TVA EMPLOYEE CONCERNS SPECIAL PROGRAM

REPORT NUMBER: 20800

REPORT TYPE: SUBCATEGORY REPORT FOR ENGINEERING

REVISION NUMBER: 3

TITLE: HUMAN FACTORS

REASON FOR REVISION:

1. Revised to incorporate SRP comments.
2. Revised to incorporate SRP comments.
3. Revised to incorporate TAS comments (general revision) and add Attachment C (References).

PREPARATION

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SIGNATURE — 10/16/87 DATE

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REVIEW COMMITTEE:

SIGNATURE — 10/16/87 DATE

TAS:

SIGNATURE — 11/5/87 DATE

CONCURRENCES

SIGNATURE — DATE

CEG-H: — 11-4-87

SRP: SIGNATURE* — 11-10-87 DATE

APPROVED BY:

ECSP MANAGER — 11/6/87 DATE

NA
MANAGER OF NUCLEAR POWER — DATE
CONCURRENCE (FINAL REPORT ONLY)

* SRP Secretary's signature denotes SRP concurrences are in files.

EXECUTIVE SUMMARY

This subcategory report summarizes and evaluates the results of five Employee Concerns Special Program element evaluations prepared under the Engineering Subcategory 20800, Human Factors. Eight employee concerns are included in this subcategory. Issues were derived from these eight employee concerns, which cited presumed deficiencies or inadequacies in the area of human factors engineering.

There are 11 unique issues in the element evaluations. Because some issues are applicable to more than one plant, the element evaluations document the evaluation of 25 issues related to human factors at TVA's four nuclear plant sites, Sequoyah, Watts Bar, Browns Ferry, and Bellefonte. Of the 25 findings, nine were found to require no corrective action. For the remainder, three corrective actions were identified to address all 16 negative findings. The 16 negative findings were related to inadequate consideration of human factors in the design of the control room and to the incomplete status of the detailed control room design reviews (DCRDRs). The causes for the negative findings were diverse, with no single category of cause dominating. Two of the three corrective actions, which addressed 15 negative findings, were initiated by TVA before the Employee Concerns Task Group evaluations. The third corrective action is a new action required to resolve one negative finding. It calls for listing an unfinished human factors review task for Bellefonte on TVA's computerized open item tracking system. Only one of these three corrective actions, correcting human engineering discrepancies in the control room, was judged to be significant.

The general subject of human factors needs to be put in context. Following the Three Mile Island accident in March 1979, the NRC staff developed an Action Plan, NUREG-0660, in May 1980 to provide a comprehensive and integrated plan to improve the safety of power reactors. The TMI Action Plan required that a detailed control room design review (DCRDR) be conducted to address the problems caused by a lack of emphasis on human factors engineering, if any, during the control room design process. As a result of these DCRDRs, nuclear utilities have identified numerous human engineering discrepancies (HEDs) in their control rooms. The identified HEDs at TVA nuclear plants are similar in quantity and safety significance to those reported for other commercial nuclear power plants. Thus, TVA's control room designs are comparable to most other designs.

Some employee concerns and issues examined in the course of the evaluations for this subcategory were valid problems, indicating that human factors was an area needing improvement. The control room modifications proposed by TVA in its DCRDR Summary Reports for each plant and approved by the NRC as documented in Safety Evaluation Reports should bring the control rooms into acceptable compliance with NRC human factors guidelines.

A review of the Corporate Nuclear Performance Plan reveals no commitments specifically related to human factors.

The grouped evaluation at the subcategory level found no new or broader issues requiring attention. The causes identified and other evaluation results are being reexamined from a wider perspective in the Engineering category evaluation.

Preface, Glossary, and List of Acronyms
for ECTG Subcategory Reports

HISTORY OF REVISION

REV NUMBER	PAGES REVISED	REASON FOR CURRENT REVISION
3	i	To clarify that one or more attachments will help the reader find where a particular concern is evaluated

Preface

This subcategory report is one of a series of reports prepared for the Employee Concerns Special Program (ECSP) of the Tennessee Valley Authority (TVA). The ECSP and the organization which carried out the program, the Employee Concerns Task Group (ECTG), were established by TVA's Manager of Nuclear Power to evaluate and report on those Office of Nuclear Power (ONP) employee concerns filed before February 1, 1986. Concerns filed after that date are handled by the ongoing ONP Employee Concerns Program (ECP).

The ECSP addressed over 5800 employee concerns. Each of the concerns was a formal, written description of a circumstance or circumstances that an employee thought was unsafe, unjust, inefficient, or inappropriate. The mission of the Employee Concerns Special Program was to thoroughly investigate all issues presented in the concerns and to report the results of those investigations in a form accessible to ONP employees, the NRC, and the general public. The results of these investigations are communicated by four levels of ECSP reports: element, subcategory, category, and final.

Element reports, the lowest reporting level, will be published only for those concerns directly affecting the restart of Sequoyah Nuclear Plant's reactor unit 2. An element consists of one or more closely related issues. An issue is a potential problem identified by ECTG during the evaluation process as having been raised in one or more concerns. For efficient handling, what appeared to be similar concerns were grouped into elements early in the program, but issue definitions emerged from the evaluation process itself. Consequently, some elements did include only one issue, but often the ECTG evaluation found more than one issue per element.

Subcategory reports summarize the evaluation of a number of elements. However, the subcategory report does more than collect element level evaluations. The subcategory level overview of element findings leads to an integration of information that cannot take place at the element level. This integration of information reveals the extent to which problems overlap more than one element and will therefore require corrective action for underlying causes not fully apparent at the element level.

To make the subcategory reports easier to understand, three items have been placed at the front of each report: a preface, a glossary of the terminology unique to ECSP reports, and a list of acronyms.

Additionally, at the end of each subcategory report will be a Subcategory Summary Table that includes the concern numbers; identifies other subcategories that share a concern; designates nuclear safety-related, safety significant, or non-safety related concerns; designates generic applicability; and briefly states each concern.

Either the Subcategory Summary Table or another attachment or a combination of the two will enable the reader to find the report section or sections in which the issue raised by the concern is evaluated.

The subcategories are themselves summarized in a series of eight category reports. Each category report reviews the major findings and collective significance of the subcategory reports in one of the following areas:

- management and personnel relations
- industrial safety
- construction
- material control
- operations
- quality assurance/quality control
- welding
- engineering

A separate report on employee concerns dealing with specific contentions of intimidation, harassment, and wrongdoing will be released by the TVA Office of the Inspector General.

Just as the subcategory reports integrate the information collected at the element level, the category reports integrate the information assembled in all the subcategory reports within the category, addressing particularly the underlying causes of those problems that run across more than one subcategory.

A final report will integrate and assess the information collected by all of the lower level reports prepared for the ECSP, including the Inspector General's report.

For more detail on the methods by which ECTG employee concerns were evaluated and reported, consult the Tennessee Valley Authority Employee Concerns Task Group Program Manual. The Manual spells out the program's objectives, scope, organization, and responsibilities. It also specifies the procedures that were followed in the investigation, reporting, and closeout of the issues raised by employee concerns.

ECSP GLOSSARY OF REPORT TERMS*

classification of evaluated issues the evaluation of an issue leads to one of the following determinations:

Class A: Issue cannot be verified as factual

Class B: Issue is factually accurate, but what is described is not a problem (i.e., not a condition requiring corrective action)

Class C: Issue is factual and identifies a problem, but corrective action for the problem was initiated before the evaluation of the issue was undertaken

Class D: Issue is factual and presents a problem for which corrective action has been, or is being, taken as a result of an evaluation

Class E: A problem, requiring corrective action, which was not identified by an employee concern, but was revealed during the ECTG evaluation of an issue raised by an employee concern.

collective significance an analysis which determines the importance and consequences of the findings in a particular ECSP report by putting those findings in the proper perspective.

concern (see "employee concern")

corrective action steps taken to fix specific deficiencies or discrepancies revealed by a negative finding and, when necessary, to correct causes in order to prevent recurrence.

criterion (plural: criteria) a basis for defining a performance, behavior, or quality which ONP imposes on itself (see also "requirement").

element or element report an optional level of ECSP report, below the subcategory level, that deals with one or more issues.

employee concern a formal, written description of a circumstance or circumstances that an employee thinks unsafe, unjust, inefficient or inappropriate; usually documented on a K-form or a form equivalent to the K-form.

evaluator(s) the individual(s) assigned the responsibility to assess a specific grouping of employee concerns.

findings includes both statements of fact and the judgments made about those facts during the evaluation process; negative findings require corrective action.

issue a potential problem, as interpreted by the ECTG during the evaluation process, raised in one or more concerns.

