUTAGE SCHEDULE

   - o CORE COOLING
   - o ECCS
   - o SECONDARY CONTAINMENT

7. COMPREHENSIVE INDEPENDENT REVIEW


RX SHUTDOWN
COND IV
COND V
HEAD OFF
MSL PLUGS
CAVITY FLOODED
GATES OUT
FUEL OFF-LOADED
GATES IN
SERVICE WATER OUT
GATES OUT
FUEL LOAD
RHR DIV 2 OUTAGE
RHR DIV 1 OUTAGE
200°F
140°F
SDC 1
SDC 2
CONDENSER +1
SRV/CS/SPC +1
HPCI/RCIC/SPC
ECCS NOT REQ
ONLY TS LIMIT IS 22' OVER SPENT FUEL DESIGN 125°F ADMIN 110°F
COND V 140°F
FPC-OUT
FPC-OPR +1
RHR OPR-FPA
BOILING
SDC 1
CS/SRV/SPC
CONDENSER
FLOODING +1
BOILING
SDC 1
FLOODING
BOILING
FPC-OPR
RHR OPR-FPA +1
BOILING
SDC 1
FPC-OUT +1
FPC-OPR
RHR OUT FPA
RHR OPR FPA
BOILING
SDC 2
FPC-OPR +1
RHR OUT-FPA
RHR OPR-FPA



818' ELEVATION REFUELING FLOOR

SPENT FUEL POOLS CONNECTED VIA THE CASK STORAGE PIT

FIGURE 3.

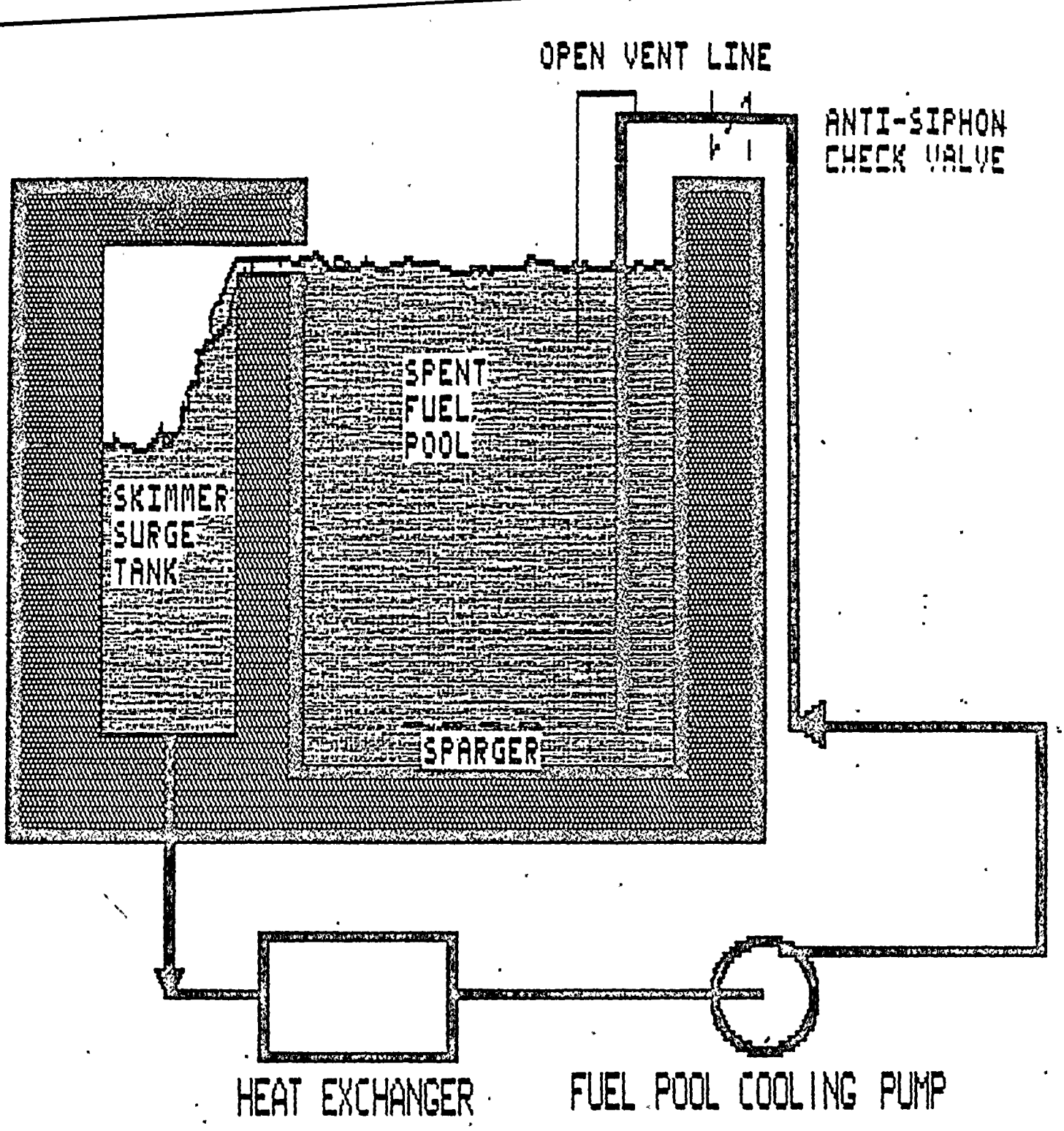
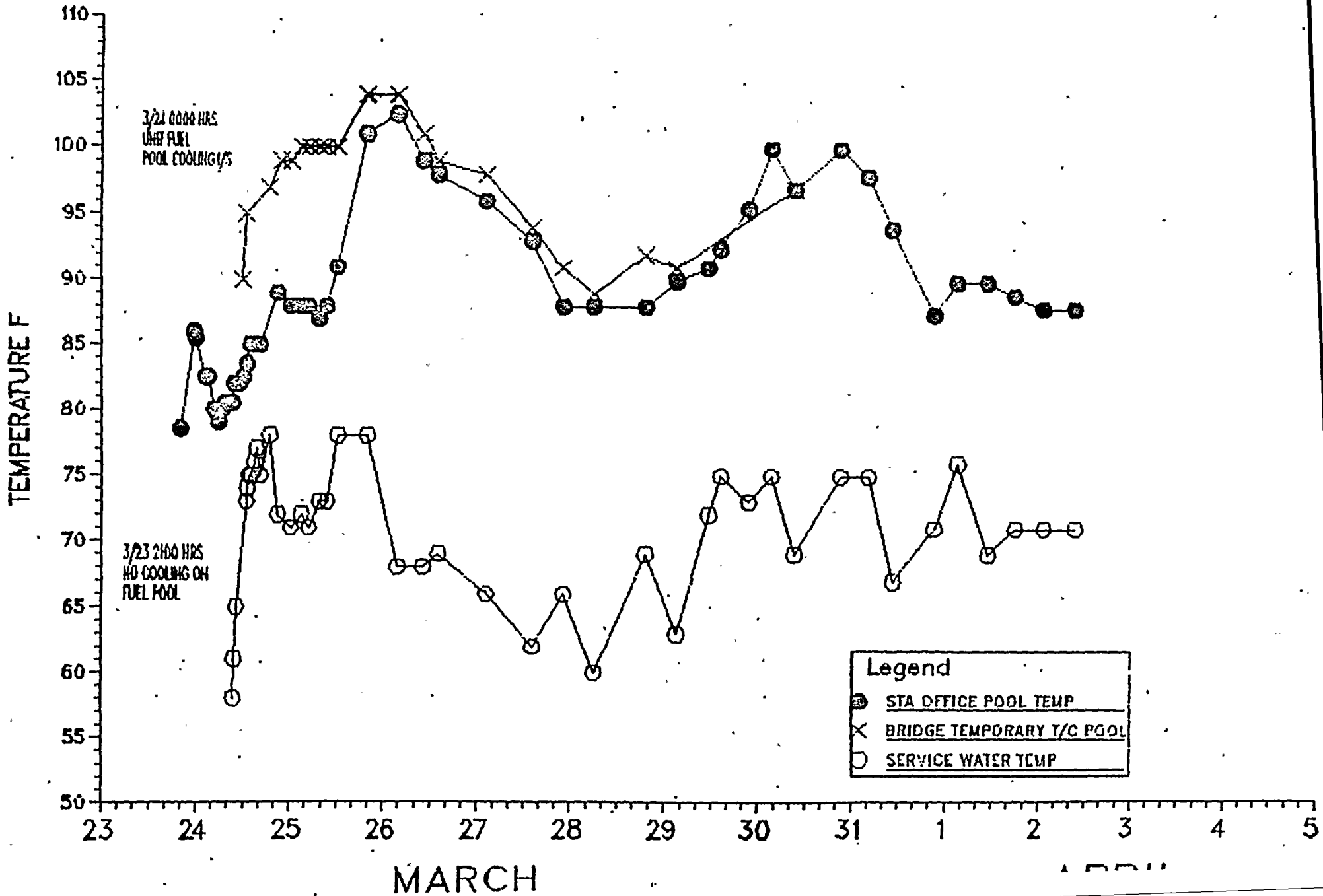


