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PROPOSED WORK PLAN FOR

DEVELOPMENT OF THE DAVIS-BESSE SFRCS PANEL

Prepared For:

Davis-Besse Nuclear Power Station

Prepared By:

Essex Corporation
333 North Fairfax Street
Alexandria, Virginia 22314
703/548-4500

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PROPOSED WORK PLAN FOR DEVELOPMENT OF THE DAVIS-BESSE SFRCS PANEL

This document describes a work plan methodology for the design of a new panel to serve functions of the Steam Feed Rupture and Control System (SFRCS). The work plan is composed of nine tasks which include a requirements analysis (Tasks 1 & 2), the design and evaluation process (Tasks 3-7), and a final review of the completed product and documentation of the panel development (Task 8 & 9).

TASK 1: ANALYZE DOCUMENTED PROBLEMS WITH SFRCS COMPONENTS

Objective

- To determine which features of SFRCS related components have documented problems which may need correction.

Steps

1. Review all HEDs concerned with SFRCS and group HEDs according to schedule for correction.
2. Review relevant information resulting from the plant trip on June 9, 1985 (e.g., NUREG 1154, Davis-Besse reports,...) and determine which issues need to be addressed for possible SFRCS corrections.

Products (Task 1)

- List of issues which should be addressed during any corrections of SFRCS in the main control room.

Support Needed from Davis-Besse Personnel (Task 1)

- Operations and I&C personnel available to provide information regarding the operatrr requirements and hardware requirements of SFRCS.
- Project management review of identified problems.

TASK 2: IDENTIFICATION OF SFRCS INFORMATION AND CONTROL REQUIREMENTS

Objective

- Davis-Besse is in the process of developing a new panel in order to centralize SFRCS functions. The objective of this task is to identify information and control requirements for the SFRCS functions.

Steps

1. Review Task 1 results for SFRCS instrumentation and control requirements. Determine if any SFRCS related components are recommended for addition, deletion or relocation.

2. Review DCRDR task analysis to identify which information and control requirements are required for SFRCS functions in the emergency procedure.

3. Through interview and joint analysis with system engineers, I&C and operations, determine which other I&C requirements, if any, should be addressed for the proposed panel to support SFRCS functions. This analysis may review portions of selected normal procedures.

4. Determine criteria regarding installation on control panel considering:

    - o Seismic.
    - o Fire separation.
    - o Consideration of space required behind panel face and on top of panel (e.g., space for maintenance, for operation,...)
    - o Availability of new controls and displays from manufacturer.
    - o Other criteria.

Products (Task 2)

- o List of information and control requirements for SFRCS functions. This list should flag requirements for new components vs. relocated components. Requirements for relocated components should identify existing panel location.

Support Needed from Davis-Besse Personnel (Task 2)

- o Availability of Operations, I&C, and/or Systems Engineering for requirements analysis (determination of Tech Spec values, set points, ...)
- o Review by project management of component requirement list.

TASK 3: IDENTIFY HARDWARE FOR SFRCS FUNCTIONS

Objective

- o To identify specific components to provide required instrumentation and control functions for the SFRCS function.

Steps

1. Determine which existing components will satisfy information and control requirements and other practical requirements such as size. Refer to relevant HEDs from DCRDR.

2. For new component requirements compare possible components from different manufacturers on the basis of relevant criteria from 0700 and Davis-Besse experience.

Products (Task 3)

- List of displays and controls proposed for new panel.

Support Needed from Davis-Besse Personnel (Task 3)

- Availability of Operations and I&C personnel to provide Davis-Besse experience as input into selection.

- To be determined: Will CRT/SPDS be involved here? Or are only hardwired components to be used?

TASK 4: ASSESS GROUPING OF SFRCS RELATED COMPONENTS

Objectives

- Assess proposed system grouping of SFRCS related components relative to other system groupings to ensure that operator traffic patterns are effective. This task does not address arrangement of specific components within a group.

- To identify and address any human factors problems which could arise from relocating components (e.g., is it possible that important existing control-display relations will be disturbed? Will component grouping be degraded?

Steps

1. Prepare traffic patterns for proposed grouping of components. The traffic patterns should be based on procedures which use the new SFRCS components and relocated SFRCS components.

2. Compare the traffic patterns for the proposed arrangements to those developed for the DCRDR. The primary criteria used in this comparison will include:

   - Distance walked.

   - Number of shifts between system groupings.

   - Number of shifts between different panels (console, vertical panel, back panels).

   - Interference among operators.

These comparisons will focus on the SFRCS function and other functions which use components proposed for relocation to the SFRCS panel.

3. Verify problem components with operator(s).

4. Resolve locations of problem components.

Products (Task 4)

- List of problems identified in traffic pattern analysis. These items would identify which components, if any, were not in an appropriate system grouping, or those components which are strongly associated with more than one system grouping.

- Final list of components to be placed on new panel.

Support Needed from Davis-Besse Personnel (Task 4)

- Project management review of components in poor locations.

TASK 5: PRELIMINARY SFRCS COMPONENT ARRANGEMENT

Davis-Besse has developed preliminary diagrams showing different alternatives for a mimicked component arrangement. Davis-Besse has also developed a full-scale mock-up of the new panel based on one of the preliminary diagrams.

Objective

- Complete a preliminary component arrangement in sufficient detail to allow an evaluation of component arrangement.

Steps

1. Compare the list of components and component requirements developed in this work plan to the set of components used for the mock-up.

2. Review criteria for component layout. These criteria include practical considerations such as panel structural limitations and fire separation; and NUREG-0700 criteria (e.g., panel layout, location aids, ...).

3. Revise the preliminary scheme to accommodate changes in list of requirements.

4. Consider alternative mimic arrangement, if useful.

Products (Task 5)

- Description of list of criteria.