K-form (see "employee concern")

requirement a standard of performance, behavior, or quality on which an evaluation judgment or decision may be based.

root cause the underlying reason for a problem.

*Terms essential to the program but which require detailed definition have been defined in the ECTG Procedure Manual (e.g., generic, specific, nuclear safety-related, unreviewed safety-significant question).

Acronyms

AI	Administrative Instruction
AISC	American Institute of Steel Construction
ALARA	As Low As Reasonably Achievable
ANS	American Nuclear Society
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BFN	Browns Ferry Nuclear Plant
BLN	Bellefonte Nuclear Plant
CAQ	Condition Adverse to Quality
CAR	Corrective Action Report
CATD	Corrective Action Tracking Document
CCTS	Corporate Commitment Tracking System
CEG-H	Category Evaluation Group Head
CFR	Code of Federal Regulations
CI	Concerned Individual
CMTR	Certified Material Test Report
COC	Certificate of Conformance/Compliance
DCR	Design Change Request
DNC	Division of Nuclear Construction (see also NU CON)

DNE	Division of Nuclear Engineering
DNQA	Division of Nuclear Quality Assurance
DNT	Division of Nuclear Training
DOE	Department of Energy
DPO	Division Personnel Officer
DR	Discrepancy Report or Deviation Report
ECN	Engineering Change Notice
ECP	Employee Concerns Program
ECP-SR	Employee Concerns Program-Site Representative
ECSP	Employee Concerns Special Program
ECTG	Employee Concerns Task Group
EEOC	Equal Employment Opportunity Commission
EQ	Environmental Qualification
EMRT	Emergency Medical Response Team
EN DES	Engineering Design
ERT	Employee Response Team or Emergency Response Team
FCR	Field Change Request
FSAR	Final Safety Analysis Report
FY	Fiscal Year
GET	General Employee Training
HCI	Hazard Control Instruction
HVAC	Heating, Ventilating, Air Conditioning
II	Installation Instruction
INPO	Institute of Nuclear Power Operations
IRN	Inspection Rejection Notice

QCP	Quality Control Procedure
QTC	Quality Technology Company
RIF	Reduction in Force
RT	Radiographic Testing
SQN	Sequoyah Nuclear Plant
SI	Surveillance Instruction
SOP	Standard Operating Procedure
SRP	Senior Review Panel
SWEC	Stone and Webster Engineering Corporation
TAS	Technical Assistance Staff
T&L	Trades and Labor
TVA	Tennessee Valley Authority
TVTLC	Tennessee Valley Trades and Labor Council
UT	Ultrasonic Testing
VT	Visual Testing
WBECSP	Watts Bar Employee Concern Special Program
WBN	Watts Bar Nuclear Plant
WR	Work Request or Work Rules
WP	Workplans

CONTENTS

TABLES

1. INTRODUCTION

This subcategory report summarizes and evaluates the results of the ECSP element evaluations prepared under Engineering Subcategory 20800, Human Factors.

The evaluations are summarized in the balance of this report as follows:

- Section 2 -- discusses, by element, the issues stated or implied in the employee concerns and addresses determination of generic applicability
- Section 3 -- outlines the process followed for the element and subcategory evaluations
- Section 4 -- discusses, by element, the findings and identifies the negative findings that must be resolved
- Section 5 -- highlights the corrective actions required for resolution of the negative findings cited in Section 4 and relates them to element and to plant site
- Section 6 -- identifies causes of the negative findings
- Section 7 -- assesses the significance of the negative findings
- Attachment A -- lists, by element, each employee concern evaluated in the subcategory. The concern number is given, along with notation of any other element or category with which the concern is shared; the plant sites to which it could be applicable are noted; the concern is quoted as received by TVA, and is characterized as safety related, not safety related, or safety significant.
- Attachment B -- contains a summary of the element-level evaluations. Each issue is listed, by element number and plant, opposite its corresponding findings and corrective actions. The reader may trace a concern from Attachment A to an issue in Attachment B by using the element number and applicable plant. The reader may relate a corrective action description in Attachment B to causes and significance in Table 3 by using the CATD number which appears in Attachment B in parentheses at the end of the corrective action description.
- Attachment C -- lists the references cited in the text

The employee concerns provide the basis for the element evaluations and are listed by element number in Attachment A. The plant location where the concern was originally identified and the concern applicability are also identified.

2. GENERIC APPLICABILITY/ISSUES

The applicability of the employee concerns in this subcategory to each of TVA's four nuclear power plant sites and the full text of those concerns are given in Attachment A.

2.1 Applicability of Employee Concerns to TVA Nuclear Plants

The following employee concerns related to the overall adequacy of TVA's human factors engineering (element 208.1) and are generic to all four TVA nuclear plant sites:

- OE-QMS-3
- WI-85-100-007
- XX-85-122-020 through -022

Employee Concern IN-85-102-001 addresses unanswered concerns and unfinished modifications for the control room at Watts Bar Nuclear Plant (WBN). Generic aspects of this site-specific concern are addressed as outlined below:

- "Control room modifications have not been made." The generic aspects of this part of the concern are addressed in connection with element 208.1, issue 3 in Section 2.2 below, concerning implementation of modifications.
- "There are 1,600 outstanding unanswered concerns." The generic aspects of this part of the concern are addressed in connection with element 208.1, issue 2 in Section 2.2 below, concerning implementation of the detailed control room design review.
- "Reference Appendix D to the Safety Evaluation Report. Individual considers this a material false statement." The material false statement to which the concerned individual refers cannot be ascertained from the quotation itself. However, the evaluators believe that the employee concern must be related to a series of submittals made by TVA to the NRC between November 1983 and October 1984 which inaccurately reported the status of WBN unit 1

control room design modifications called for in Appendix D to the Watts Bar SER (NUREG-0847; Ref. 9). The reason for this conclusion is that on August 29, 1985, NRC Region II issued a Notice of Violation and Proposed Imposition of Civil Penalty to TVA for a material false statement contained in a series of status reports submitted by TVA to the NRC between November 1983 and October 1984 (Ref. 30). These status reports purported to indicate the completion of corrective actions related to Watts Bar unit 1 control room design modifications called for by Appendix D to the SER.

Employee Concern BLN-ONP-EC-011 is specific to the Bellefonte Nuclear Plant (BLN). The concern states:

> "CI worried that human engineering concerns (HEC's) might not be properly reviewed due to delayed start-up and reduction of manpower at BLN."

The wording of this concern is specific to Bellefonte Nuclear Plant (BLN). Moreover, the fact that the concern originated in the Office of Nuclear Power (ONP) suggests that the concerned individual was cognizant of the status of the detailed control room design review (DCRDR) programs at other sites. In any event, while there have been personnel reallocations and startup delays at other sites, they have not been as drastic as at BLN. The BLN DCRDR program was temporarily, but indefinitely, suspended. Although there were temporary suspensions of the DCRDRs at Sequoyah Nuclear Plant (SQN) and WBN, they were relatively short-lived and not indefinite.

The one employee concern related to element 208.2, IN-85-102-002, is specific to WBN. This is apparent from the wording of the concern (see Attachment A).

2.2 Identification of Issues

The employee concerns listed in Attachment A for each element and plant have been examined, and the potential problems raised by the eight concerns have been identified as 11 separate issues. Because each separate issue may be applicable to more than one plant, 25 issues were evaluated in five element evaluations. Many of these issues were discussed in more detail during an NRC interview of one of the concerned individuals conducted on February 26, 1986. This interview did not alter the more broadly stated concerns or the issues derived from them. As such, the issues are integrated with the concerns and resolved accordingly in the element evaluations of this subcategory.

The 11 issues evaluated under this subcategory, grouped by element, are outlined below. The applicable plants are noted in parentheses following the issues.

2.2.1 Human Factors Review Program NUREG-0700 - Element 208.1

- o Control room design review program plan is inadequate to find and resolve all problems affecting safe shutdown (all plants).
- o Human factors review has not been implemented for control panels or stations (all plants).
- o Human factors engineering has not been implemented for control plants or stations (all plants).
- o A total of 1,600 outstanding human engineering concerns have not been resolved (WBN).
- o There are too many poor engineering practices in the human factors area (all plants).
- o Compliance with NUREG-0700 is questioned (all plants).
- o There is a possible material false statement related to Appendix D to the Safety Evaluation Report (WBN).
- o Human engineering concerns (HECs) might not be properly reviewed because of delayed startup and reduction of manpower at BLN (BLN).

