CONTROL ROOM DESIGN REVIEW PLAN

MONTICELLO NUCLEAR
GENERATING PLANT

NORTHERN STATES POWER COMPANY
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INTRODUCTION

This document describes the human factors detailed control room design review (DCRDR) which will be undertaken at the Northern States Power Company's Monticello Nuclear Generating Plant. It is submitted to the Nuclear Regulatory Commission in accordance with NUREG 0737 Supplement 1.

In accord with the review phases in NUREG 0700, Section 1.4, this document consists of four (4) sections. Section 1 contains an overview of the review plan, focusing on issues of policy and purpose. Section 2 describes the staffing plan, and how the review plan will be supported within the management structure of Monticello Nuclear Generating Plant. Section 3 details the methods and procedures to be used during the detailed control room review program. Section 4 establishes formal procedures for documenting the control room review.
SECTION 1

REVIEW PLAN OVERVIEW

1.1 Objectives

The primary objective of the control room review is the improvement of the man-machine interface in the control room.

Northern States Power Company (NSP), in association with the Boiling Water Reactor Owner's Group (BWROG), has been active in the review of the Monticello control room for over two years. The control room review plan presented in this document will continue and complete this work at Monticello.

The Monticello detailed control room review plan was developed in recognition of Nuclear Regulatory Commission (NRC) activities concerning control room review, especially NUREG 0700 and Generic Letter 83-18, the NRC Staff Review of the BWROG program.
1.2 **Perspectives and Scope**

The control room design review is part of a larger set of activities involving human factors taking place at Monticello. These activities include the development of a safety parameter display system (SPDS), an upgrading of emergency operating procedures (EOP's), and the establishment of emergency response facilities.

For the purposes of definition, the scope of this control room review includes 1) the Monticello control room and 2) the remote shutdown panel. All control panels, display components, auxiliary and back panel controls and display components, workspace, and environmental issues associated the control room or the remote shutdown panel will be reviewed.

To the extent that it is practical, without delaying the completion of the DCRDR, control room modifications and additions made during the review process will be recognized in the review.

1.3 **Approach**

Monticello's approach to the detailed control room review (DCRDR) has two major features. First, in May 1981, Monticello completed an initial control room design review with the cooperation of the Boiling Water Reactor Owners Group (BWROG). This review surveyed the panel layout, controls and displays, annunciators, computers, procedures, workspace, and environment in the Monticello control room. This BWROG control room review will be integrated into the current effort.

Second, Monticello and its human factors consultant, Honeywell, will document the BWROG survey and complete the BWROG survey supplement as recommended in the NRC Generic Letter 83-18. In addition, the BWROG material will be checked for compliance with the NRC guidelines contained in NUREG 0700.
SECTION 2
MANAGEMENT PLAN

2.1 Objectives

The objective of the control room design review management plan and committee/team selection is to assure that qualified multidisciplinary personnel are selected to coordinate the detailed DRCR and to identify, review, and recommend corrections for control room human engineering discrepancies to plant management.

2.2 Committee Selection

A group of technical specialists and managers have been selected to coordinate the Monticello detailed control room design review. This committee will also provide interface and human factors review for all NUREG 0737 Supplement 1 requirements. These personnel have skills in the following areas:

- Human Factors
- Systems Engineering
- Operations
- Training

Evaluation members from the plant operations staff, technical services support, and training department have been selected for their decision making and judgemental skills as well as their technical knowledge and management status. The review committee includes:

1. Monticello Superintendent of Nuclear Technical Services, Chairman
2. Monticello Superintendent of Technical Engineering
3. Monticello Superintendent of Operations
4. Monticello Nuclear Technical Services Senior Operations Specialists
5. Monticello Superintendent of Training
6. Monticello Superintendent of Operations Engineering
7. Honeywell Human Factors Project Leader
When additional expertise is needed, the review committee has the authority to recruit personnel from Northern States Power and from Honeywell Technology Strategy Center.

Details of the review committee's education and experience are included in Appendix A.

2.3 Review Committee Authority

The DCRDR committee will present to the Plant Operations Committee all recommended changes to the control room. Decisions to recommend control room modifications will be by simple majority voice of the review committee. In addition, any committee member has the option of bringing topics directly to the Plant Operations Committee.