- Revised mock-up and/or drawing to reflect incorporation of updated criteria and requirements. This scheme to include sufficient labeling for component location and identification during evaluation.

Support Needed from Davis-Besse Personnel (Task 5)

- I&C personnel to provide information regarding panel structure and component area constraints.
- Review of revised layout by Project Manager.

TASK 6: EVALUATION OF PRELIMINARY COMPONENT ARRAWGEMENT

Objective

- Determine to what extent the preliminary component arrangement satisfies operational needs defined by (1) a walkthrough on the mock-up and (2) review of relevant SFRCS HEDs from DCRDR.

Steps

1. Develop scenarios for SFRCS operation for emergency procedure walkthroughs.
2. Ensure that all relevant portions of mock-up are prepared for a walkthrough to evaluate only component arrangement (relationships among individual components within a grouping) and labeling.
3. Observe operators as they walkthrough the prepared scenarios to identify possible human factors concerns with the panel layout.
4. Interview operators participating in walkthrough for comments, criticisms, and suggestions.
5. Assess operator comments.
6. Review the HEDs which are relevant to the component arrangement and determine if the layout corrects the problems.

Products (Task 6)

- Scenarios and procedural steps used in the evaluation.
- Record of walkthrough comments by observors and operators.
- Record of assessment of comments.
- Record evaluation of HED correction.

Support Needs from Davis-Besse Personnel (Task 6)

- Operators to assist in development of scenarios.
- Operator to ensure relevant portions of mock-up are prepared for walkthough.
- Operators to participate in walkthrough and interview.
- Operators and Systems Engineer to assist in evaluating SFRCS HED correction.

TASK 7: REFINE AND FINALIZE DESIGN

Objective

- To complete the design process and prepare final documents suitable for panel construction.

Steps

1. Incorporate comments on preliminary design into drawing of new panel. (This process may be somewhat iterative due to evaluations of new changes and trade-off analyses).
2. Evaluate modified design as required. Examine all HEDs identified in Task 1.
3. Prepare final drawing and necessary notes for panel manufacture. The final design drawing should include proposed label content.

Products (Task 7)

- Record results of HED correction assessment.
- See No. 3 above.

Support Needed from Davis-Besse Personnel (Task 7)

- Operations and Project Management to review changes and final document.

TASK 8: REVIEW MANUFACTURED PRODUCT

Objective

- To determine if manufactured panel satisfies specifications.

Steps

(This item could change depending on who manufactures the panel and the number of participants in the process.)

1. Check physical layout features of panel such as dimensions, color, application of mimic lines, and components characteristics against the requirements established in earlier tasks.

Product (Task 8)

- Statement of any problems identified in above evaluation.

Support Needed from Davis-Besse Personnel (Task 8)

- Review by Project Manager, Operations, and I&C.

TASK 9: DOCUMENTATION OF DESIGN PROCESS

Objective

- To provide description of important steps in the design process, to record the level of preparation for the design process and the rationale for key decisions in the process.

Steps

1. Prepare summary of each task in the design process and combine into a final report.

Product (Task 9)

- Final report for SFRCS panel design.

Support Needed from Davis-Besse Personnel (Task 9)

- Review of report by Project Manager.

METHOD FOR UPDATING SFTA AND I&C REQUIREMENTS VERIFICATION

The following additional function and task analysis will be performed to document and further verify required instrumentation and control requirements as recommended in the NRC's DCRDR audit report of July 2, 1985:

1. Complete function and task analysis of radioactivity release response (not previously analyzed)

2. Reanalysis of operator actions for steam generator tube rupture to ensure comprehensive identification of information and control needs (parameters and control action capabilities)

3. Analysis and documentation of required characteristics of instrumentation and controls to meet information and control needs for all emergency operator tasks.

4. Verification of I&C availability and suitability by comparison of requirements data from steps 1 - 3 above to existing instrumentation and controls.

ANALYSIS TEAM

The analysis team will consist of a human factors specialist with experience in DCRDR task analysis and a nuclear operations specialist (SRO license), and a systems/ I&C engineer.

INPUTS TO THE ANALYSIS

- Abnormal Transient Operating Guidelines (ATOG)
- Safety sequence diagrams developed in analysis leading to ATOG
- System Function Review Tables developed in previous function and task analysis for the Davis-Besse DCRDR
- Documentation of system changes recommended by Davis-Besse's System Review Group.

ANALYSIS APPROACH

The analysis approach is divided into four parts, corresponding to the four needs identified in the DCRDR audit report.

1. Radioactivity Release Analysis

a. Review system documentation and technical specifications pertinent to radioactivity release detection and control system.

b. Review administrative procedures concerning personnel responsibilities for radioactivity release control.

c. Prepare safety sequence diagrams identifying system and operator functions for radioactivity release response.

d. List tasks required to accomplish operator functions.

e. Analyze each task and specify task action requirements, and the necessary instrumentation and controls and their characteristics, based on what the operator is expected to accomplish and plant system characteristics and operating and safety limits.

f. Synthesize instrument and control requirements specified for each component and parameter, by system.

2. Steam Generator Tube Rupture Analysis

a. Compare existing Task Data Forms to applicable portions of the ATOG and safety sequence diagrams. Add any operator actions and associated information and control needs that may have been omitted from Task Data Forms.

b. Compare Task Data Forms as amended in step (a) to applicable parts of the symptom-based EOP and technical specifications to identify any additional action, information, and control needs that may be called for by those documents.

c. Analyze all information and control needs on updated Task Data Forms to specify implications for I&C characteristics as in step 1(e) above.

d. Synthesize I&C requirements as in step 1(f) above.