Element 208.1 had valid issues that required corrective action involving possible documentation and hardware changes.

2.2.2 Control Room Design Review by NRC - Element 208.2

- o The NRC review of the Watts Bar control room, as reported in its Safety Evaluation Report (SER), Chapter 18 and Appendix D, June 1982, was inadequate. That inadequacy is attested to by the fact that over 1,700 human engineering concerns have been identified during the first two phases of the TVA Detailed Control Room Design Review (DCRDR) completed on February 1, 1985: (a) review of operating experience, including a personnel survey, and (b) an onsite control room survey (WBN).
- o Had the NRC conducted a thorough review of the Watts Bar design (which could have identified similar concerns), it would have been placed in an embarrassing situation having previously authorized operating licenses to Sequoyah units 1 and 2 (which have basically identical control rooms) in September 1980 and September 1981, respectively (WBN).

- The NRC will not, as of early 1985, reevaluate its original Watts Bar control room review and revise its SER in which it approved the control room design fully aware of TVA's subsequent findings (WBN).

3. EVALUATION PROCESS

This subcategory report is based on the information contained in the applicable element evaluations prepared to address the specific employee concerns related to the issues defined in Section 2. The element evaluation process consisted of the following steps:

a. Defined issues for each element from the employee concerns. (See Section 2.2.)

b. Evaluated each employee concern to determine whether it was specific to a particular TVA nuclear plant or generic to two or more plants. (See Section 2.1.)

c. Reviewed current regulatory requirements and TVA criteria documents related to the issues to develop an understanding of the design and licensing bases for human factors engineering and detailed control room design reviews.

d. Reviewed applicable FSAR sections (all plants), WBN Safety Evaluation Report (SER), and NRC Safety Evaluation of the SQN DCRDR to understand scope and basis of NRC review, to determine regulatory compliance, and to identify any open issues or TVA commitments related to human factors engineering. The review of the Sequoyah Nuclear Plant (SQN) Safety Evaluation took place after issuance of the element evaluation.

e. Reviewed baseline documents related to human factors engineering and review:
   - Regulatory requirements: TMI Action Plan (NUREG-0660 and NUREG-0737), and Generic Letter 82-33 (NUREG-0737 Supplement 1)
   - Guidelines: NUREG-0700, NUREG-0801 (draft), NUREG-0800 Section 18
   - EPRI and INPO documents on human factors engineering

f. Determined each nuclear power plant's human factors engineering activities and status of those activities.

g. Reviewed TVA's generic program plan SEP 82-17, revision 0, and NRC comments regarding the plan. Compared revision 2 with revision 0 to determine whether NRC's comments were considered in making the revision. Also reviewed site-specific program plans for Sequoyah (Standard Practice SQA-179) and Watts Bar (Standard Practice WB 6.3.14). Considered significance or shortcomings in either the program or program status.

h. Reviewed transcripts of NRC investigative interviews to gain additional information regarding the concerns.

i. Examined TVA procedures and design guides concerning control room design changes.

j. Reviewed Detailed Control Room Design Review (DCRDR) Action Plans, preliminary Action Plans, Action Plan Supplements, and Summary Reports, as available, for each plant. The review of the Sequoyah DCRDR Summary Report took place after issuance of the element evaluation.

k. Reviewed any other documents applicable to the issues and determined to be needed for the evaluation such as correspondence, etc.

l. Reviewed NSRS Investigative Reports I-85-241-SQN, I-85-471-BFN, and I-85-439-BLN.

m. For the Browns Ferry Nuclear Plant (BFN) element evaluation 208.1 only, compared BFN's schedule for human engineering discrepancy (HED) corrective action implementation to NRC guidelines and to Nebraska Public Power District's schedule for HED corrective action implementation at Cooper Nuclear Station and reviewed NRC's acceptance of Cooper's implementation schedule, in order to assess whether TVA's implementation of human engineering is timely.

n. Using the results from steps a through m above, evaluated the issues for each element and documented the findings in element evaluations.

The subcategory evaluation process consisted of the following additional steps:

o. Tabulated the employee concerns, the plants at which each concern was originally identified, and the applicability to other TVA plants (see Attachment A).

p. Tabulated issues, findings, and corrective actions from the element evaluations in a plant-by-plant arrangement (see Attachment B).

q. Prepared Tables 1, 2, and 3 to permit comparison and identification of common and unique issues, findings, and corrective actions among the four plants.

r. Classified the findings and corrective actions from the element evaluations using the ECSP definitions.

s. On the basis of ECSP guidelines, analyzed the collective significance and and most pertinent causes of the findings from the element evaluations.

t. Evaluated defined corrective actions to determine if additional actions are required as a result of causes found in step q.

u. Provided additional judgment and information that was not apparent at the element level.

4. FINDINGS

The findings from each of the five element evaluations for this subcategory are contained in Attachment B. The findings are listed by element number and by plant. The following subsections are a discussion of those findings.

4.1 General Background to Human Factors

Before the TMI-2 accident in March 1979, there was no systematic, uniform treatment of the human factors engineering aspects of control room design in the nuclear power industry. Regulatory and industry attention then began to focus on human factors engineering, and the application of human engineering concepts to nuclear power plant control room designs evolved from 1979 to 1982.

In November 1980, NRC published NUREG-0737 (Ref. 6), which presented those items from the TMI Action Plan of NUREG-0660 (Ref. 3) that NRC had approved for implementation as of that date. NUREG-0737 states that:

> ". . . all licensees and applicants for operating licenses will be required to conduct a detailed control room design review (DCRDR) to identify and correct design deficiencies. . . . Therefore, the Office of Nuclear Reactor Regulation (NRR) requires that those applicants for operating licenses who will be unable to complete the detailed control-room design review prior to issuance of a license make preliminary assessments of their control rooms to identify <u>significant</u> human factors and instrumentation problems and establish a schedule

approved by NRC for correcting deficiencies. [Emphasis added]. These applicants will be required to complete the more detailed control room reviews on the same schedule as licensees with operating plants" (Section I.D.1).

The objective of the detailed control room design review is to "improve the ability of nuclear power plant control room operators to prevent accidents or cope with accidents if they occur by improving the information provided to them" (Item I.D.1 of NUREG-0660).

NRC published NUREG-0700 (Ref. 4) in September 1981. This document presents detailed guidelines that NRC expects applicants and licensees to use when performing their detailed control room design reviews. Although NUREG-0700 is not a requirement, NRC expects applicants to clearly document the approach to reviews and to justify any deviations. NRC published draft NUREG-0801 (Ref. 8) in October 1981. This NUREG presents the criteria NRC would use when evaluating an applicant's detailed control room design review. In September 1984, these evaluation criteria were incorporated into the NRC's Standard Review Plan (SRP; Ref. 7) as Appendix A to SRP 18.1.

In December 1982, NRC issued Generic Letter 82-33 (Ref. 2) forwarding Supplement 1 to NUREG-0737 (Ref. 5), which provided further clarification of TMI Action Plan requirements for the required detailed control room design reviews (DCRDRs).

A concerned individual (CI) expressed a concern nearly identical to EC WI-85-100-007 in a letter to the NRC (Ref. 31). A review of the NRC interview transcript (Ref. 33) reveals that the detailed control room design reviews were not in progress at the time the CI expressed the concern. However, at the time of the interview, the CI was aware that NUREG-0700 reviews were in progress at some of the plants. It is also clear from the transcript that the CI intended that the concerns include the human factors engineering of all local control panels/stations as well as the main control room.

The NRC requires a review of the control room only, which NUREG-0700 defines as both the main control room and remote shutdown facilities. Therefore, this evaluation has been limited to an examination of the TVA review of the main and auxiliary control rooms, including a few remote boards which contain switches required to transfer control from the main control room (MCR) to the auxiliary control room (ACR).

4.2 Element 208.1, Human Factors Review Program Per NUREG-0700

4.2.1 Adequacy of the DCRDR Program Plan (All Plants)

Employee Concern OE-QMS-3 questioned the adequacy of the Detailed Control Room Design Review Program Plan to identify and resolve all human engineering concerns that could significantly affect the safe shutdown of TVA's nuclear plants.

Interpretation of Employee Concern. The term "human engineering concern" is defined by TVA to refer to any item identified by a DCRDR team member as a potential human engineering discrepancy (HED) (Ref. 18). This terminology is not used in the regulatory criteria documents published by the NRC and, therefore, appears to be unique to TVA's human factors review program. Use of this language by the concerned individual implies familiarity with TVA's DCRDR program.*

It is conceded at the outset that no single program could identify "all human engineering concerns that could significantly affect safe shutdown." Other methods, such as plant-specific probabilistic risk assessment and broad-based systems interactions studies would, perhaps, be better suited to this goal.