2.4 Review Team

The review team consists of Honeywell human factors consultants supported by Monticello operations and engineering personnel. The team will function according to the procedure outlined in the DCRDR plan. The qualifications of this review team are presented in Appendix A.
SECTION 3
CONTROL ROOM REVIEW PROCEDURES

The various components of the detailed control room review of Monticello Nuclear Plant and the interrelationships between these components are presented in the program summary in Figure 3-1. The interrelationship between the DCRDR and other control room projects at Monticello (SPDS, EOP's) is shown in Figure 3-2.

The principal tasks of the detailed CRDR are described in this section. They include the following activities:

- Operating experience review,
- System review and task analysis,
- Control room inventory,
- Control room survey,
- Verification of task performance capability,
- Validation of control room functions,
- Compilation of HEDs.
- Assessment of HEDs.
- Control room design improvements.

3.1 Operating Experience Review

The 1981 BWR Owner's Group control room review surveyed Monticello operating experience by 1) analyzing plant LER's and scram reports and 2) interviewing seven operators (one-third of the total operator pool). The LER and scram reports included the reports from the two years prior to the survey.

In the detailed CRDR, archival reports of Monticello operating experience since 1981 will be analyzed. The following reports will be examined:

- License Event Reports/Reportable Occurrences,
- Reactor trip reports,
- Significant Operating Event Reports.
Figure 3-2. Monticello control room enhancement projects.
Six additional operators will also be interviewed as part of the detailed CRDR. These interviews will be conducted using the structured interviews and critical incident recording forms (see Appendix B). These interviews will be conducted by Monticello's human factors consultant (Honeywell) to ensure that information is offered freely and without bias. Operators will be selected for interviews so that a variety of experience levels will be represented in the interview data.

3.2 System Review and Task Analysis

A task analysis will be used to compile and organize the monitoring, decision-making, and action requirements for the Emergency Operating Procedures. This analysis was completed for the BWR Owner's Group review for the generic EOP's in use at that time.

The detailed CRDR will identify control room tasks under plant-specific EOP's and the interaction of inputs (instruments and indicators), throughputs (knowledge and decision capability), and outputs (controls) that are required to perform these tasks. The methodology includes:

- Defining operator tasks,
- Specifying instrumentation and control requirements,
- Conducting walk/talk-throughs with experienced operators,
- Debriefing operators and engineers.

Information from the task analysis on equipment configuration and information/task requirements will be used in the DCRDR verification and validation procedures described in Section 3.5.

3.3 Control Room Inventory

A control room inventory was not prepared as a part of the BWR Owners Group review.
As part of the detailed CRDR, Monticello will develop a complete list of all control room controls, indicators, displays, and other front panel instruments. The inventory will include data about component location, instrument number, function, manufacturer, and where appropriate, range, switch positions, and color codes. It will be organized by component type (switches, meters, controllers, etc.). A sample control room inventory form is shown in Appendix C.

The control room inventory will provide the required information for the comparison of control room equipment and the information and control requirements specified in the system review and task analysis.

3.4 Control Room Survey

Monticello control room components were reviewed against human factors guidelines by the BWROG review team. Their findings for these components are summarized in a prior BWROG review report.

The detailed CRDR will complete the control room survey, using the additional checklist items provided in the BWR Owners' Group Checklist Supplement. With this supplement, the original checklist is comparable to the checklist in NUREG 0700. The control room survey will be fully consistent with NUREG 0700 guidelines.

Discrepancies identified during the previous review and this review will be documented in Human Engineering Discrepancy record forms which contain the following information:

- HED data source;
- Plant system, subsystem, and component identification;
- HED record identification code and topic;
- Photograph identification code (as appropriate);
- HED description;
- Significance and safety consequences;
- Backfit requirements.

A sample HED record form is shown in Appendix D.
3.5 **Verification and Validation of Task Performance**

The BWR Owners' Group review document does not specifically cite task performance considerations. This information is in addition to determining if the available equipment is suitable for the operator's tasks.

The detailed CRDR review will include verification that the control room contains all the hardware the operator needs to operate the plant. This will be accomplished by comparing the results of the task analyses with the equipment inventory.

In addition control room functions will be validated using a select list of critical control room events and a simulation of operator actions during these events. The events to be studied are those that provided focus for the system and task analysis activities. Walk-through/talk-through analyses will be performed at the Monticello simulator.

HEDs will document any discrepancies revealed by the hardware verification and the control room function reviews.