FIG. 4. SPENT FUEL POOL

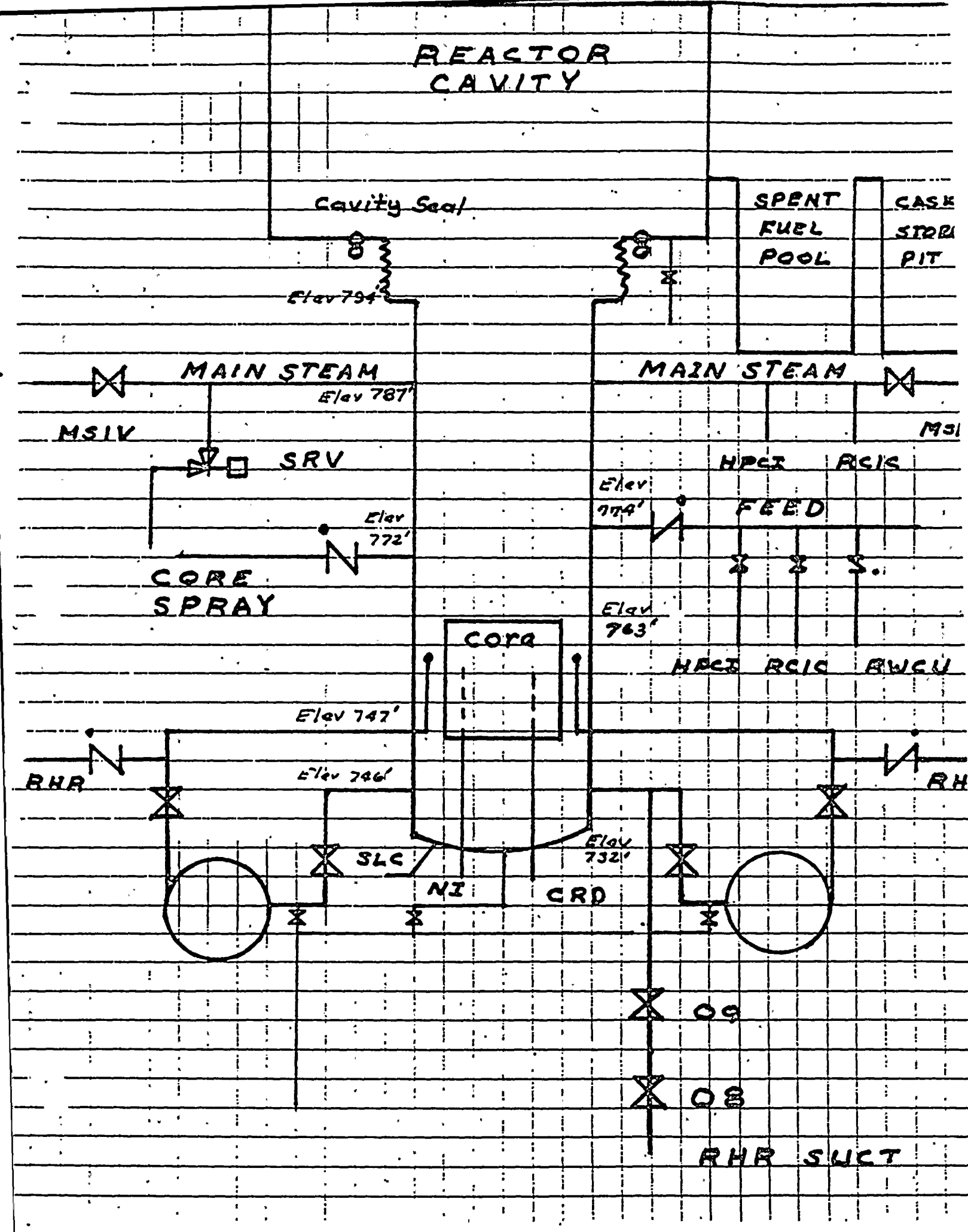
STA OFFICE AND TEMPORARY BRIDGE FUEL POOL TEMPS AND SERVICE WATER TEMPERATURE

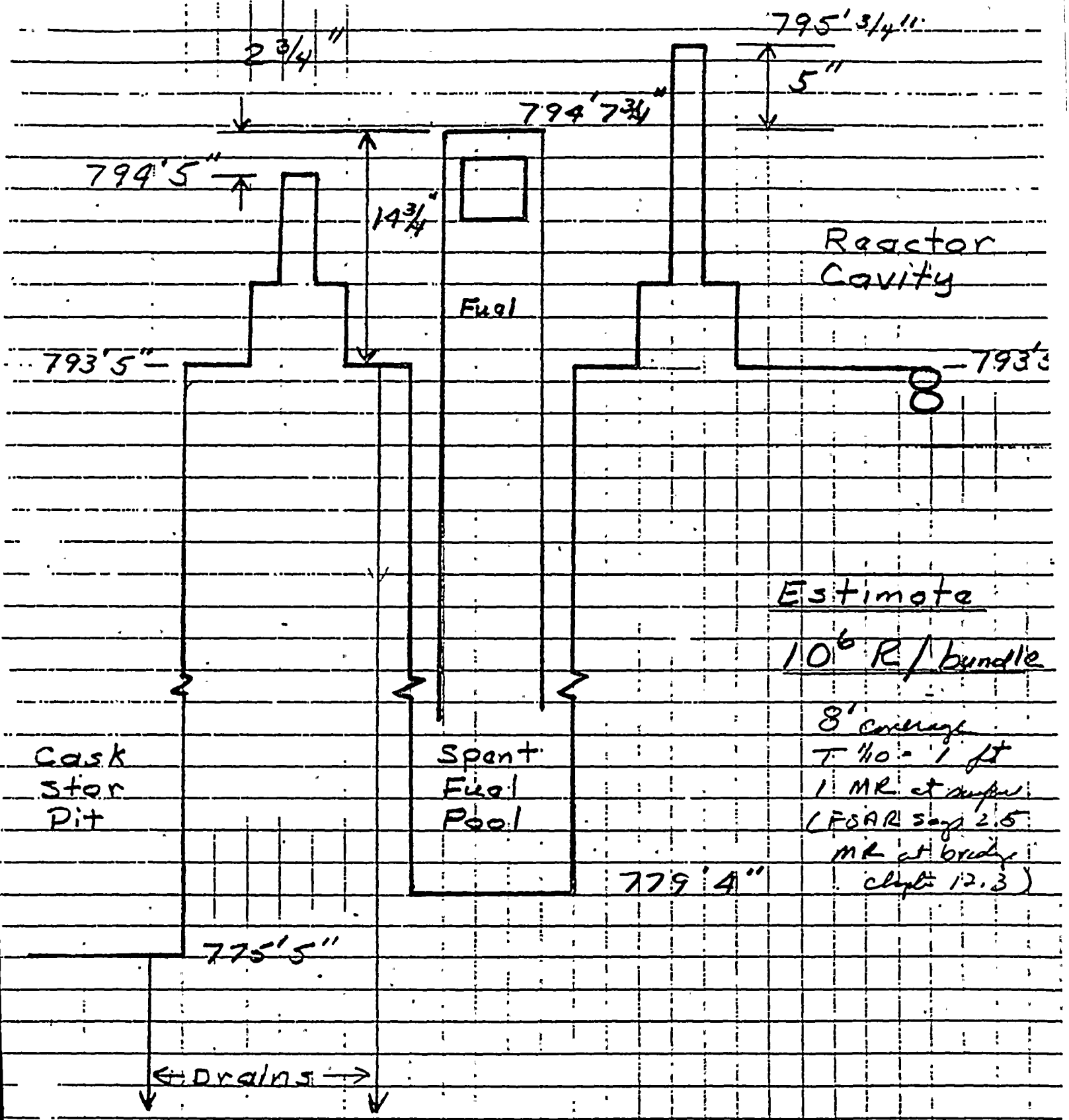


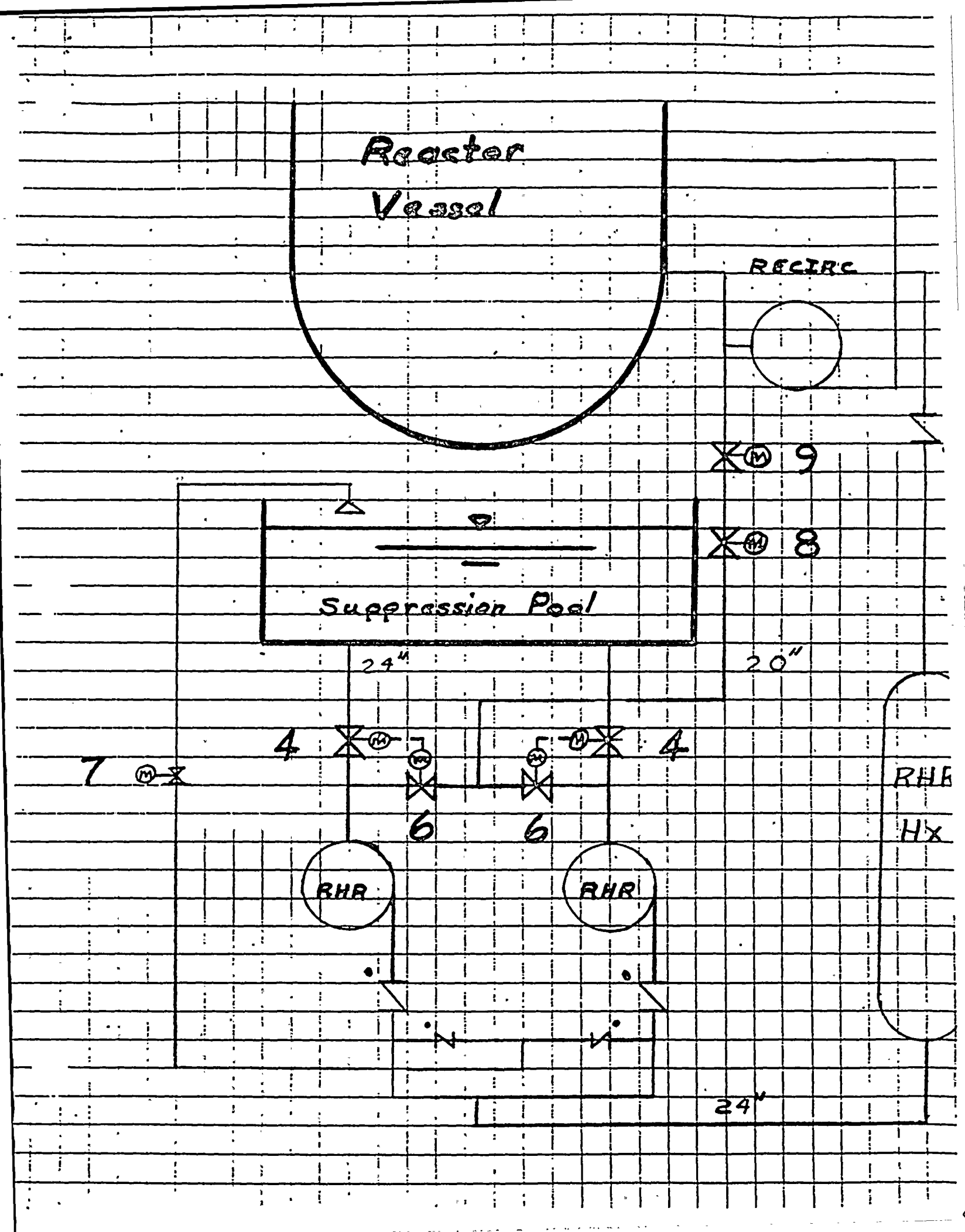
KEEP

CORE

COVERED


REACTOR CAVITY
Cavity Seal
SPENT FUEL POOL
CASK STOR PIT
Elev 794'
MAIN STEAM
Elev 787'
MAIN STEAM
MSIV
SRV
HPCI
RCIC
Elev 774'
FEED
Elev 772'
CORE SPRAY
Elev 763'
Core
HPCI
RCIC
RWCU
Elev 747'
RHR
Elev 746'
RH
SLC
Elev 732'
NI
CRD
09
08
RHR SUCT