3. Analysis and Documentation of Required I&C Characteristics for All Remaining Emergency Operating Sequences

This will be done as described for steps 1(e) and 1(f).

4. Verification of Availability and Characteristics of Existing Instrumentation and Controls

The synthesized set of requirements for each emergency response sequence will be compared to existing components in a walk-through exercise involving one to two operators to assist the analysis team. This will be done in the mockup. Before these exercises the mockup will be verified and updated as necessary to ensure that it is fully accurate with respect to the current control room.

DAVIS-BESSE HED REASSESSMENT METHODOLGY: DETERMINATION OF CUMMULATIVE AND INTERACTIVE EFFECTS

The procedure employed to determine cummulative and interactive effects between HEDs initially requires the identification of all HEDs related to a specific component. This will be done using the on-line tracking system which can cross-reference HEDs using specific component ID numbers.

A team of human factors specialists and operations personnel will evaluate the specific relationships between HEDs to determine those which will interact to increase the error potential and/or decrease the potential for recovery. Because the consequence of the error is a constant, and only the potential for that effort is impacted by interaction effects, the consequence of error will remain as determined during normal assessment.

The factors to be considered by the evaluation team are as follow:

I. Potential for Error
   - A. Situational factors
     1. Time criticality for task completion
     2. Frequency of use of component
   - B. Specific factors
     1. Operator function/involvement
        - a. Maintained control of dynamic system parameter
        - b. Discrete control of plant systems
        - c. Monitoring systems/responding to alarm information
     2. Human engineering considerations
        - a. Determination of general location of component in control room
        - b. Identification of specific location of component in control room
        - c. Usability of component

II. Potential for Recovery
   - A. Detectability of error-contingent on verfication of control action (feedback)
     1. Nature of verification information (direct vs. inferred)
     2. Accessibility of verification information
   - B. Restoration of error dependent on dynamics of system(s) involved

DAVIS-BESSE COMPUTERIZED HED TRACKING SYSTEM
(Prototype)

Sample HED Data and Sample HED Status Summary

HUMAN ENGINEERING DISCREPANCY (HED) REPORT

TITLE: Accidental activation of Pushb
utton Controls

HED NO: P.4.1.3
CATEGORY: III
STATUS: COMP
CORR CODE: N/A

ITEMS INVOLVED:
PANEL ID: C-15
COMPNT ID: HIS-6227 HIS-6236 HIS-6237 HIS-6240
HIS-6242 HIS-6243 HIS-6244 HIS-6246
HIS-6248 HIS-6250 HIS-6251 HIS-6254
HIS-6626

PROBLEM DESCRIPTION:
Pushbuttons mounted low on the Electrical Distribution Panel are subje
ct to accidental activation by personnel leaning or bumping against th
em.

0700 PARA: 6.4.1.2g

DATA SOURCE: 01.3

SPECIFIC ERROR:
Inadvertant activation of controls

BACKFIT:
Change the pushbuttons to rotary switches to prevent inadvertent activ
ation

DISPOSITION:
Changing the controls would violate the current shape coding conventio
ns in the control room. A foot-guard extends 4.5 inches from the base
of the panel to prevent operators from leaning or bumping the panel.

SCHEDULE: N/A

ORIGINATOR: D.Beith DATE: 07/19/83

APPROVED: DATE:

HUMAN ENGINEERING DISCREPANCY (HED) REPORT

TITLE: Indicator Lights are Dim

HED NO: P.5.1.1
CATEGORY: IIC
STATUS: COMP
CORR CODE: CL5

ITEMS INVOLVED:

PANEL ID: C-22
COMPNT ID: SI-60098

PANEL ID: C-6
COMPNT ID: ZI-3000

PANEL ID: C-7
COMPNT ID: TI-RCT

PROBLEM DESCRIPTION:

Lights on the above panels are difficult to read clearly and have litt le contrast in ambient lighting. Operators must shield the lights wit h their hands to read the displays clearly.

0700 PARA: 6.5.3.1b

DATA SOURCE: S.5.1.B3(4),S.5.1.B6(1),04.3

SPECIFIC ERROR:

Misinterpretation of equipment status

BACKFIT:

Increase brightness of LED lights.

DISPOSITION:

Add a hood to all LED displays to eliminate glare and increase the bri ghtness contrast.

SCHEDULE: 6th Refuel

ORIGINATOR: D.Beith DATE: 07/26/83

APPROVED: DATE:

HUMAN ENGINEERING DISCREPANCY (HED) REPORT

TITLE: Label Cleanliness

HED NO: P.6.1.2
CATEGORY: III
STATUS: COMP
CORR CODE: CL5

ITEMS INVOLVED:
PANEL ID: ALL
COMPNT ID: ALL

PROBLEM DESCRIPTION:
No procedure exists for the periodic cleaning of control panel labels. Labels are not cleaned on a regular basis

0700 PARA: 6.6.2.4d

DATA SOURCE: S6.1.B6(9),S6.1.B4(1),D6.7

SPECIFIC ERROR:
Misreading component labels

BACKFIT:
Establish a maintenance or administrative procedure for periodic cleaning of labels.

DISPOSITION:
Same as above. In addition labels will be standardized black on white to reduce reading problems.

SCHEDULE: 7th Refuel

ORIGINATOR: D.Beith DATE: 07/25/83

APPROVED: DATE:

HUMAN ENGINEERING DISCREPANCY (HED) REPORT

TITLE: Computer Display Titles are Un
clear in Describing Display Co

HED NO: P.7.1.1
CATEGORY: III
STATUS: COMP
CORR CODE: ENH

ITEMS INVOLVED:
PANEL ID: CRT'S
COMPNT ID: DISPLAYS

PROBLEM DESCRIPTION:
Titles used for individual CRT displays do not accurately describe the actual contents of the display

0700 PARA: 6.7.1.2a(2)

DATA SOURCE: S7.1.B2(6),B3(7),B3(B3)

SPECIFIC ERROR:
Delay in obtaining appropriate data.