3.6 **Compilation of Human Engineering Discrepancies**

The HEDs that are identified from the BWR Owners' Group material and the detailed process will be reviewed, clarified, and compiled by plant system and topics. Duplicate discrepancies will be eliminated and the remaining discrepancies will be compiled, documented, and summarized prior to assessment.

3.7 **Assessment of HEDs**

Human engineering discrepancies will be assessed for potential consequences on safety, plant integrity, and operator performance to determine which discrepancies require correction.
The following factors will be considered in the assessment process:

- Potential of the HED to affect plant safety and availability,
- Careful balance of human factors considerations and remediation impact,
- Professional judgment of the Control Room Design Review Committee.

Figure 3-3 provides a flowchart that details the dimensions and prioritization in HED assessment.

3.8 Selection of Design Improvements

Control room design improvements will be selected by general discussion of the DCRDR committee and design improvements will be developed under their responsibility. Review of proposed design improvements includes:

- Initial committee review,
- Operating personnel review,
- Mockups and subsequent walk/talk-throughs,
- Final committee review.

In all cases, the review process will ensure that:

- Enhancements will be prescreened and implemented as soon as possible;
- Design improvement(s) will correct the HED;
- Design improvement(s), including enhancements, will not create additional HED's.

3.9 Implementation of Improvements

Control room improvements will be implemented after considering several factors. A primary consideration is the safety implication of each discrepancy. Other factors affecting the implementation schedule include:
FIGURE 3-3. HED Prioritization Flowchart.
- Severity of discrepancy,
- Type of design improvement (enhancements, modifications, or new equipment),
- Plant shut-down schedule,
- Integration of the other elements of the Emergency Response Capabilities as described in NUREG 0737 Supplement 1 as it applies to Monticello.

HED solutions (design improvements) will be implemented in accordance with the Monticello plant review procedures already in place.
SECTION 4
DOCUMENTATION AND DOCUMENT CONTROL

A records and data management system will be used to:

A. Record results of analyses, inventories, and surveys.
B. Provide a support base to manage and execute the various steps and phases of the systems review.

Information in different formats and media contained in the data base will include equipment inventory listings, human engineering surveys, and photographic documentation.

In addition, detailed technical interim reports will be issued as the detailed CRDR progresses. A series of reports are anticipated, including:

Volume 1: Operating Experience Review
Volume 2: Control Room Inventory
Volume 3: Component Checklist
Volume 4: Surveys: Noise, Lighting, Communications, Annunciators, Workspace, Panel Layout
Volume 5: Task Analysis
Volume 6: Verification and Validation
Volume 7: HED Compilation and Assessment
Volume 8: Implementation Schedule

4.1 Reference Documents

Basic reference documents that are used to support the detailed control room design review will be listed. They include, but are not limited to, the following materials:
o Control room documentation, e.g., floor plans, panel layout drawings, panel photographs, system functional descriptions, and flow diagrams;

o Procedures, e.g., operating procedures, emergency procedure guidelines, guidelines for procedure development, and operating training procedures;

o Plant reports, e.g., License Event Reports, Final Safety Analysis, Significant Event Reports, Operating Logs, Outage Analysis Reports.

4.2 Data Collection Instruments

Information contained on various data collection forms will be cross-referenced. The following categories will be used in the data management system for efficient retrieval of information:

- Major plant operating systems,
- Major component subsystems,
- Panel/work station equipment components,
- Control room operator tasks,
- Photograph identification

The types of data and documentation that will be collected during each of the planned design review tasks are summarized in Table 4-1.
TABLE 4-1. DOCUMENTATION FOR DESIGN REVIEW TASKS

<table>
<thead>
<tr>
<th>TASK</th>
<th>DOCUMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating experience review</td>
<td>o Reference documentation</td>
</tr>
<tr>
<td></td>
<td>o Plant reports, e.g., licensee event reports, reportable occurrences, Monticello significant operating event reports</td>
</tr>
<tr>
<td></td>
<td>o Structured interview forms</td>
</tr>
<tr>
<td></td>
<td>o HED record forms</td>
</tr>
<tr>
<td>System functions &amp; task analysis</td>
<td>o Task element tables</td>
</tr>
<tr>
<td>Control room inventory</td>
<td>o Task analysis forms</td>
</tr>
<tr>
<td>Control room checklist</td>
<td>o Control room equipment components, labeling photographs</td>
</tr>
<tr>
<td>Verification of task performance capability</td>
<td>o Equipment design checklists</td>
</tr>
<tr>
<td>Validation of control room</td>
<td>o HED record forms</td>
</tr>
<tr>
<td>Compilation and assessment of human engineering discrepancies</td>
<td>o HED record forms</td>
</tr>
<tr>
<td></td>
<td>o Walk-through talk-through records</td>
</tr>
<tr>
<td></td>
<td>o HED record forms</td>
</tr>
<tr>
<td></td>
<td>o HED summary listing by instrument/control, task, and topic</td>
</tr>
</tbody>
</table>
APPENDIX A