The DCRDR program, as it has been conceived in the regulatory scheme, does not set so broad a goal for itself. Supplement 1 to NUREG-0737, Section 5.1, Detailed Control Room Design Review-Requirements, states, in part:

> "The objective of the control room design review is to 'improve the ability of nuclear power plant control room operators to prevent accidents or cope with accidents if they occur by improving the information provided to them' (from NUREG-0660, Item I.D.1). As a complement to improvements of plant operating staff capabilities in response to transients and other abnormal conditions that will result from implementation of the SPDS and from upgraded emergency operating procedures, this design review will identify any modifications of control room configurations that would contribute to a significant reduction of risk and enhancement in the safety of operation." [Emphasis added]

Thus, the purpose of the DCRDR program, in this context, is not to identify all HECs which could affect safe shutdown, but rather to improve the operators' ability to prevent or cope with accidents (in conjunction with other improvements), to contribute to risk reduction, and to enhance safety.

With this in mind, the evaluators have focused on TVA's process for identifying and resolving human engineering concerns to determine whether the program, if implemented as described in the program plan, would be expected to achieve a reasonable level of improvement/enhancement in plant safety.

If the concerned individual intended to raise broader issues related to safe shutdown of TVA's nuclear plants (e.g., systems interaction), a new employee concern would have to be generated, since such issues are not taken to be within the scope of this element.

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* Various TVA documents use the acronyms "CRDR" and "DCRDR" somewhat interchangeably to refer to this program. This subcategory report uses "DCRDR" throughout for consistency.

Differing Professional Judgments. On August 2, 1985, a TVA nuclear engineer who was a member of the DCRDR team forwarded a memorandum to the Nuclear Engineering Branch Files (Ref. 45). The first paragraph of this memo states:

> "The purpose of this memorandum is to permit signout of a document with unresolved comments. It was written to document my professional judgment that the subject program plan [SEP 82-17] is not adequate to assure identification and resolution of all human engineering concerns that could significantly affect safe shutdown of TVA's nuclear plants."

Underscoring has been added to highlight the identical wording to the employee concern in question. (It should be noted that the author of this memo is not presumed to be the concerned individual who raised Employee Concern OE-QMS-3. This employee concern was recorded on July 25, 1986, nearly a year after the subject memo. The memo itself is addressed to the Nuclear Engineering Branch Files, was placed on RIMS, with copies to a number of other TVA employees. Before receipt of EC OE-QMS-3, the subject memo doubtless had widespread publication within TVA.)

In addition to the above general concern, the engineer raised six other issues in the memo.

The TVA chief electrical engineer responded to these documented concerns in a memorandum dated September 13, 1985 (Ref. 47), which addressed the general concern and the six specific issues. One of the specific issues related directly to the employee concern regarding review of human factors at local control stations and is discussed herein. The other five specific issues raised in the nuclear engineer's memo are regarded as differing professional judgments that are not specifically related to the employee concerns and that are adequately documented in the two TVA memos (Refs. 45 and 47), the nuclear engineer's memo of August 2, 1985, and the chief electrical engineer's memo of September 13, 1985.

The nuclear engineer's general concern is that TVA's program plan is inadequate to identify and resolve all human engineering concerns that could significantly affect safe shutdown of TVA's nuclear plants. This, of course, is worded identically to the employee concern in question. The chief electrical engineer's response is basically that Task I.D.1 of NUREG-0660 (the precursor to NUREG-0737) requires that the DCRDR program improve the operator's ability to prevent or cope with accidents, and that the program plans's scope and methodology were carefully constructed to respond to the regulatory mandate. These points have been covered in the above section on Interpretation of Employee Concern.

The relevant, specific issue raised in the nuclear engineer's memo is that the overall scope of the review is "not responsive to the NRC's intent that plant features necessary to achieve safe shutdown during an abandonment of the main

control room should be free of significant human engineering concerns." The chief electrical engineer's response disputes this characterization of the NRC's intent. The response notes that, since prevention of and coping with accidents is the NRC's stated goal of the DCRDR, it must only be safe shutdown from accident conditions that is to be considered.

NRC Guidelines on Scope of Review. Because either interpretation of the NRC's intent could be disputed, it is useful to review the NRC's actual statements concerning the scope of review. Supplement 1 to NUREG-0737, Section 5, and NUREG-0737, Item I.D.1, (Refs. 5 and 6) call for a detailed design review of the control room; however, neither document defines the term "control room."

NUREG-0700 (Ref. 4) states that "the scope of the control room design review described by these guidelines covers the engineering review of completed control rooms*. . ."

The footnote states: "*'Control room' as used in these guidelines includes remote shutdown facilities - see General Design Criterion 19."

This citation refers to 10 CFR 50 Appendix A, General Design Criteria, Criterion 19, Control Room (Ref.), which states:

> "A control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. . ."
>
> "Equipment at appropriate locations outside the control room shall be provided (1) with a design capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and (2) with a potential capability for subsequent cold shutdown of the reactor through the use of suitable procedures."

This criterion is, by definition, general, and not conclusive with respect to the NRC's intent regarding the scope of human factors engineering review of the "control room."

Standard Review Plan (SRP) 18.1, Human Factors Engineering - Control Room (Ref. 7), provides the most explicit statement of the NRC's expectation on the scope of review. Section I of the SRP states:

> "Nuclear power plants are provided with a control room from which actions can be taken to operate the unit safely under normal conditions and to maintain it in a safe condition under accident conditions. In addition, equipment outside the control room is provided with a design capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and with a potential capability for subsequent cold shutdown. . . ."

"The HFEB [Human Factors Engineering Branch] reviews the design of the control room and remote shutdown capability to assure that the interfaces between the systems, structures and components, and the plant personnel expected to operate them have been designed and provided in conformance with good human factors engineering practice. The objectives of the review are to confirm that:

"1. Operator tasks necessary for emergency operation have been identified and defined, and are appropriate to the functions they are designed to fulfill;

"2. the information, displays, controls and other interfaces necessary for operators to successfully carry out the tasks required to implement all emergency procedures have been identified and are provided in the control room and remote shutdown areas; and

"3. the information, displays, controls and other interfaces in the control room and other plant areas required for remote shutdown are designed and provided in a manner consistent with good human factors engineering practice. This is, the layout and environment where control stations are located, panel layout, individual control and display components, and the integration of controls, displays and other interfaces must be provided such that the personnel responsible for operating the plant from the control room and remote shutdown areas can perform their tasks in as error-free and timely a manner as possible.

"A human factors engineering evaluation of designs, at operating reactors, of the remote shutdown capability provided to meet 10 CFR Part 50, Appendix A, GDC-19, and 10 CFR Part 50, Appendix R is not specifically required. However, the staff recommends that the scope of the DCRDR include a human factors engineering evaluation of the remote shutdown capability."

Thus, while the NRC expects the scope of review of the DCRDR to encompass the "remote shutdown capability," this review "is not specifically required." It also appears that, since emergency operations and emergency procedures are mentioned specifically, the chief electrical engineer's contention that the DCRDR should focus on accidents has some validity; however, the program should not exclude consideration of operations in nonemergency situations. Regardless, to a great extent, TVA's DCRDR program does provide the forum for identifying human factors engineering concerns arising from normal or abnormal operating conditions (see "Generic Plan Program Specifics" below).

Scope of Review in Generic Program Plan. The scope of review expressed in TVA's generic program plan (Ref. 18), Section 1.3, is as follows:

> "This program plan addresses only the man-machine interfaces of the main control room (MCR) and those portions of the auxiliary control system located in the auxiliary control room (ACR) and the transfer devices."

Therefore, generically, TVA has made a limited commitment to review human factors outside the control room. This approach meets the specific requirements for the DCRDR under NUREG-0737 and Supplement 1, although it does not extend to the local panel level.

Scope of Review in Site-Specific Program Plans. The Sequoyah site-specific program plan SQA-179 (Ref. 21) contains a scope statement identical to that in the generic program plan.

The Watts Bar site has committed to expand its human factors review effort to include selected local panels; however, TVA characterized this additional scope as not mandated by the NRC.