2 3/4"
795'3/4"
5"
794'7 3/4"
794'5"
14 3/4"
Reactor Cavity
Fuel
793'5"
793'
Estimate
10^6 R/bundle
8' coverage
T 1/10 - 1 ft
1 MR at surface
(FSAR says 2.5 MR at bridge elev 12.3)
Cask Stor Pit
Spent Fuel Pool
779'4"
775'5"
Drains


Reactor
Vessel
RECIRC
9
8
Suppression Pool
24"
20"
4
4
7
6
6
RHR
RHR
RHR
Hx
24"

KEY ELEMENTS

1. IDENTIFY AND CONTROL DRAINAGE PATHS

2. PRESERVE RHR INTERLOCKS

3. CONTROL THE GATES

4. DOWNCOMER COVERS REMOVED

PROCEDURE AD-QA-326 OPERATIONS WITH POTENTIAL FOR DRAINING THE REACTOR VESSEL/CAVITY.

SHUTDOWN ISSUES

1. OFFGAS SYSTEMS.

2. LEAKING FUEL

   - o GAS (XENON)
   - o CRUD
   - o IODINE

3. AUXILIARY BOILERS - BOTH IN SERVICE.

4. RADIATION EFFECTS OF PROTRACTED OPERATION.

5. RETENTION OF RWCU IN SERVICE.

6. WATER CLARITY/RADIATION ON 818.

7. MECHANICAL VACUUM PUMP.

8. IF COOLING IS LOST, SECONDARY CONTAINMENT MUST BE ESTABLISHED.

9. PURGE OF REACTOR VESSEL - HEAD DRYWELL HEAD COMES OFF.

10. RADIATION EFFECTS OF FUEL ELEMENT FAILURES.

SUMMARY

1. PP&L APPROACH IS DEFENSE IN DEPTH.

2. SAFETY IS BUILT INTO AN OUTAGE BY SCHEDULING KEY ACTIVITIES TO MEET THE SAFETY REQUIREMENTS.

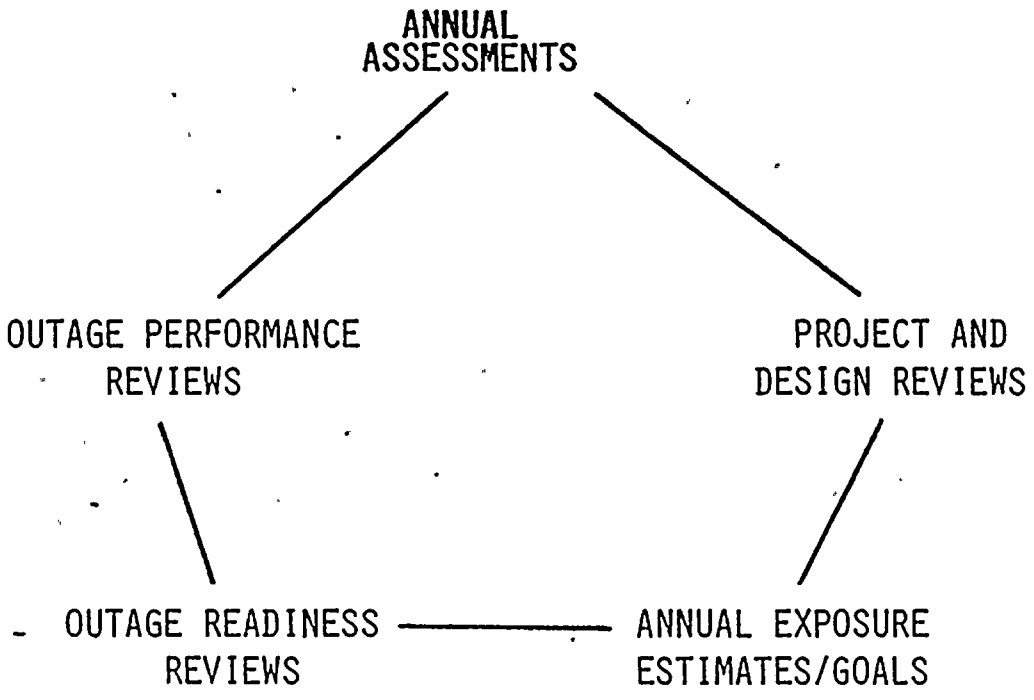
3. POLICIES HAVE EVOLVED TO ENHANCE SAFETY.

4. SATISFYING THE TECHNICAL SPECIFICATIONS IS NOT ENOUGH TO ENSURE OUTAGE SAFETY.

5. SAFETY IS A LINE FUNCTION.

6. NSAG FUNCTION IS TO OBSERVE AND REFLECT.

OUTAGE READINESS
A RADIOLOGICAL PERSPECTIVE


ANNUAL
ASSESSMENTS
OUTAGE PERFORMANCE
REVIEWS
PROJECT AND
DESIGN REVIEWS
OUTAGE READINESS
REVIEWS
ANNUAL EXPOSURE
ESTIMATES/GOALS

EARLY VIEWS AND REVIEWS

- PROJECT REVIEWS
  - PRELIMINARY EVALUATIONS
  - FINAL EVALUATIONS

- DESIGN REVIEWS
  - ZONE V WORK
  - EXPECTED CUMULATIVE DOSE > 10 MAN-REM
  - ON REQUEST

YEAR IN PREVIEW
ANNUAL EXPOSURE ESTIMATE AND GOAL

- REVIEW OF PLANNED WORK
- REVIEW OF JOB HISTORY
  - BUILD ON PREVIOUS ALARA INITIATIVES
- DISCUSSIONS WITH WORK GROUPS
- DEVELOPMENT OF DRAFT ESTIMATE/GOAL
- DISCUSSIONS WITH WORK GROUPS
- REVIEW WITH STATION ALARA COMMITTEE
- CONCURRENCE OF STATION AND CORPORATE MANAGEMENT

1989 MAN-REM EXPOSURE ESTIMATES AND GOALS

	MAN-REM ESTIMATE	ALARA GOAL
ROUTINE OPERATIONS		
PLANT OPERATIONS	45	40
ROUTINE MAINTENANCE	97	88
DECONTAMINATION	11	10
RADWASTE OPERATIONS	18	16
FORCED OUTAGES	13	13
TOTAL	185	167
NON-OUTAGE MODIFICATIONS	25	23
UNIT 1 OUTAGE ACTIVITIES	430	390
UNIT 2 OUTAGE ACTIVITIES	330	295