BACKFIT:
Modify display titles to give a clearer indication of display contents using standard acronyms and abbreviations developed for control room labels.

DISPOSITION:
Same as above.

SCHEDULE: 7th Refuel

ORIGINATOR: D.Beith DATE: 12/14/83

APPROVED: DATE:

HUMAN ENGINEERING DISCREPANCY (HED) REPORT

TITLE: Inconsistent Use of Color in t
he Control Room

HED NO: P.8.1.1
CATEGORY: III
STATUS: OPEN
CORR CODE:

ITEMS INVOLVED:
PANEL ID: ALL
COMPNT ID: ALL

PROBLEM DESCRIPTION:
There is no consistent meaning assigned to the colors used for compone
nt and mimic coding across the control room.

0700 PARA: 6.5.1.1d(1) 6.5.1.6d(2) 6.5.3.2a(2)
6.4.2.2f(1)

DATA SOURCE: S6.1.B7(1,7,8,9)

SPECIFIC ERROR:
Delay in locating/identifying controls and display.

BACKFIT:
Development and implement a standard system of color coding to the con
trol room.

DISPOSITION:
To be reviewed further under the labeling study.

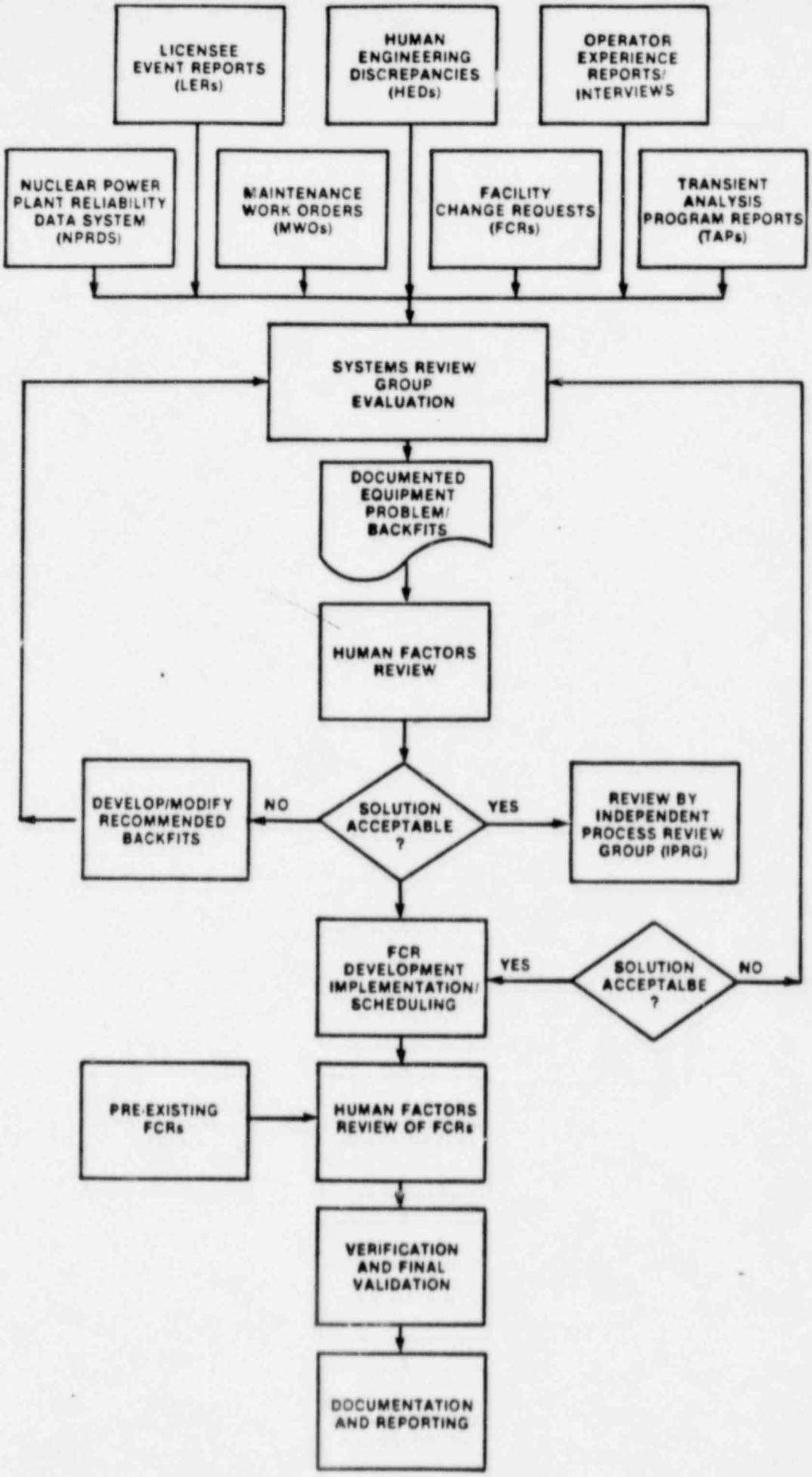
SCHEDULE:

ORIGINATOR: D.Beith DATE: 01/17/84

APPROVED: DATE:

DAVIS-BESSE HED STATUS SUMMARY

HED NO.	TITLE	PNL	CMPNT	0700	CAT	STAT	COR	SCHED
P4.1.3	Accidental Control Activation	C15	HIS6227 HIS6242 HIS6248 HIS6626 HIS6236 HIS6243 HIS6250 HIS6237 HIS6244 HIS6251 HIS6240 HIS6246 HIS6254	6412g	III	Comp	N/A	N/A
P5.1.1	Dim Indicator Lights	C06	ZI3000	6531b	IIC	Comp	CLS	Ref-6
		C07	TI-RCT					
		C22	SI6009B					
P6.1.2	Label Cleanliness	ALL	ALL	6624d	III	Comp	CLS	Ref-7
P7.1.1	CRT Display Title Clarity	CRT	ALL	6712a	III	Comp	ENH	Ref-7
P8.1.1	Inconsistent Color Codes	ALL	ALL	6411f1 6511d1 6516d2 6532a2	III	Open	-	-


LICENSEE EVENT REPORTS (LERs)
HUMAN ENGINEERING DISCREPANCIES (HEDs)
OPERATOR EXPERIENCE REPORTS/ INTERVIEWS
NUCLEAR POWER PLANT RELIABILITY DATA SYSTEM (NPRDS)
MAINTENANCE WORK ORDERS (MWOs)
FACILITY CHANGE REQUESTS (FCRs)
TRANSIENT ANALYSIS PROGRAM REPORTS (TAPs)
SYSTEMS REVIEW GROUP EVALUATION
DOCUMENTED EQUIPMENT PROBLEM/ BACKFITS
HUMAN FACTORS REVIEW
SOLUTION ACCEPTABLE ?
NO
YES
DEVELOP/MODIFY RECOMMENDED BACKFITS
REVIEW BY INDEPENDENT PROCESS REVIEW GROUP (IPRG)
FCR DEVELOPMENT IMPLEMENTATION/ SCHEDULING
YES
SOLUTION ACCEPTALBE ?
NO
PRE-EXISTING FCRs
HUMAN FACTORS REVIEW OF FCRs
VERIFICATION AND FINAL VALIDATION
DOCUMENTATION AND REPORTING

DAVIS-BESSE SYSTEMS REVIEW GROUP
DISCREPANCY INDEX

HED NO.	TITLE	CATEG	SRG NO.
P1.7.10	LAMP TEST/DUAL BULB CAPABILITY	IA	
P1.7.11	INDICATOR BULBS SHORT OUT DURING REPLACEMENT	IA	
P3.1.37	ANNUNCIATORS WITH MULTI-PARAMETER INPUTS	IIA	
P4.1.4	CONTROLS CO-LOCATED EXCESSIVELY CLOSE TOGETHER	IA	MU & P-NRR-22
P5.1.2	UNLIT INDICATOR LIGHTS PROVIDE SYSTEM STATUS	IIA	MU & P-NRR-26
P5.1.6	SCALE RANGE INSUFFICIENT FOR MAXIMUM SYSTEM VALUE	IIA	MU & P-RR-03 IMS-NRR-03
P5.1.7	METERS DO NOT HAVE AN OBVIOUS FAILURE MODE(OFF-SCALE LOW)	IIB	
P5.1.9	MULTISCALE METERS DIFFICULT TO READ	IIA	
P5.1.29	METERS SUFFER PARALLAX PROBLEMS	IIA	IMS-NRR-03
P6.1.12	LABELS NOT LOCATED ABOVE THE ELEMENTS DESCRIBED	IIA	ARTS-NRR-02
P6.1.15	TEMPORARY LABELS OBSCURE LABELS AND COMPONENTS	IIA	
P9.2.1	SFRCS DISPLAY ARRANGEMENT INCORRECT	IIA	-SFRCS FCR-
P9.2.4	RELATED CONTROLS/DISPLAYS NOT PROPERLY GROUPED	IIB	
P9.2.5	ICS PANEL ARRANGEMENT MISLEADING	IIB	
P9.2.6	CONTROL VIOLATES OPERATOR EXPECTANCY	IIA	SFAS-NRR-04
P9.2.7	AFW DISPLAY ACCURACY INSUFFICIENT	IIA	AF-NRR-06
P9.2.18	SFRCS INFORMATION AVAILABILITY INCONSISTENT	IIA	SG-NRR-01
P9.2.20	SFAS ISOLATION GROUPS UNCLEAR	IIA	SFAS-NRR-05 MU & P-NRR-09

P9.2.28	FEEDWATER FLOW INDICATION MISLEADING	IIB	
P9.2.30	CRITICAL DISPLAYS NOT VISIBLE	IIA	
P9.2.33	AFW SYSTEM LACKS APPROPRIATE MIMICS	IIA	
P9.2.42	STEAM GENERATOR LOGIC INPUTS VARY (ICS AND SFRCS)	IIA	SG-NRR-02 MFW-RR-04
P9.2.43	SFRCS BLOCK CONTROL NOT LOCATED IN CONTROL ROOM	IIA	-SFRCS FCR-
P9.2.47	DECAY HEAT MIMIC RELATIONSHIPS UNCLEAR	IIA	HPI-RR-11
P9.2.54	CONTROLS NOT ARRANGED TO SUPPORT OPERATIONS (SFRCS)	IIA	-SFRCS FCR-
P9.2.65	MAIN TURBINE INFORMATION INADAQUATE	IIB	
P9.2.83	ICS TRACK MODE INFORMATION INADAQUATE	IIB	
P9.2.84	DEAERATOR LEVEL CONTROL VALVE INFORMATION INADAQUATE	IIB	
P9.8.7	INACCURATE DISPLAYS	(PAM) IIA/ (CR) IIC	RCS-RR-04