> "Beyond and separate from the requirements of the program plan, Watts Bar is scoping a human factors review of selected local boards. These may include local boards where operator manipulation is required to safely shut down the plant under conditions of main control room abandonment or other panels important to safety, reliability, or performance. Because this is beyond and separate from the requirements of NUREG 0737, any modifications resulting from this review will not be addressed in the summary report submitted to NRC." (Ref. 21, p. 1.)

Other Consideration of Local Panels. For design changes, TVA is committed to conduct a human factors engineering review of any change that affects the operation or environment of the main control room (MCR), auxiliary control room (ACR), or local control stations. (Ref. 11, p. 1). Therefore, while TVA has not included reviews of local control panels in the generic DCRDR program, human factors will be considered in implementing design changes affecting local control stations. In addition, an examination of the Sequoyah DCRDR Summary Report (Ref. 35) reveals that, despite the limited scope statement in the program plan, TVA did identify HEDs related to local control stations and control room abandonment.*

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* Examples: HEDs 0021, 4068, 0260, 1095

Furthermore, to the extent that the concern for human factors engineering of local control panels may be related to perceived inaccessibility, Subcategory OP30500, Accessibility (Ref. 60), is dispositive. The Summary of Findings states, in part:

> "The concerns related to inaccessibility of emergency equipment were not validated since evidence was shown that access is possible. This evidence was demonstrated in several ways including walkdowns of plant local control stations, interviews with Operations section personnel, and reviews of previous efforts in emergency equipment access determination.
>
> These previous efforts had consisted of WBN and SQN Operations sections' performance of the Emergency Operating Procedures Verification and Validation plant walk-throughs. The validation program had considered local actions specified in plant emergency procedures. Objectives of the program included verification that emergency equipment is available and accessible for use by Operations. The validation program was a result of the Procedures Generation Package submittal to NRC in 1982 which responded to NUREG-0737 Supplement 1 concerning upgrading of emergency procedures at nuclear power plants. The walk-throughs were successful in determining the required accessibility for equipment necessary to implement emergency procedures at WBN and SQN."

TVA Generic Program Plan Development. In April 1983, TVA issued Special Engineering Procedure SEP 82-17, Rev. 0, "Control Room Design Reviews for All TVA Nuclear Plants," to meet the requirement in Supplement 1 to NUREG-0737 for a DCRDR program plan. SEP 82-17 covers detailed design reviews of both the main and auxiliary control rooms. NRC requires that the Program Plan be submitted 2 months before the DCRDR begins (Ref. 5). TVA submitted its generic DCRDR Program Plan (which is identical to SEP 82-17, Rev. 0) to the NRC on June 9, 1983 (Ref. 25).

The NRC returned its comments on the Program Plan to TVA on December 23, 1983 and requested a meeting with TVA to discuss the review program (Ref. 26). NRC was concerned that the task analysis portion of the program plan would not satisfy requirements presented in Supplement 1 to NUREG-0737. Thus, TVA met with the NRC staff on June 14, 1984; TVA had previously informally provided its response to the NRC comments contained in the NRC's December 23, 1983 letter. At the meeting, the NRC staff requested a presentation of TVA's approach to performing the DCRDR task analysis. TVA described its basic approach. These responses to the NRC are included with the TVA summary of the meeting (Ref. 42). TVA drew the following conclusion from this meeting: "The TVA CRDR program plan appears completely adequate to perform its intended function. Additional verbage [sic] may be required to better define the TVA task analysis approach" (Ref. 42).

In June 1985, the Office of Engineering issued the new Engineering Program Directives (OEPs) which replace the old Engineering Procedures Manual (EN DES-EPs) including SEP 82-17. The latest revision to the DCRDR program plan (now called OE-SEP 82-17) was issued on August 20, 1985 (Ref. 18), at which time NRC comments and the lessons learned from having initiated the program were incorporated.

The following paragraphs discuss how TVA's program attempts to identify and resolve human engineering concerns (HECs) with particular emphasis on those methods which relate to HECs that could significantly affect safe shutdown.

Generic Program Plan Specifics. The DCRDR as described in the TVA program plan consists of the following eight main tasks:

- o Perform an operating experience review
- o Survey the MCR and the ACR
- o Perform task analysis
- o Assess human engineering concerns (HECs) for possible redesignation as human engineering discrepancies (HEDs)
- o Assess HEDs for priority
- o Develop recommendations for corrective action
- o Prepare an action plan
- o Prepare the Summary Report for submittal to NRC

The methodology of the program plan is discussed below; where pertinent, the above tasks are defined. Emphasis is given to tasks which attempt to identify and resolve human engineering concerns that could significantly affect safe shutdown.

Initially, a DCRDR schedule is outlined. TVA's DCRDR program plan does not develop "a detailed schedule for each of the review tasks, and for the subsequent assessment and implementation phase tasks" as discussed in NUREG-0700. Rather, a tentative DCRDR schedule for all TVA nuclear plants was submitted to NRC in a meeting held on December 4, 1984 (Ref. 28).

HEC Identification. The DCRDR team identifies human engineering concerns (HECs) based on the operating experience review (including operator questionnaires and interviews), control room surveys by team members, and task analysis (an assessment of the control room design with respect to performance of emergency operating procedures).

- o Operating Experience Review - DCRDR team members reviewed the plant's documents related to operating experience, including:
  - Industrywide sorts of Licensee Event Reports (LERs), INPO Significant Event Reports, and INPO Operations and Maintenance Reminders
  - Scram and trip reports (plant specific)
  - Licensee Event Reports (LERs) (plant specific)
  - Operator questionnaires and interviews
  - Earlier, preliminary DCRDR reports for the specific TVA plant
  - DCRDR reports of other TVA nuclear power plants
  - Other utilities' DCRDR reports

  The operating experience review attempts to elicit pertinent HECs related to safe shutdown by identifying actual events in which human factors affected the initiation or outcome of the event. The reviews of LERs and other actual operating events also garner data tending to yield HECs arising from normal or abnormal operating conditions, not just during emergencies. As described further in Section 4.2.2, operators' knowledge of human factors concerns which could affect safe shutdown was elicited by questionnaires and interviews. Perhaps more so than the methods for identifying HECs, this process is designed to provide a forum for eliciting HECs related to nonemergency conditions, as well as those related to emergencies.

- o Main and Auxiliary Control Room Surveys - Using checklists derived from NUREG-0700, the DCRDR team members surveyed the main control room (MCR) and auxiliary control room (ACR) to identify HECs related to the following:
  - Control room workspace
  - Lighting

- HVAC
- Sound and noise
- Communications
- Alarm systems
- Controls
- Visual displays
- Labels and location aids
- Computers
- Control-display integration
- Panel layout

These surveys are designed principally to identify "ergonomic" concerns, i.e., physical or psychological impediments to the operator's performance. By improving operator comfort and reducing distractions, modifications derived from these surveys intangibly improve or enhance plant safety. Of the listed surveys, the alarm systems and the control-display integration surveys might be expected to yield concerns with the most tangible connection to safe shutdown of the plant. All of the listed surveys tend to elicit HECs related to nonemergency, as well as emergency, operating conditions.

o Integrated Task Analysis - Two task analyses were conducted. The first of these, the Integrated Task Analysis, was a joint effort between the DCRDR team and a procedures team involved with developing plant-specific emergency instructions [called variously Emergency Operating Procedures (EOPs) or Emergency Operating Instructions (EOIs), depending on the site]. This phase of the program involved an analysis of operator tasks and system functions to support emergency operations; verification of task performance capabilities, focusing both on procedures and information needs as well as on availability and adequacy of information and equipment; and validation of control room functions. The process involved completion of worksheets which detailed the activities of the operator in performing each task; a "walk-through" and "talk-through" of each EOP/EOI in the actual control room and plant-specific simulator by licensed operators under the observation of the integrated task analysis team; and performance of real-time simulation for highly time-dependent emergency scenarios.

The Integrated Task Analysis attempts to elicit HECs by observing both operator conduct and control room availability and response under simulated emergency conditions. This process would be expected to identify HECs significantly affecting safe shutdown.

- Supplemental Task Analysis - Because plant-specific EOPs/EOIs typically are developed with knowledge of, and reliance upon, existing control room instrumentation, the Integrated Task Analysis is not satisfactory for identifying the action and information requirements for emergency operations in the abstract. Therefore, Supplemental Task Analysis and verification were conducted based on generic Emergency Response Guidelines (ERGs) developed by the nuclear steam supply system designers. This process extracted generic operator and information requirements from the ERGs, converted them to plant-specific requirements, and then compared the requirements to existing control room inventories to verify instrumentation and control equipment availability and suitability.