EDUCATION AND EXPERIENCE
EDUCATION AND EXPERIENCE

Monticello

All utility members on the review committee (with a single exception) hold or have held a Senior Reactor Operators License at the Monticello Nuclear Plant.

The educational background of the Monticello committee members include the following degrees:

- Nuclear Engineering
- Mechanical Engineering
- Electrical Engineering
- Chemical Engineering

Honeywell

The education and experience of Monticello's human factors consultants from the Honeywell Technology Strategy Center is detailed below:

THOMAS R. EDMAN, Principal Development Engineer

EDUCATION: Ph.D., Experimental Psychology, University of Minnesota, 1980
B.A., University of Notre Dame, 1970

EXPERIENCE: Dr. Edman is responsible for TSC's program in control room design and process control ergonomics. He was a principal investigator on the EPRI NP-2411 report, "Human Engineering Guide for Enhancing Nuclear Control Rooms."

His expertise is in:

- Contract and program management,
- Development of human factors approaches for enhancing nuclear control rooms,
- Research application of advanced man-machine interfaces to control systems, data entry systems, visual displays, and man-machine interactions.

PUBLICATIONS: Dr. Edman has published over 25 articles in human factors.
STEPHEN V. METZ, Development Engineer

EDUCATION: Ph.D. Candidate, Psychology, University of Minnesota
B.A., Psychology, St. Olaf College, 1975

EXPERIENCE: Mr. Metz has participated in human factors research and development of control rooms and CRT displays and is especially qualified in the application of advanced technologies for the man-machine interface.

Mr. Metz has:

- Developed human factors design guidelines for fossil-fired steam generating systems,
- Participated in a human factors evaluation of a nuclear power plant control room,
- Developed a checklist design that improves efficiency and documentation of control room assessment,
- Participated in an in-depth analysis of a colorgraphic operation workstation.

PUBLICATIONS: Mr. Metz has published or presented six papers in human factors design and evaluation.
APPENDIX B

SAMPLE STRUCTURED INTERVIEW QUESTIONNAIRE
A. CONTROL ROOM DESIGN

1. How easy is it for you to move about the control room in the course of normal or emergency operations? Are there any major obstacles in your path?

2. Do you have any problems controlling the number of people in the control room during normal periods? (During emergency periods?)

3. Is the control room designed to restrict non-operational personnel from coming into contact with the boards?

4. Are you required to leave the primary control boards to attend to instruments or displays on backracks or other areas away from the main control boards? What displays, if any, do you wish had been placed closer at hand?

5. During normal or off-normal operations, do the actions or tasks of another operator ever interface with performance of your tasks?

6. Does each operator have a specific station or desk? How about the Shift Supervisor, Assistant Shift Supervisor and Shift Technical Advisor?

7. Can the status of the control boards be adequately monitored from each operational station?

8. Are all peripheral consoles, e.g., computer, properly arranged to allow effective operations?

9. Are restrooms, kitchen, etc., properly arranged?

10. Have all necessary measures been taken to provide you with a pleasant, comfortable, or attractive working environment? What changes would you recommend?

B. CONTROL ROOM ENVIRONMENT

1. Is the noise level in the control room maintained at a reasonable level and free of annoying or distracting noises?

2. Do you have adequate control over room illumination? Can you avoid glare or reflections on display faces while maintaining overall illumination at a comfortable level?

3. Is the emergency backup illumination system properly designed to allow you to conduct operations effectively in an emergency illumination environment?

4. Have you experienced any problems with temperature, humidity or ventilation in the control room on a year-round basis?

5. Have you had any problems with contamination in the control room? How easy is it to decontaminate rugs, etc.? Is the control room designed to allow you to operate it wearing a facemask?
C. CONTROL BOARD DESIGN

1. Is your control board shaped right to allow effective monitoring of displays and access to instruments and controls?

2. Are the major systems organized properly around the control boards for both normal and emergency operations?

3. Are there cases where you must be in two places at once because the panels aren't designed correctly or where two operators are required to do what one operator should be able to handle?