TOTAL 1989 ESTIMATE:	970	MAN-REM
ALARA GOAL:	875	MAN-REM
TLD GOAL:	720	MAN-REM

OUTAGE IN PREVIEW

- DISCUSSIONS ABOUT WORK PLANNING AND WORK SCOPE CHANGES
- REVIEWS WITH STATION ALARA COMMITTEE
- OUTAGE READINESS MEETING
- POTENTIAL GOAL REVISION - WEEK 1

UNIT 1 FOURTH REFUELING & INSPECTION OUTAGE

MAN-REM GOAL BY TASK

TASKS	MAN-REM GOAL	% OF GOAL
ISI ACTIVITIES	85	22
SNUBBER TESTING	54	14
VALVE REPACKS & REWORKS	53	14
GENERAL ENTRY & WORK	50	13
DW SUPPORT SERVICES	45	11
CRD & UNDERVESSEL WORK	33	8
MODIFICATIONS	21	7
REFUEL FLOOR ACTIVITIES	22	6
MISC MAINTENANCE	10	3
LIMITORQUE TESTING & REPAIRS	9	2
RWCU WORK	3	1
LLRT'S	3	1
HEAT EXCHANGER INSPECTIONS	1.5	.4
TURBINE WORK	0.5	.1
TOTAL	390	

UNIT 1 FOURTH REFUELING AND INSPECTION OUTAGE

MAN-REM GOAL BY COST AREA

COST AREA	DEPARTMENT	MAN-REM GOAL	PERCENT OF GOAL
430	QUALITY ASSURANCE/CONTROL	12	3
451	NUCLEAR SERVICES (ISI)	20	5
452	NUCLEAR TRAINING	0.1	.03
460	INSTRUMENTATION & CONTROL	11	3
461	HEALTH PHYSICS	31	8
462	TECH GROUP	2	0.5
463	MAINTENANCE	28	7
	LABOR SUPPORT (DECON)	8	2
464	OPERATIONS	6	1.5
465	PLANT MANAGEMENT	0.1	.03
467	OUTAGE MANAGEMENT	0.1	.03
468	INSTALLATION ENGINEERING	1	.25
471-480	NPE (INCL RESIDENT ENG)	1	.25
551-555	E&S CONST (INCL CATALYTIC)	260	67
VARIOUS	OTHER	8.6	2.5
	TOTAL	390	

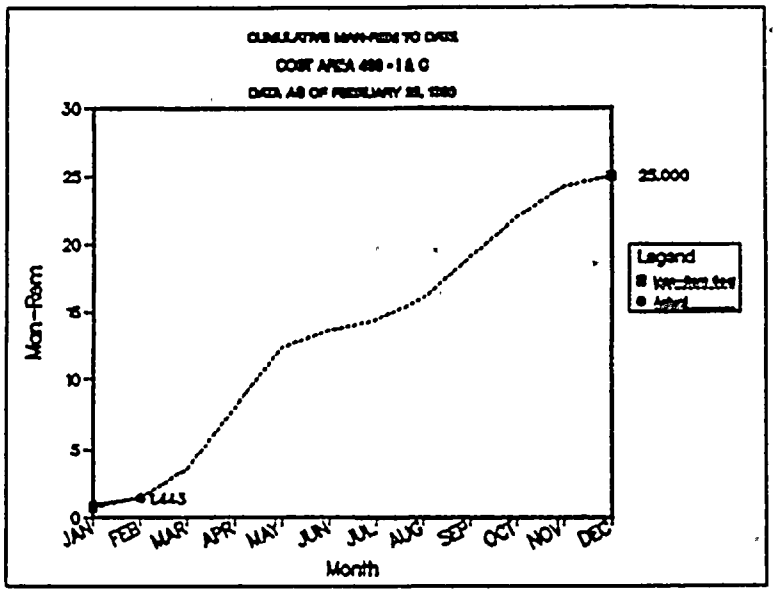
IN-PROGRESS REVIEW

- DAILY RWP STATUS REVIEW
- DEVELOPMENT OF GRAPHICS-EXPOSURE BY COST AREA AND BY TASK
- DISCUSSIONS WITH STATION ALARA COMMITTEE

1989 MAN-REM GOAL BY COST AREA
DATA AS OF FEBRUARY 28, 1898

COST AREA	DEPARTMENT	MAN-REM GOAL	ACTUAL MAN-REM	PERCENTAGE OF MAN-REM GOAL
430	NQA/QC	23.000	0.531	2.31
451	NUCLEAR SERVICES (ISI)	30.000	0.575	1.92
452	NUCLEAR TRAINING	0.400	0.000	0.00
459	PERSONNEL & ADMIN	0.400	0.066	16.50
460	I & C	25.000	1.443	5.77
461	HEALTH PHYSICS	95.000	6.323	6.66
	CHEMISTRY	6.000	0.851	14.18
462	TECH GROUP	6.000	0.141	2.35
463	MAINTENANCE	60.000	6.340	10.57
	DECONTAMINATION	45.000	3.263	7.25
464	OPERATIONS	38.000	2.843	7.48
	RW PROCESSING PERSONNEL	9.000	0.295	3.28
465	PLANT MANAGEMENT	0.300	0.000	0.00
467	OUTAGE MANAGEMENT	0.300	0.005	1.67
468	IEG	3.000	0.220	7.33
471-479	NPE (ALLENTOWN)	2.000	0.315	15.75
480	NPE - RE	2.000	0.309	15.45
551-555	E&S CONSTRUCTION (ALL)	525.000	7.628	1.45
VARIOUS	OTHER	5.300	0.000	0.00
	TOTALS	875.000	31.148	