  As with the Integrated Task Analysis, the Supplemental Task Analysis attempts to identify HECs that could significantly affect safe shutdown by comparing system functional requirements for emergency response to existing control room design, but without a preconceived notion of what equipment is in the control room.

HEC Assessment. During the HEC assessment phase, the DCRDR team evaluates each concern against identified NRC guidelines to determine the HEC's validity. Certain HECs may be determined to be invalid or not part of the DCRDR scope. The remaining HECs are grouped into categories, referred to by TVA as "human engineering discrepancies" (HEDs).

HED Assessment. "Human engineering discrepancy" (HED) is defined by TVA as "a characteristic of the existing control room that does not comply with the human engineering criteria used in the control room survey" (Ref. 18). NRC's definition in NUREG-0700 of HED is "the term . . . used to denote a deviation from some benchmark such as a preference or need, or an instrument/equipment characteristic implicitly or explicitly required for an operator task." TVA assigns human engineering discrepancies to one of four categories, as follows:

- Category 1 - HED could result in errors which directly challenge or cause a loss of critical safety function.

- Category 2 - HED could reduce or cause a loss of resources needed to maintain a critical safety function.

- Category 3 - HED could adversely affect normal plant operation or has potential to affect critical safety function resources.

- o Category 4 - HED has no significant effect on plant operations.

Action Plan. After categorizing the HEDs, the DCRDR team then prepares a proposed HED action plan for submittal to the site director. The action plan is to include, as a minimum, the following:

- o Identification of each HED
- o Proposed corrective action for each HED
- o Priority assignment for HEDs

This HED action plan is used to develop a DCRDR summary report. This summary report is required to outline all HEDs significant to safety, proposed control room changes, proposed schedule for implementation, and justification for safety-significant HEDs to be left uncorrected or partially corrected (Ref. 18).

NRC Review of Generic Program Plan. The NRC has reviewed the Program Plan as a basis for conducting the DCRDRs at all TVA nuclear plants and has evaluated its adequacy for identifying human factors discrepancies and for proposing modifications to resolve these. The results of the DCRDRs for SQN, BFN, and WBN are contained in the respective Summary Reports. The BLN Summary Report will be submitted at the conclusion of the DCRDR (see Section 4.2.2).

According to Appendix A of SRP 18.1:

> "This summary report should be submitted to the NRC after the DCRDR is completed and before the licensee/applicant begins any major modifications to the control room . . .
>
> The following areas will be reviewed by the NRC staff in its evaluation of the DCRDR summary reports:
>
> (1) A description of any significant changes that were made from the program plan report that was previously submitted, and an explanation of why these changes were made.
>
> (2) A description of the proposed control room modifications with an explanation of how the HEDs were resolved (chosen for correction or noncorrection).
>
> (3) A summary justification for HEDs with safety significance to be left uncorrected or partially corrected.
>
> (4) A proposed schedule for implementing the modifications . . .
>
> The result of the NRC staff evaluation of the licensee's/applicant's DCRDR effort will be a safety evaluation report (SER). This NRC staff SER will be based on the staff evaluation of the submitted program plan

report, the results of any in-progress site audit, the evaluation of the submitted DCRDR summary report, and the results of any pre-implementation audit."

Therefore, the NRC's review constitutes final assessment of the adequacy of the Program Plan for finding and resolving safety-significant human engineering discrepancies. The NRC published the safety evaluation of the SQN Summary Report on August 27, 1987 (Ref. 39). As of September 20, 1987, no safety evaluation had been published for the BFN Summary Report. Since the WBN Summary Report was issued so recently (October 2, 1987), its safety evaluation is not expected to be published for several months.

Site-Specific Program Plans. For Sequoyah and Watts Bar only, site-specific program plans were used. The Sequoyah plan, Standard Practice SQA-179, Rev. 1, replaces the generic program plan. The Watts Bar plan, Standard Practice WB 6.3.14, supplements the generic program plan.

Sequoyah. The evaluation team has reviewed SP SQA-179, Rev. 1 (Ref. 19), as a basis for conducting the DCRDR and evaluated its adequacy for identifying human factors concerns and human factors discrepancies, and for proposing modifications to resolve these.

The program plan was evaluated for its site adequacy as a plan; implementation of the plan was not addressed. The plant-specific program plan (SP SQA-179, Rev. 1) was approved for use on May 21, 1986. For Sequoyah only, SQA-179 supersedes the generic TVA program plan.

This standard practice:

- States that the program plan addresses the man-machine interfaces of the MCR, the ACR, and the transfer devices, thus encompassing the control room as defined in NUREG-0700.
- Establishes the responsibility of all employees to identify operational and procedural matters requiring correction. Although this does not relieve the DCRDR team from its responsibility to identify HECs, it does improve the probability of discovery.
- Provides guidance that is essentially a copy of NUREG-0700 guidelines. As such, the plan encompasses the basic requirements for a complete and comprehensive review process.
- Gives a listing of the required documentation which could readily serve as a road map for the conduct of a DCRDR and a checklist to ensure that necessary steps in the process are completed. It thus adds further assurance that appropriate action has been taken to identify HECs and that they have been assessed and resolved.

Coordination and integration of related programs (e.g., safety parameter display system) are tabulated and discussed in detail. The tabulation and discussion are sufficient to establish a program of required activities. The task analysis portion of the DCRDR evaluates the human factors aspects of the tasks of performing all the emergency operating procedures (EOPs). The development of the EOPs is part of the Procedure Generation Package that has been developed by the EOP team. The coordination of Emergency Operating Procedure (EOP) and DCRDR teams in SQA-179 is clear and provides a viable delineation of responsibilities. The methodology described for verification and validation of procedures using a simulator operating under a dynamic environment. This approach is consistent with typical methods for assessing the ability of operators to demonstrate their operating skills and effectiveness. The list of 35 EOPs has been provided separately to this evaluation team (Ref. 54). It is the judgment of the evaluation team that the list of EOPs meets the intent of NUREG-0737 Supplement 1 for analysis of emergency procedures.

The composition of the DCRDR team is in accordance with NUREG-0801. The team members, some of whom are nationally recognized in the human factors engineering field, are not listed for the plant-specific program plan. However, they are listed, with their backgrounds, in the status report of April 25, 1986 (Ref. 49). On the basis of their backgrounds, the team members are considered appropriate for the designated assignments.

The DCRDR team management and responsibility of the review team leader is in accordance with NUREG-0801. In fact, Table 1 of the SQN-specific DCRDR program plan is essentially a copy of NUREG-0801, Exhibit 2-1.

SQA-179 references the basic standards in common use in industry and government as well as throughout the nuclear power industry. Appendix A of SQA-179 is a copy of Section 6.0 of NUREG-0700 and, as such, forms a guideline for the conduct of the control room survey portions of a DCRDR.

The training and preparation of the DCRDR team are included in the SQN-specific DCRDR program plan. In addition to including the guidelines of NUREG-0700, the DCRDR plan, SQA-179, also considers such items as:

- Control/display integration
- Feedback of control activation
- Safe and efficient movement of personnel during task performance
- Sufficiency of staff for crew workload distribution
- Sequential grouping of controls and displays

The checklists and instructions presented in SQA-179 have their origins in standard, accepted references in the field.

Therefore, the evaluation team concludes that the SQN-specific DCRDR program plan, Standard Practice SQA-179, when implemented properly, will be adequate to identify and resolve human engineering concerns, thereby enhancing plant safety.

Watts Bar. On January 13, 1986, TVA issued the WBN Standard Practice WB 6.3.14 (Ref. 21). The DCRDR program was thereafter under the Watts Bar Site Director. This procedure covers the details of the DCRDR specific to Watts Bar, including descriptions of the detailed steps and worksheets to be used. Some of the sections are only briefly outlined or are incomplete. They were to be amplified by the DCRDR Project Manager with necessary details before performance of the subject activities. Section 2.0 of the WBN Standard Practice states, in part:

> "The original OE procedure [interpreted to refer to OE-SEP 82-17] was used as the generic TVA program plan. . . The program plan is now controlled and issued onsite in accordance with AI-9.8 [sic, it is clear from Reference 3.2.1 of the Standard Practice that this should refer to AI-4.8.] The standard practice provides additional administrative details and responsibilities specific to the Watts Bar DCRDR effort. . ."

Thus, it is clear that the generic program plan, OE-SEP 82-17, is incorporated by reference into WB 6.3.14. Also referenced in this procedure is the license condition that the Summary Report was to have been submitted to the NRC before April 1, 1987.

Section 5.1 of the Standard Practice states that "in cases of conflict between the program plan and this standard practice, the standard practice should be followed. Important differences will be addressed in the Summary Report when submitted to the NRC."