4. Are there cases where you must leave the primary control room area to attend to instruments in peripheral areas at just the wrong time?

5. Is your control board sized right so that controls and displays aren't placed beyond easy reach or visibility? If not, what aids do the operators use to read these displays and reach these controls?

6. Are the control boards too small, too large or just about right to allow effective operations? Do the control boards allow free space for the addition of new control-displays that may be required?

D. PANEL DESIGN

1. Are the controls and displays on your boards arranged in a logical manner? Are the relationships between panel elements easy to spot?

2. In what ways have you had to modify the boards to make them easier to operate?

3. Have backfits to the boards been done in a logical manner or have these backfits made the boards harder to operate?

4. If you had a chance to redesign the panels, what changes would you make?

E. DISPLAYS

1. Based on your operational experience, are you lacking any important information displays that would help you conduct normal or emergency operations?

2. Do you find yourself out of visual reach of any important displays when you are conducting operations at one end of the console or the other or anywhere in between?

3. Have your displays been coded properly so that abnormal trends or malfunctions become immediately apparent to you?
4. Are your displays grouped properly and designed to allow you to make comparisons when necessary?

5. Do you have any operational problems with your chart recorders? Are some overloaded?

6. Are your meters designed and located to allow error-free readings?

7. Do you have any difficulties servicing displays, e.g., changing burned out lamps, inking recorders, etc.?

8. Do you feel that some displays are not needed and just add clutter to the boards?

9. When your meters or other displays fail, is it obvious to the operator?

F. CONTROLS

1. Have you experienced any problems with the design of the controls on the boards?

2. Are the controls designed and located so that it is not likely that an operator will grab the wrong one by mistake?

3. Are the controls designed and located to minimize chances of accidental disturbance?

4. Have all critical controls been guarded, covered or otherwise protected to prevent accidental activation?

5. Are all controls within easy reach?

6. Are controls coded in any way that would help you differentiate between identical controls in the same general panel area?

7. Do some controls require too much or too little force to actuate them?

8. What control modifications have the operators made to reduce the possibility of errors?

G. ANNUNCIATOR WARNING SYSTEM

1. What problems, if any, have you experienced with the design of your annunciator warning system?

2. During a major transient does your annunciator system provide too much, too little or just the right amount of information?

3. How would you characterize the coding of visual and auditory alarms?
4. Are any important annunciators missing or located where they are not readily accessible to you?

5. Are you troubled with false or nuisance annunciators?

6. Has the annunciator control system been properly designed and located?

7. Do you have any problems reading or identifying annunciators while you are conducting normal or emergency operations?

8. Are the different auditory alarm signals easy to differentiate?

9. What measures do you feel should be undertaken to upgrade the annunciator-warning system to improve operations during both normal and emergency conditions?

H. LABELS

1. Were your boards labeled properly from the outset or did the operators have to add many labels?

2. Is the labeling clear, concise and consistent or are there labels that could confuse the less-experienced operator?

3. How are labeling changes or additions coordinated?

4. What provisions do you have available for making new labels?

I. PROCEDURES

1. Do you have any problems finding or retrieving the procedures you need during normal or emergency situations?

2. Can you conveniently use procedures while operating the boards? Are procedures detachable and is there laydown space on the boards?

3. Are the procedures comprehensive and accurate to promote error-free operations?

4. Are operators required to memorize an unreasonable number of emergency operation procedures?

5. Do operators have the proper opportunity to write, review and revise procedures based on operational experience?

6. Do the values and terminology used in procedures match those on the boards?
J. COMPUTER

1. In what ways does your computer help you in your operational duties?

2. Could your computer and associated readouts be upgraded in any way to be of greater assistance to you?

3. If the computer fails are operators generally capable of manually performing the functions assigned to the computer?

4. Are your training programs adequate to allow you to make maximum use of the computer?

K. DESIGN CHANGES

1. When it becomes obvious to operators that a specific change in the control room is badly needed, e.g., a panel rearrangement of a different meter scale, how easy is it to get the change made?

2. Are operators encouraged or discouraged from modifying the boards?

3. Who keeps track of board changes, approves them or coordinates approvals?

L. MANNING

1. Is the control room manning level adequate to handle the work load during normal and emergency periods across all shifts?