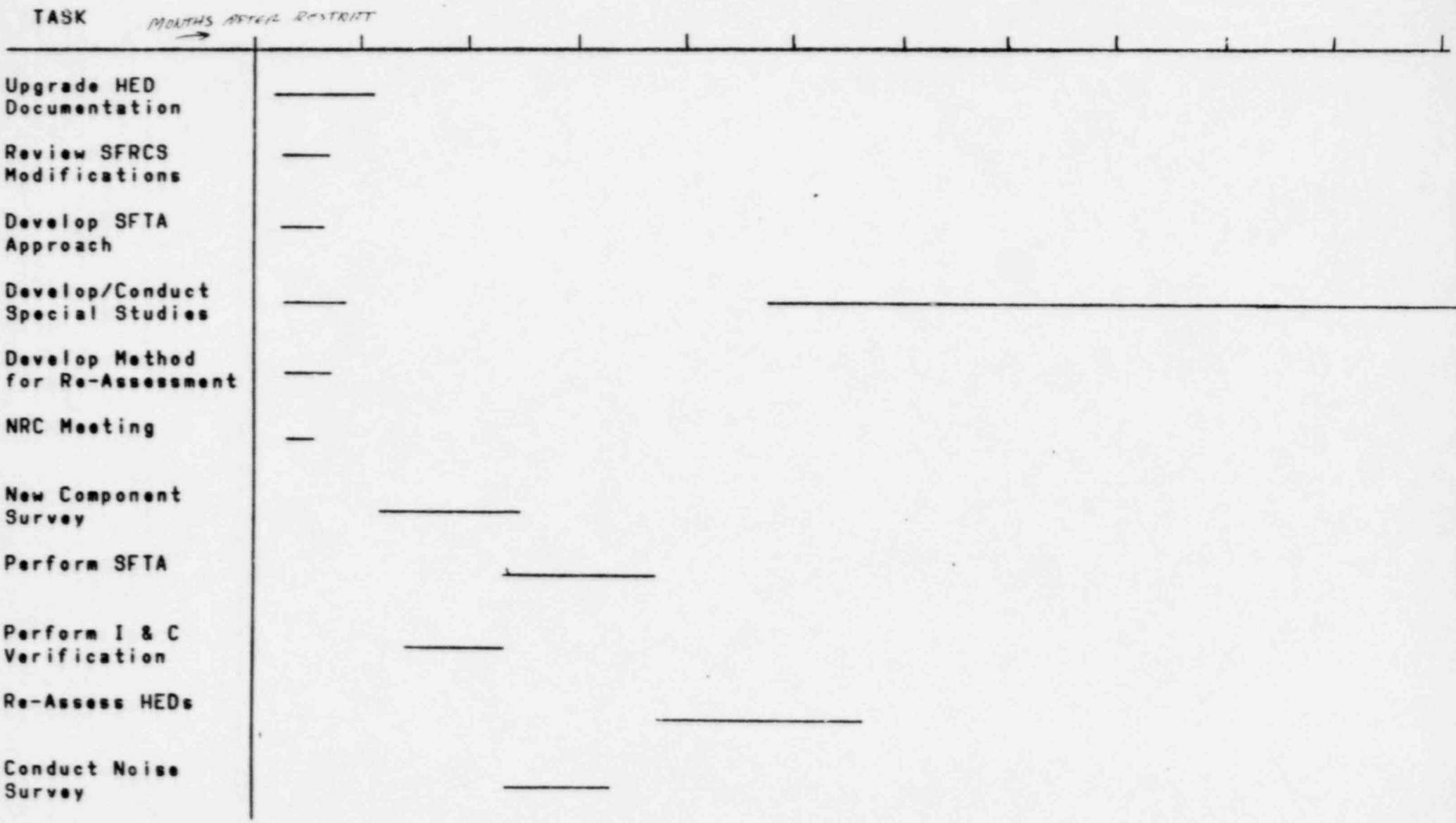
DAVIS-BESSE HED/SYSTEMS REVIEW GROUP
PROBLEM ID CROSS-INDEX

PROBLEM ID. NO.	PROBLEM DESCRIPTION	RELATED HED NO.
ARTS-NRR-02	CONTROLS TOO CLOSE TOGETHER - ACTUAL PROBLEM IS LABELING AS THE ARTS OUTPUT TRIP AND LAMP TEST CONTROLS ARE LABELED "CH 1, 2, 3, 4" AND "BKR A, B, C, D" WHILE THE ACTUAL RELATIONSHIP IS 1 TO B, 2 TO A, 3 TO D, AND 4 TO C.	P6.1.12
SIA-NRR-09	STATION AIR COMPRESSOR CANNOT BE STARTED FROM THE CONTROL ROOM - NO CONTROL SWITCH	
SIA-NRR-14	NO INSTRUMENT AIR FLOW METER IN THE CONTROL ROOM	
AF-NRR-06	NO FLOW INDICATION EXISTS ON THE AFW PUMP MINIMUM FLOW LINE	P9.2.7
CCW-NRR-09	NO CCW LETDOWN FLOW METER IN THE CONTROL ROOM	
EVS-RR-01	CONTROLLERS NOT PROTECTED AGAINST ACCIDENTAL ACTIVATION (PDC 5000, PDC 5014)	
CS-NRR-03	NO CONTAINMENT SUMP LEVEL INDICATION - ONLY TWO INDICATOR LIGHTS THAT OPERATORS ARE UNSURE OF TO INDICATE LOW LEVEL	
CS-NRR-04	NO PUMP DISCHARGE PRESSURE INDICATION IN THE CONTROL ROOM FOR MONITORING CAVITATION WHEN IN THE RECIRC. MODE	
CRD-NRR-04	DIAMOND CONTROL PANEL LIGHTS ARE NOT COLOR CODED TO MATCH THOSE USED ON THE SIMULATOR	
CRD-NRR-09	CRD MOTOR POWER ANNUNCIATOR IS A NUISANCE ALARM	
CF-NRR-02	CORE FLOOD TANK LEVEL INDICATION READS IN CUBIC FEET, TECH. SPECS. READ IN GALLONS	
13.8KV-NRR-02	MIMIC BUSSES ARE CONFUSING TO FOLLOW	
13.8KV-NRR-03	METERS ON ELECTRICAL PANEL ARE DIFFICULT TO READ CLEARLY	
HPI-RR-11	HPI AND DECAY HEAT PUMP CONTROL SWITCHES ARE NOT CLEARLY GROUPED	P9.2.47
MS-NRR-03	INCORE TEMPERATURE METER RANGE ON PAM PANEL IS NOT LARGE ENOUGH FOR SYSTEM CAPABILITIES	P5.1.6 P5.1.29