The assessment methodology described in Watts Bar Standard Practice WB 6.3.14 has been reviewed by the Essex Corporation and found to be acceptable. Documentation of this review is to be placed in the project files (Ref. 21).

Responsibility for translating the DCRDR team action plan recommendations into actual control room modifications is not assigned by WB 6.3.14. Chapter 2 of WB 6.3.14 states:

> "Implementation of enhancements is controlled and is in accordance with other established site and TVA instructions. This standard practice may, however, coordinate, integrate, and track implementation; it does not control it."

It is not clear how the responsibility for implementing recommended modifications will be assigned, although WB 6.3.14 implies that this will be controlled at the site.

The NRC's review of the WBN DCRDR Summary Report will constitute final assessment of the adequacy of WB 6.3.14, in conjunction with the generic program plan, to find and resolve human engineering discrepancies, thereby enhancing plant safety.

4.2.2 Progress of the DCRDRs (All Plants)

Employee Concerns WI-85-100-007 and XX-85-122-020, -021, and -022 asserted that human factors reviews had not been implemented yet. These concerns are interpreted to mean that the formal DCRDRs had not been implemented at any of TVA's nuclear power plant sites. A discussion of the actual progress of the DCRDRs at each site follows.

Sequoyah. The actual implementation of the SQN DCRDR program began August 23, 1983, when a training course on human factors was conducted for the DCRDR team members (Ref. 41). The review of operator experience was conducted in several steps. Initially the operators completed a basic questionnaire and the results were used to develop an addendum to the questionnaire. This new questionnaire was then given to those operators whom the DCRDR team felt could best provide answers (Ref. 49).

In addition to using questionnaires, the DCRDR team interviewed 17 operators after having first received instruction in effective interview techniques from a consultant human factors specialist.

For the survey of industry experience, the DCRDR team reviewed an INPO sort of Licensee Event Reports (LERs), Significant Event Reports (SERs), and INPO Operations and Maintenance Reminders (OMRs) involved either directly or indirectly with control room design or control room operators. A detailed review was also performed of all Sequoyah LERs and reactor trips to identify any with control room or operator involvement. Finally, the results of the DCRDR effort at Watts Bar were also reviewed for applicability to Sequoyah. These efforts were completed in March 1986.

Surveys of the MCR and the ACR were initiated in September 1984. The associated tasks of performing a sound survey, a lighting survey, and a survey of the HVAC for the MCR were completed during 1984 and 1985 (Ref. 46). The MCR/ACR surveys were completed in March 1986.

The DCRDR team performed a task analysis for all emergency operating procedures (EOPs) identified for SQN. There were 35 EOPs which had been developed by the site EOP team and were analyzed by the DCRDR team. The task analysis was completed in April 1986 (Ref. 49).

In March 1986 the Essex Corporation (Essex) reviewed the Sequoyah DCRDR documentation (Ref. 32). Essex reviewed only the documentation related to the operating experience review, the control room surveys, and the task analysis, as the remaining portions of the DCRDR were not complete. Based on their review, Essex concluded that the SQN DCRDR documentation is responsive to the guidelines of NUREG-0700, adequately describes the HECs, and provides a track to data collection methods and NUREG-0700 guidelines. The report summarized the documentation as ". . . adequate and, when complete, should provide an adequate basis for control room design improvements and for NRC audit." The report also mentioned that Essex would work with the DCRDR team to develop additional task analysis information. In addition to reviewing DCRDR documentation, Essex has also provided consulting services in essentially all phases of the DCRDR since February 1986, including significant participation in the preparation of the Summary Report (Ref. 55). In November 1986, on completion of the Summary Report, Essex provided a summary evaluation of the TVA DCRDR program in which they commented:

> ". . . TVA has structured and implemented a comprehensive program to identify and resolve those issues which, from a human factors perspective, could adversely impact plant safety and operations. In so doing, we feel that TVA has complied with regulatory requirements as presented in NUREG 0700 and NUREG 0737, Supplement 1." (Ref. 34)

Priority assessment, corrective action recommendation, and action plan preparation were completed, and the Summary Report was transmitted to the NRC on November 26, 1986 (Ref. 35).

A possible contributing factor to the concerned individual thinking the control room design review was not in progress is the length of time which elapsed between the NRC issuing the requirements and any visible activity of the review. Part of the reason given for the length of time the DCRDR team had taken to perform their review was a lack of manpower committed to perform the necessary assignments, as pointed out by memo (Ref. 46) in September 1985. This problem was further clarified in October 1985 (Ref. 48) as being due to the DCRDR team management structure. In December 1983, prior to the development of the Office of Power and Engineering and the owner/operator concept, NUC PR requested that the DCRDR team have a co-manager and a co-team leader from NUC PR. Under this arrangement, the co-managers and co-team leaders lacked direct control of the team members' assignments because they had no administrative responsibility over the individual team members.

This structure also increased the difficulty of coordinating technical and schedule issues. In addition to these direct effects of the management structure, and the fact that the members were not dedicated to the DCRDR activity, the individual DCRDR team member's immediate supervisor would often redirect the individual to other activities the supervisor felt were the individual's primary responsibilities (Ref. 48).

The NRC had been concerned about these deficiencies in the management of the DCRDR effort as early as November 1984 (Ref. 27). Due to the inconsistencies of TVA's reports on the status of the Watts Bar control room modifications, the NRC felt there may have been a serious deficiency in the management of the DCRDR team. The NRC was concerned that no one individual was responsible for DCRDR within TVA.

In February 1986, the co-manager, co-team leader structure was replaced by a single manager and a single team leader. Since that time, the DCRDR team operated with this structure.

The conclusion of the NRC's safety evaluation of the SQN DCRDR is that ". . . the DCRDR activities for Sequoyah Nuclear Power Plants, Unit 1 and 2, of TVA meet all the requirements of Supplement 1 to NUREG-0737 provided that TVA submit an acceptable document as discussed. . . " below (Ref. 39, p. 4).

The NRC staff found that:

> ". . . TVA has conducted an appropriate program for selection of design improvements. However, in order for TVA to meet the Supplement 1 to NUREG-0737 requirement for selection of design improvements, it will be necessary for TVA to provide NRC with confirmation regarding the implementation schedule for control room modifications that was discussed with the NRC during the preimplementation audit" (Ref. 39, p. 3).

The NRC's concerns related to selection of design improvements are covered more fully in section 2.6 of the Technical Evaluation Report (TER) appended to the safety evaluation. Section 4.0 of the TER lists the items to be confirmed by TVA. As stated in Section 2.6 of the TER:

> "In most cases, the audit team agreed with the proposed HED correction and schedule for implementation. However, in a number of cases, TVA committed to modify the proposed correction or implementation schedule."

In one such case TVA committed, in a letter to NRC dated July 14, 1987 (Attachment 13 to the TER), to provide interim corrective actions for a HED related to the location of the containment differential pressure indicating recorder on a back panel. SAIC judged TVA's commitment to be acceptable. TVA also agreed to accelerate implementation of corrective actions for four other HEDs; the confirmatory document still required TVA management approval at the time of issuance of the TER.

Watts Bar. During the first two phases of the WBN DCRDR (review of operating experience including a personnel survey, and the onsite control room survey) the team identified approximately 1,600 human engineering concerns (HECs). These two tasks were completed by February 1, 1985 (Ref. 43). As of February 17, 1987, more HECs had been identified for a total of 1,846 HECs.

The WBN DCRDR HEC assessment phase evaluates each concern against identified NRC guidelines to determine their validity. Approximately 600 HECs have been disposed of because they are either (1) duplicates of other HECs, (2) not valid, (3) previously corrected, or (4) maintenance items. The remaining HECs are grouped into categories, referred to by TVA as "human engineering discrepancies" (HEDs).

The proposed resolution of these HEDs were transmitted to the Watts Bar plant management. As of February 17, 1987, corrective action plans to resolve approximately three-fourths of the HEDs had been proposed and were being reviewed by plant management. No further corrective action is proposed for the remaining HEDs; justifications have been prepared. The plant had a review group comprised of senior reactor operators who were to evaluate the proposals. After the corrective actions are agreed upon by the DCRDR team and the plant management review group, the proposed solutions and schedule for implementing them, where appropriate, were then to be submitted to the NRC in the DCRDR Summary Report.