2. Is the operational manning sufficient to allow time for training, proper reliefs, vacations and to avoid excessive overtime requirements?

3. Is there a clearcut division of responsibility between the control room shift crew members?

4. Are operational crews selected to provide the best mix of talent and experience across the shifts?

M. COMMUNICATIONS

1. Is your communication system adequately sized and designed to allow effective communications with auxiliary operators, maintenance people, etc.?

2. Is your communications gear properly integrated into the control room?

3. Are there situations where the lack of proper communications caused operational problems?
OPERATIONAL PRACTICES

1. Are your watch turnover practices systematic and designed to ensure the proper transfer of information between outgoing and oncoming crews? Is there enough overlap?

2. Are shift rotation practices adequate to avoid prolonged or frequent periods of adjustment where operators may not be at their best? How serious a problem is this?

3. How much of an impact does shift work have on operator efficiency, homelife, social life and attitudes towards the job? Have permanent or long-term shifts been considered?

4. How much overtime did you work in the past year? Is this excessive?

5. Is your job structured to avoid long periods of monotonous and/or confining working conditions across all shifts? How could the operator's job be made more interesting and productive?

6. Is there a clearcut chain of command in your control room during an emergency.

7. How would you describe communication channels between the operators and plant management?

8. How effective are your clearance and tagging procedures? Can they be improved? Do maintenance tags interfere with the normal or emergency operation of the plant?

PROTECTIVE EQUIPMENT

1. Please describe the quantity and location of operator protective equipment in the Control Room.

2. Have you had any practice in conducting control room operations while wearing protective equipment?

3. Do the face masks interfere with visibility of displays?

4. Do you have any communications problems while wearing protective gear?

5. Do you feel confident that you can conduct all necessary operational tasks while wearing protective equipment?
P. TRAINING - SELECTION

1. In retrospect, how well did your training program prepare you for your job? What changes, if any, are needed in operator training programs?

2. How important is simulator training in preparing an operator for his job? How could simulator training programs be improved?

3. How effective is your requalification training program? Are any improvements needed?

4. How well-qualified are licensed management personnel to operate the control room?

5. How good a job does your utility do in selecting candidates for operator training?

Q. OPERATING EXPERIENCE/EVENT

Based on your operational experience, cite some examples of incidents with serious or potentially serious consequences. Describe the specifics of the case. Please only describe incidents you have witnessed directly.

Based on your operating experience, cite some examples of a particular control, display, panel, warning device, procedure, etc., that could lead to a malfunction or operator error.

Now for the last question. Have I neglected to ask you any questions that relate to operator performance in your control room?
APPENDIX C
SAMPLE CONTROL ROOM INVENTORY FORM
<table>
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<tr>
<th>PANEL</th>
<th>INSTRUMENT NUMBER</th>
<th>FUNCTION</th>
<th>MANUFACTURER</th>
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<th>RANGE</th>
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<th>MINOR DIV</th>
<th>MISC INFORMATION</th>
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APPENDIX D

SAMPLE HUMAN ENGINEERING DISCREPANCY FORM
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<tr>
<th>HED DATA SOURCE</th>
<th>HED IDENTIFICATION</th>
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<tr>
<td>OPER. EXP. REVIEW</td>
<td>CODE NO.</td>
</tr>
<tr>
<td>INTERVIEW</td>
<td>PHOTO I.D. NO.</td>
</tr>
<tr>
<td>CHECKLIST</td>
<td>DATE</td>
</tr>
<tr>
<td>SURVEY</td>
<td>REVIEWER</td>
</tr>
</tbody>
</table>

**HED IDENTIFICATION**

HED TOPIC ITEM ____________________________
NUREG-0700 GUIDELINE REF. ____________________________

**EQUIPMENT IDENTIFICATION**

PLANT SYSTEM/SUBSYSTEM ____________________________
CONTROL BOARD PANEL ____________________________
COMPONENT I.D. NO. ____________________________
COMPONENT NAME ____________________________

**HED DESCRIPTION**

DESCRIPTION:

**RELATED EVENT/FUNCTION/TASK:**

**SAFETY CONSEQUENCES:**

**INTERACTION WITH OTHER HED'S, SYSTEMS, EVENTS, FUNCTIONS, TASKS:**

**POTENTIAL CORRECTIONS**

**ACTIONS TO CORRECT HED:**

**CORRECTION SCHEDULE:**

**COMMENTS**