NOTE: ALL DATA BASED ON SRD EXPOSURE

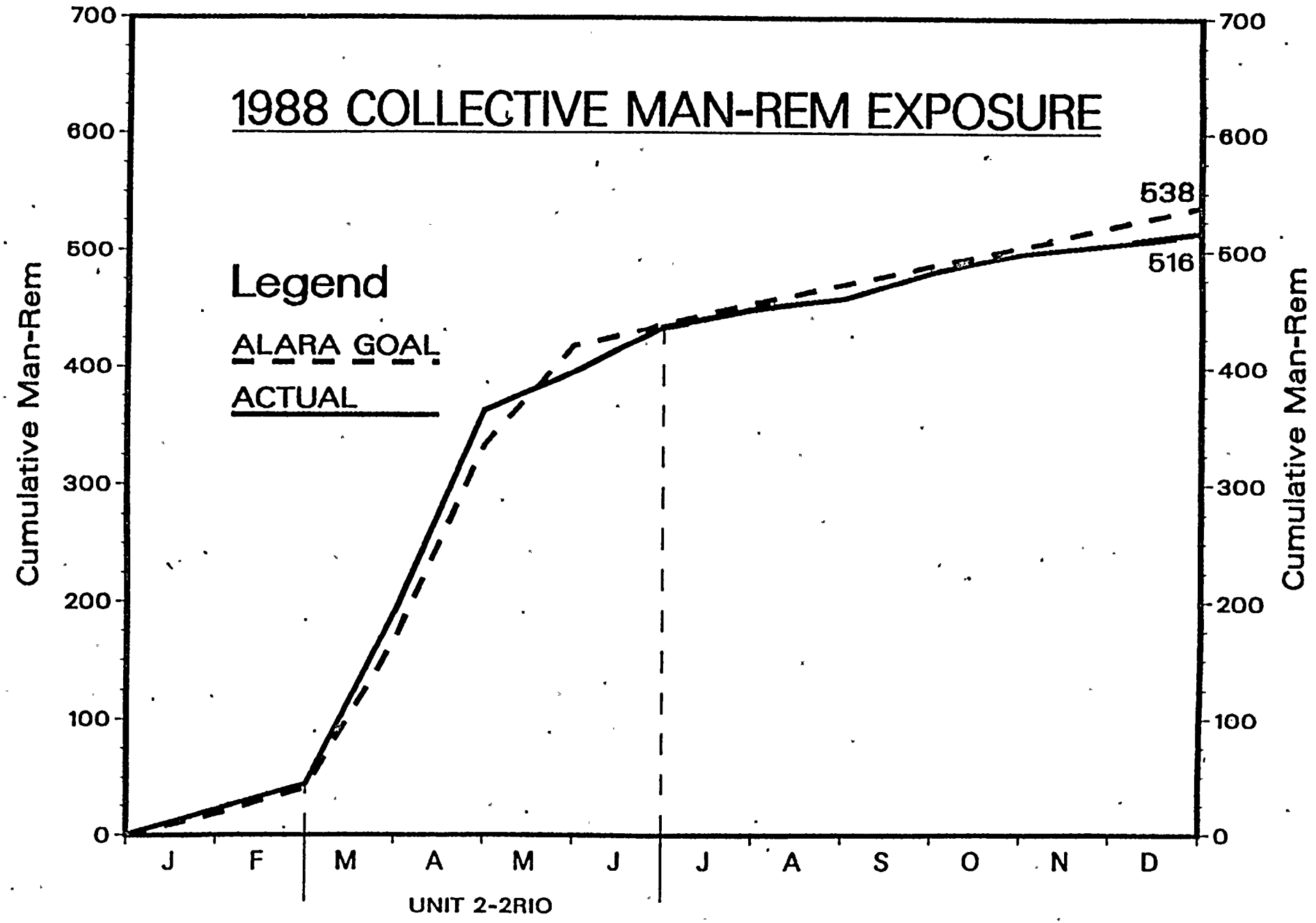


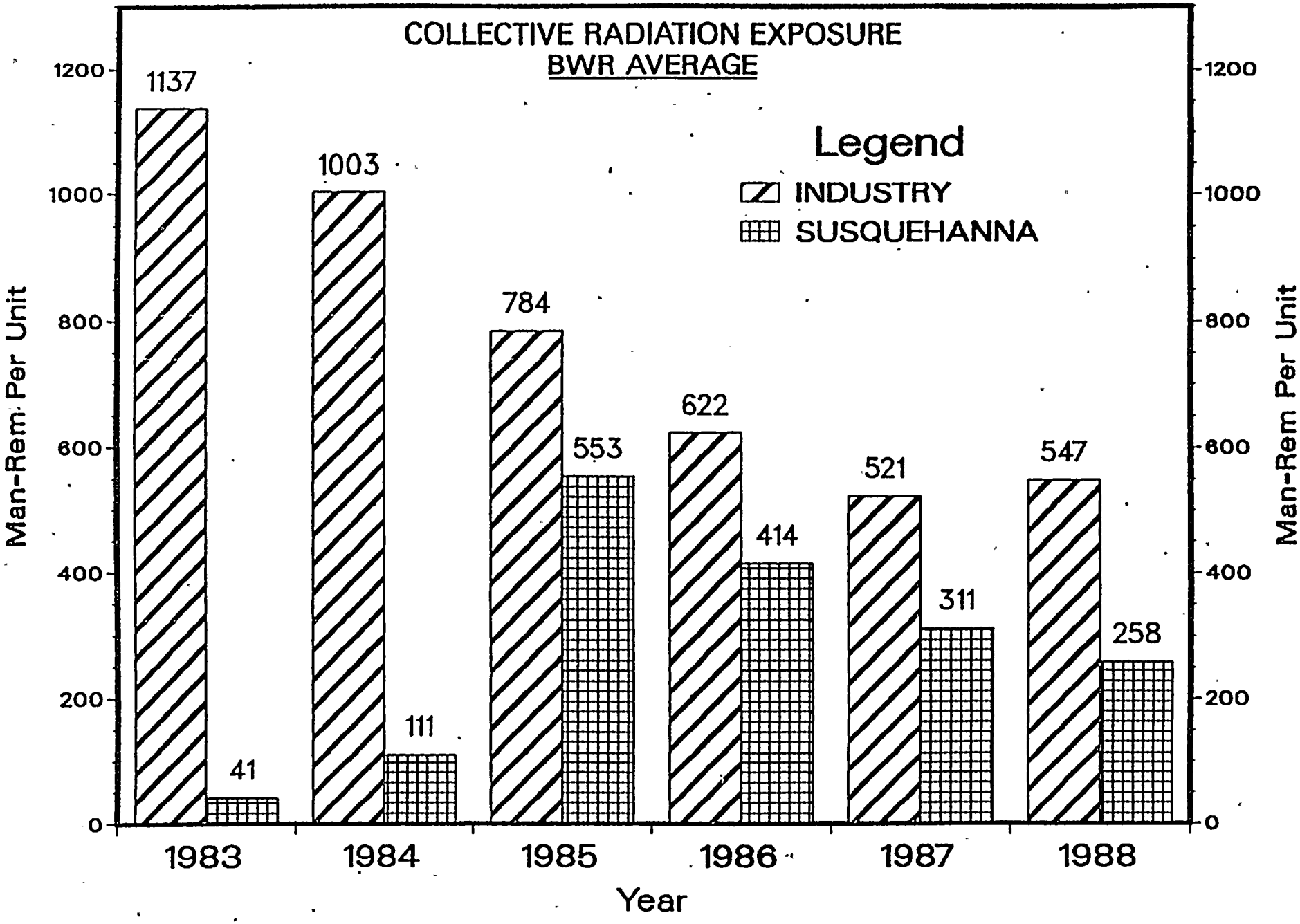
EXPOSURE BREAKDOWN BY TASK - I & C

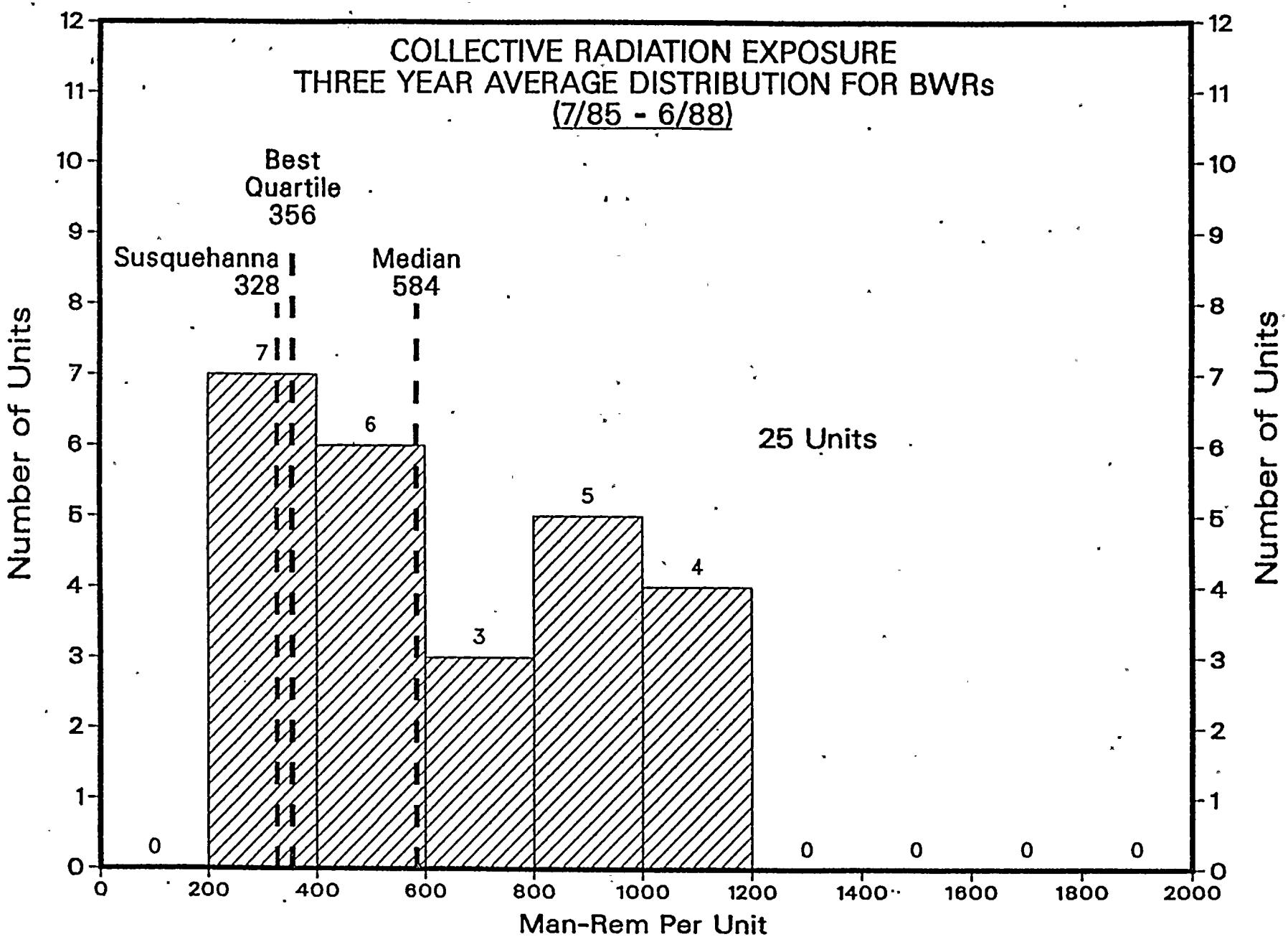
Job Description	February Man-Rem	February % of Total Man-Rem	Year To Date Man-Rem	Year To Date % of Total Man-Rem
Gen Entry/Inspection	0.054	10	0.164	11
I&C Surveillances (4&5 Rack, Scram Disc Vol., Smoke Detectors)	0.380	75	0.700	49
Misc. Valve Work	0.005	1	0.005	0
IRMs	0.000	0	0.489	34
Other Misc. Work	0.070	14	0.085	6
	0.509		1.443	

YEAR IN REVIEW

- o PARTICIPATION IN OUTAGE CRITIQUES
  - IDENTIFICATION OF NEW INITIATIVES
  - PLANNING FOR, TRACKING OF INITIATIVES
  - DEVELOPMENT OF ISSUES FOR STATION ALARA COMMITTEE
- o ANNUAL ALARA ASSESSMENT
  - PERSONNEL EXPOSURE
  - TASK ANALYSIS


1988 COLLECTIVE MAN-REM EXPOSURE
Legend
ALARA GOAL
ACTUAL
538
516
Cumulative Man-Rem
700
600
500
400
300
200
100
0
J
F
M
A
M
J
J
A
S
O
N
D
UNIT 2-2RIO


COLLECTIVE RADIATION EXPOSURE
BWR AVERAGE
Legend
INDUSTRY
SUSQUEHANNA
Man-Rem Per Unit
Year
1200
1000
800
600
400
200
0
1137
41
1003
111
784
553
622
414
521
311
547
258
1983
1984
1985
1986
1987
1988


COLLECTIVE RADIATION EXPOSURE
THREE YEAR AVERAGE DISTRIBUTION FOR BWRs
(7/85 - 6/88)
Best Quartile 356
Susquehanna 328
Median 584
25 Units
Number of Units
Man-Rem Per Unit
0
7
6
3
5
4
0
0
0
0
0 200 400 600 800 1000 1200 1400 1600 1800 2000
0 1 2 3 4 5 6 7 8 9 10 11 12