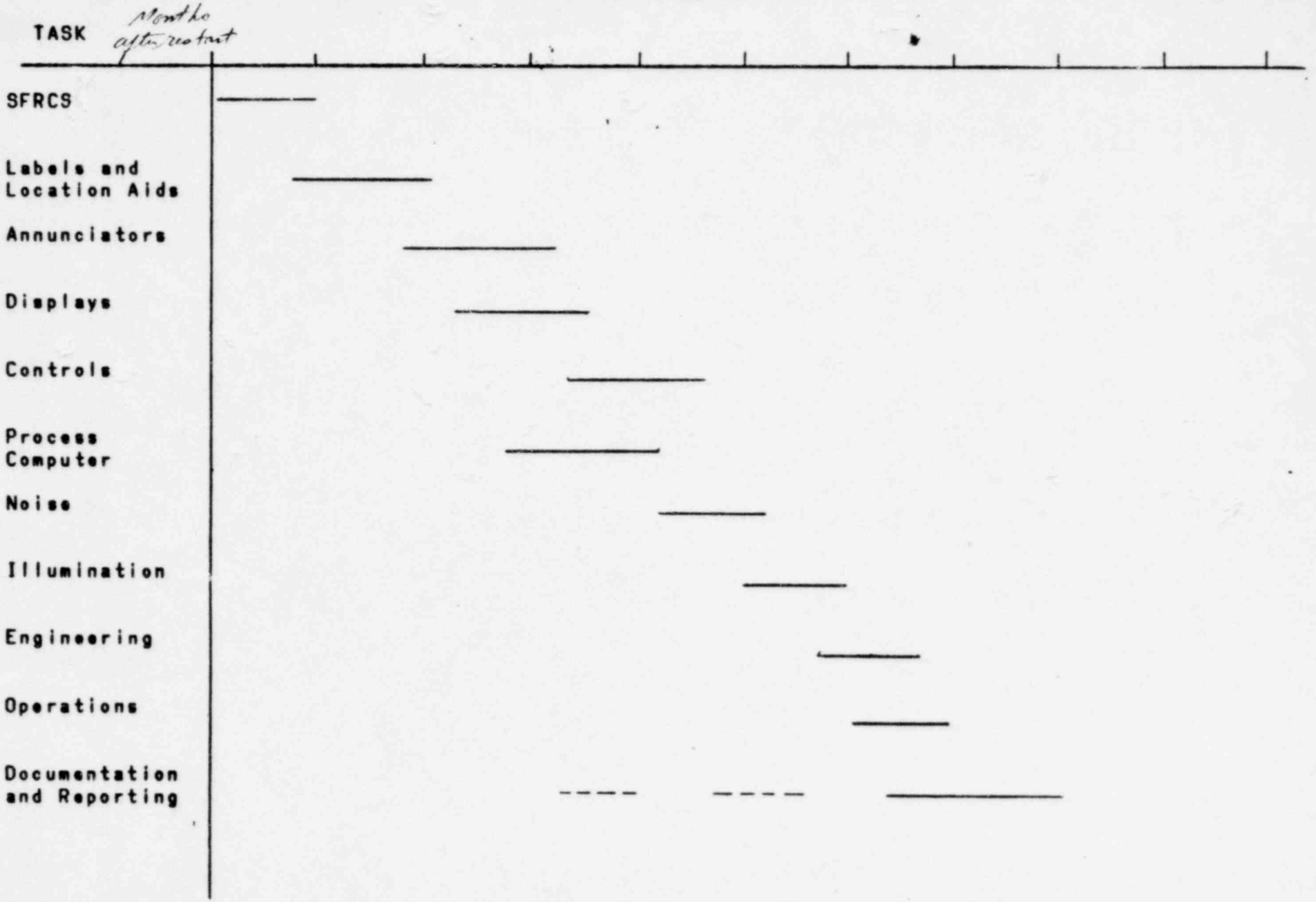
IMS-NRR-04	TWO BACKUP INCORE MULTIPOINT DETECTORS ARE AVAILABLE - ONLY NEED ONE	
ICS-NRR-03	NO ALARM TO INDICATE SATURATION OF Tavg INTEGRAL	
ICS-NRR-07	NON-NUCLEAR INSTRUMENTATION SYSTEM SELECTOR SWITCHES CAN BE POSITIONED BETWEEN DETENTS - THIS COULD CAUSE AN ICS TRANSIENT	
ICS-NRR-08	THE SYSTEMS REVIEW GROUP FEELS A CONTROL ROOM DESIGN REVIEW IS NEEDED	
MFW-RR-04	ELIMINATE UN-NECESSARY INTERLOCKS IN THE MFW SYSTEM TO ELIMINATE VARYING INDICATIONS OF MFW LEVEL AND THE UN-NECESSARY LEVEL CONTROLS	P9.2.28 P9.2.43 P9.2.85
MFW-NRR-05	HI PRESSURE FEEDWATER HEATER SIGHTGLASS LEVEL INDICATIONS ARE UNRELIABLE/OUT OF SERVICE - REPLACE THEM WITH BETTER COMPONENTS	
MFW-NRR-09	MFW STARTUP CONTROL VALVE POSITION INDICATION INDICATES THE DEMAND PLACED ON THE VALVE, NOT THE ACTUAL STATUS	
RCS-RR-03	BENTLEY-NEVADA PROXIMITY PROBES USED TO DETECT RC PUMP VIBRATION ARE CONFUSING TO READ - OPS PERSONNEL RELY ON THE ANNUNCIATOR AS SOLE INDICATION OF HIGH VIBRATION. NEW METERS ARE BEING ADDED TO THE CONTROL ROOM	
RCS-RR-04	INCORE TEMP. INDICATIONS ARE AVAILABLE ON THE PAM PANEL BUT THREE OPERATORS ARE REQUIRED IN ORDER TO READ THEM. SPDS DOES PROVIDE THIS INFORMATION	P9.8.7
RCS-NRR-09	INOPERATIVE DISPLAYS - RC Tave DIGITAL DISPLAY IS BROKEN	
RCS-NRR-16	CCW SYSTEM WATER LOSS LEADS TO AN RCP TRIP AFTER A CERTAIN AMOUNT OF TIME. NO DEVICES IN THE CR TO MEASURE ELAPSED TIME AND DETERMINE WHEN A MANUAL TRIP SHOULD OCCUR - A TIME DELAY IS BEING ADDED TO THE CCW ANNUNCIATORS	
RPS-NRR-04	RPS CHANNELS ARE LABELED 1,2,3,4 - TRIP BKRS ARE RELATED B,A,D,C NOT A,B,C,D AS WOULD BE EXPECTED. SEE ARTS-NRR-02 AS WELL	P6.1.12
SFAS-NRR-01	SFAS ACTUATES MSIV'S LOCATED OUTSIDE CONTAINMENT - THESE VALVES ARE UNNECESSARY AND ARE BEING REMOVED (SFRCS ACTUATES THE SAME VALVES)	
SFAS-NRR-04	SFAS MANUAL TRIPS ARE NOT GROUPED WITH THE ASSOCIATED RESET CONTROLS, AND RESET INVOLVES TWO ACTIONS - PRESS "OFF" ON THE TRIP CONTROL AND THEN PRESS RESET	P9.2.6