MAN-REM PER MWE YEAR

SUSQUEHANNA

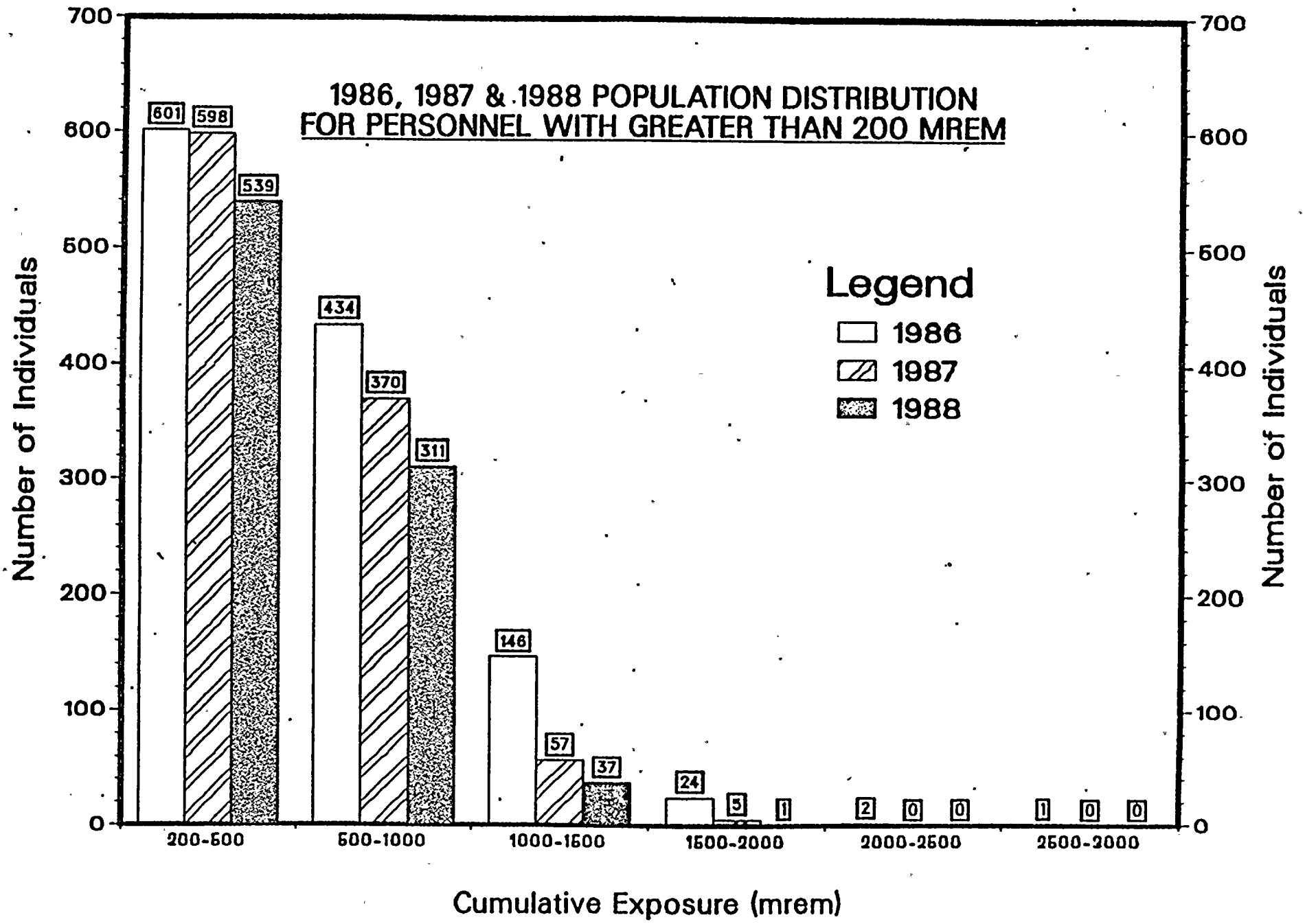
1984	1985	1986	1987	1988	1987 INDUSTRY AVERAGE
0.400	1.200	0.643	0.379	0.304	0.800

AVERAGE EXPOSURE PER WORKER (MREM)*

SUSQUEHANNA

1984	1985	1986	1987	1988	1987 INDUSTRY AVERAGE
350	301	276	243	270	410

* WORKERS WITH REPORTED EXPOSURE: GREATER THAN 10 MREM.


1986, 1987 & 1988 POPULATION DISTRIBUTION
FOR PERSONNEL WITH GREATER THAN 200 MREM
Legend
1986
1987
1988
Number of Individuals
Cumulative Exposure (mrem)
200-500
500-1000
1000-1500
1500-2000
2000-2500
2500-3000
601
598
539
434
370
311
146
57
37
24
5
1
2
0
0
1
0
0
0
100
200
300
400
500
600
700

POPULATION EXPOSURE TRENDS

	1985	1986	1987	1988
LESS THAN 10 MREM	920	1177	1501	2048
10 TO 200 MREM	2156	1788	1518	1016
GREATER THAN 200 MREM	1513	1208	1030	888
TOTAL	4589	4173	4049	3952

CRD IMPROVEMENT ITEMS

FOR UNIT 1 SECOND AND UNIT 2 FIRST:

MOCK-UP TRAINING IN TEAMS

USE OF DEDICATED EXPERIENCED CREWS

IMPROVED UNDERVESSEL DECON

RESOLVED EQUIPMENT PROBLEMS - CAROUSEL WINCH AND SHOOT OUT STEEL CART

SCHEDULING CHANGES - COMPLETE TESTING PRIOR TO REINSTALLATION OF INTERFERENCES

COMMUNICATION - UNDERVESSEL CAMERA & IMPROVED HEADSETS

FOR UNIT 1 THIRD AND UNIT 2 SECOND:

CRD FLANGE SHIELDS

CHANGES IN THE UNCOUPLING SCHEDULE

REMOTE UNDERVESSEL TOOLING (ALSO CHANGED MOCK-UP AT TRAINING CENTER)

REBUILD ROOM UPGRADES

MAN-REM PER CRD

		OUTAGE		
		FIRST	SECOND	THIRD
REMOVAL/REPLACEMENT	UNIT 1	1.68	0.95	0.59
	UNIT 2	0.97	0.67	-
REBUILD	UNIT 1	0.35	0.35	0.33
	UNIT 2	0.27	0.27	-
TOTAL	UNIT 1	2.03	1.30	0.92
	UNIT 2	1.24	0.94	-

HEALTH PHYSICS READINESS

- o PEOPLE
  - INCREASED PERMANENT MANPOWER
  - LOW TURNOVER; SEASONED STAFF
  - CONTRACTOR TECHNICIANS-SUFFICIENT NUMBERS AND ONSITE
- o TRAINING
  - HIGH PRIORITY
  - IMPROVED CONTRACTOR TECHNICIAN TRAINING
    - TRAINING CENTER
    - CONTROL POINT
- o PROGRAMS AND PROCEDURES
  - PLANNING FOR PP&L LEAD TECHS AT CONTROL POINTS
  - PROCEDURES REVIEW COMPLETED
  - CONTROL POINT CONDUCT PROCEDURES
  - IN-PLANT OVERSIGHT EMPHASIS
    - ASSISTANT FOREMEN
    - SPECIALISTS
  - RESOURCE SCHEDULING UPGRADE
  - RADIOLOGICAL PERFORMANCE STANDARDS TRAINING-EACH SECTION
    - CONTAMINATION CONTROL
    - RADWASTE MINIMIZATION
  - HOT PARTICLE CONTROLS
    - REFUEL FLOOR

- FACILITIES AND EQUIPMENT
  - PERSONNEL AND TOOL CONTAMINATION MONITORS
  - ALARMED UNAUTHORIZED ACCESS POINTS
  - DAW PROCESSING TRAILER
  - UNIT-2 ACCESS STRUCTURE IN CONSTRUCTION
  - DRYWELL AND OTHER AIR MONITORING

- ALARA
  - SHUTDOWN PLAN
  - FLUSHES
  - SHIELDING
    - INCLUDES GENERIC DRYWELL SHIELDING
  - PREJOB REVIEWS
  - IN PROGRESS REVIEWS

SUMMARY

- ACHIEVEMENTS IN PROJECTS PLANNING
- LESSONS LEARNED FROM SITE EXPERIENCE
- AVAILABILITY OF INDUSTRY COMPARISONS
- RELATIONSHIPS WITH WORK GROUPS
- AWARENESS OF WORK PRACTICES AND INITIATIVES