SFAS-NRR-05	RCP SEAL INJECTION ISOLATION VALVES AND RCP SEAL RETURN VALVE CONTROL SWITCHES ARE GROUPED UNDER LEVEL TWO ACTUATION WHEN THEY SHOULD BE UNDER LEVEL THREE	P9.2.20
SW-RR-02	EMERGENCY CONDENSER OUTLET VALVES HAVE NO AUTO-INITIATION FEFATURE - THE SYSTEM TEMP. INDICATION IS INACCURATE AS WELL	
SW-NRR-02	SW FLOW INDICATOR INACCURATE - CHANGE SENSOR LOCATION	
SW-NRR-08	NO TEMP. INDICATOR FOR THE SWING CCW HEAT EXCHANGER - AN FCR IS IN PLACE TO ADD ONE	
SW-NRR-09	NO ALARM IN THE CONTROL ROOM TO INDICATE A LOSS OF TPCCW FROM SERVICE WATER.	
SG-NRR-01	NO SFRCS LEVEL INDICATION IN THE CONTROL ROOM AN FCR IS IN PLACE TO ADD ONE (SEE SG-NRR-02)	P9.2.18 P9.2.42
SG-NRR-02	STEAM GENERATOR LEVEL INDICATION IS INACCURATE AND UNRELIABLE - DOESN'T ALWAYS MATCH ACTUAL SFRCS LEVEL - INSTALL SFRCS LEVEL INDICATION	P9.2.18 P9.2.42
MU & P-RR-03	FLOW INDICATOR RANGE IS INSUFFICIENT FOR THE POTENTIAL LIMIT OF THE SYSTEM (FI MU31)	P5.1.6
MU & P-NRR-09	LEVEL THREE ACTUATION COMPONENTS LOCATED IN THE LEVEL TWO ACTUATION GROUP (SEE SFAS-NRR-05)	P9.2.20
MU & P-NRR-11	LOCATION OF 64977A AND 64978A MAKE IT DIFFICULT TO OPERATE THE SYSTEM TO SUPPLY HYDROGEN TO THE MAKEUP TANK	
MU & P-NRR-16	RCP SEAL LEAKAGE INDICATORS ARE INACCURATE AND UNRELIABLE (FI-4137A,4237A,4337A,4437A)	
MU & P-NRR-22	CONTROL SWITCHES MU-54 AND MU-3971 ARE LOCATED EXCESSIVELY CLOSE TOGETHER, HAVE SIMILAR LABELS, AND LOOK THE SAME - THIS COULD CAUSE CONFUSION DURING OPERATIONS	P4.1.4
MU & P-NRR-26	BORATION PERMIT INDICATOR LIGHT IS UNLIT TO INDICATE SYSTEM NORMAL STATUS - NO OBVIOUS FAILURE MODE	P5.1.2
EDG-NRR-23	EDG FUEL OIL STORAGE AND DAY TANKS HAVE NO LEVEL INDICATORS ON THEM - OVERFILLING OF THE TANKS OFTEN RESULTS AND CAUSES SPURIOUS HIGH LEVEL ALARMS IN THE CONTROL ROOM	

TASK TIME-PHASE SCHEDULE



SPECIAL STUDY TIME-PHASE SCHEDULE



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Docket File
NRC PDR
L PDR
ORB#4 Rdg
Project Manager - ADe Agazio
JStolz
BGrimes (Emerg. Preparedness only)
OELD
EJordan, IE
ACRS-10
RRamirez
NRC Meeting Participants:
WRegan
DTondi