The Summary Report was to have been submitted by April 1, 1987 as a license condition. On March 25, 1987, TVA informed the NRC that the Summary Report submittal date was being slipped to August 1, 1987 (Ref. 37). By July 31, 1987, the DCRDR Summary Report had been completed and prepared for submittal to the NRC (Ref. 38). As a result of the more comprehensive and integrated DCRDR, previously completed corrective actions identified in Appendix D to the June 1982 WBN Safety Evaluation Report were going to be altered or upgraded. To ensure proper review and closure, the NRC indicated that TVA should provide an explicit correlation between the modified Appendix D corrective actions (priority 1 and 2 only) and the DCRDR corrective actions. The NRC indicated that this additional information could be included in the Summary Report or in a later supplement to the Summary Report. TVA opted to include this information in the initial submittal of the Summary Report and submit it by October 1, 1987 (Ref. 38). The WBN DCRDR Summary Report actually was submitted on October 2, 1987 (Ref. 56).

The NRC will review TVA's entire DCRDR program for Watts Bar, including corrective actions, and document this review in an SER. Part of the NRC's review will include an onsite, preimplementation audit (Ref. 38).

Browns Ferry. In 1982, before the formal DCRDR effort began, the Control Room Improvements Committee of the BWR Owners' Group (BWROG) conducted a 10-day human factors evaluation of the BFN control panels. The summary report of this review

> "identifies areas of control room design for which modifications should be considered, stated as general suggestions with the understanding that corrective action should be considered on a control room wide basis" (Ref. 24).

The BFN DCRDR was performed by TVA, Impell Corporation and Impell's subcontractor, Search Technology, as a joint effort.

According to Section 1.2 of the BFN DCRDR Summary Report (Ref. 36), which TVA submitted to the NRC on December 30, 1986:

"A multidisciplinary core review team having expertise in the following disciplines was used:

a. Instrumentation and Controls (I&C) Engineering

b. Human Factor(s)

c. Nuclear Systems Engineering

d. Reactor Operation(s)."

This multidisciplinary core team performed the following review activities:

(1) Task analysis of Emergency Operating Instructions (EOIs)

(2) Operating experience review

(3) Human factors checklist survey of the control room

(4) Additional task analysis (selected as a result of the operating experience review)

The BFN DCRDR team also used the results of the BWROG summary report to identify HECs not identified in the operating experience review, task analysis, and control room survey. These activities were completed by November 1984.

The HED assessment process then began. "The HECs were assessed (categorized) in terms of their severity and potential impact on safety by the DCRDR core team. Proposed corrective actions were developed by individual team members and reviewed and approved by the DCRDR core team" (Ref. 36). The DCRDR team's recommendations did not consider factors such as cost, schedule, and resource requirements. The assessment process lasted until March 1986.

An action plan was prepared by the DCRDR team and submitted to the Browns Ferry Site Director on July 21, 1986 (Ref. 50).

After the original and additional task analyses described above had been completed, as documented in the Action Plan, TVA revised the Emergency Operating Instructions (EOIs). The task analysis results were updated, based

on the revised EOIs. Additional HEDs, beyond those listed in the Action Plan, were identified during this update (Ref. 53). The Supplemental Action Plan (Ref. 51) incorporates the results of this activity.

BFN plant management is responsible for final disposition of the DCRDR Team HED Action Plan and the authorization of work to be done to correct any HED. After reviewing the Action Plan, plant management in some instances approved modified corrective actions. The proposed corrective actions for safety significant HEDs and schedule for implementation are presented in Appendices A and B of the Summary Report.

As of September 20, 1987, TVA was waiting for the NRC's response to the BFN Summary Report. The NRC may decide to perform an onsite pre-implementation audit before completing its review. The results of the NRC's review will be documented in a safety evaluation.

Bellefonte. The status or completion dates of the major tasks of the DCRDR are shown below (Refs. 40 and 20):

STATUS OR COMPLETION DATES OF BELLEFONTE DCRDR MAJOR TASKS

	Task	Status or Completion Date
1.	Develop DCRDR Program Plan	Complete
2.	Survey MCR and ACR	Completion date not set
3.	Perform Operator Experience Review	Complete
4.	Assess HECs for Possible Redesignation as HEDs	Complete, except for HECs which will be generated in future activities
5.	Assess HEDs	Complete for the 234 prioritized HEDs
6.	Develop Recommendations	Complete, except for HEDs which will be generated in future activities
7.	Task Analysis	July 1, 1991
8.	Final Action Plan	January 2, 1992
9.	Complete Summary Report	July 9, 1992

A preliminary Action Plan was prepared by the BLN DCRDR team and submitted to the Bellefonte Design Project Manager on August 15, 1983 (Ref. 40). A total of 340 HEDs were identified. Of these, 234 were prioritized for corrective action. For the remaining 106 HEDs, the DCRDR team recommended that no action be taken. Subsequent to issuance of the preliminary Action Plan, 19 HECs were identified during the task analysis. The task analysis, however, was not completed, because all DCRDR activities were suspended in the fall of 1985 due to a delay in fuel load. The DCRDR is scheduled to resume in 1989 (Ref. 20).

4.2.3 Implementation of HED Corrective Actions (All Plants)

Employee Concerns WI-85-100-007 and XX-85-122-020, -021, and -022 asserted that human factors engineering had not been implemented yet. Implementation of human factors engineering, interpreted here to refer to actual implementation of corrective actions resulting from the detailed control room design review, will take place in accordance with the recommendations and schedule contained in the DCRDR Summary Reports for each plant. The Summary Report is required to contain recommendations for modifications to the control room. The Summary Report is also required to present a schedule for implementing the modifications and to provide a summary justification for any HEDs with safety significance that are to be left uncorrected or partially corrected.

A discussion of the available NRC guidance on scheduling implementation of corrective actions follows.

Appendix A to SRP 18.1 specifies the criteria to develop the implementation schedule:

> "The determination of an appropriate corrective action implementation schedule should be based on the degree of degradation of operator performance caused by the HED, the effect of the HED on the safety of the plant, whether the equipment affected by the HED is part of a safety system, and the availability of resources needed for correction. Both operating and nonoperating plants are encouraged to implement all corrective actions on as short a schedule as possible to avoid problems with operator retraining" (Ref. 7, Section 2.6).

While this guidance is helpful, it is not sufficiently specific to enable an objective evaluation of a utility's proposed implementation schedule for correcting HEDs. Consequently, the evaluation team referred other regulatory guidance.

Draft NUREG-0801 (Ref. 8), which preceded SRP 18.1 Appendix A, attempted to provide more definitive criteria for scheduling implementation of corrective actions. The NUREG-0801 criteria are included here only to illustrate the kind of schedule which would be expected to be acceptable to NRC.

". . . All discrepancies which are classified in Categories I, II and III* should be scheduled for corrective action. The priority of implementation of corrective actions for each category and level is indicated in Exhibit . . . 4.5 . . . In all cases, for . . . operating . . . plants, implementation of corrective actions on a shorter schedule than that indicated is encouraged.

"For purposes of scheduling corrective actions for operating plants, the following designations are recommended:

Prompt Action: Correct promptly on schedule approved by NRC. Make changes at the first refueling after submittal of the report or the first outage after receipt of equipment (expedited).

Note: Enhancement corrections do not require NRC approval and should be made prior to submittal of the report to NRC.

Near Term: Correct on schedule approved by NRC. Make changes at the second refueling outage after submittal of the report.

Long-Term: (optional) Correction of non-significant discrepancies may be implemented at any time." (Ref. 8, Section 4.4)

In general, the NRC prefers that modifications be deferred until it has reviewed the Summary Report, evaluated the proposed corrective actions, and issued its SER. (As noted above, "enhancements," i.e., corrections involving paint, labels, and tape, can be made without specific NRC approval.) Control room modifications arising out of the DCRDR Programs will be implemented in accordance with the established TVA engineering change notice process and will reflect consideration of existing TVA engineering design guides (see Section 4.2.5).

Exhibit 4-5 of NUREG-0801 provides a complicated, multi-tiered schedule for modifications. Although no longer applicable, it may indicate an acceptable compliance position. Exhibit 4-5 specifies that some kinds of Category I and II HEDs and all Category III HEDs should be scheduled for prompt implementation. The remaining Category I and II HEDs are near-term items, while Category IV HEDs are long-term (optional) items.

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* Note: There is no direct correlation between the HED categorization scheme in draft NUREG-0801 and TVA's categories.

The implementation schedules proposed (to date) by TVA for correcting HEDs identified at each of the four sites are described and evaluated, where appropriate, in the following subsections.

Sequoyah. In the safety evaluation of the SQN DCRDR (Ref. 39), the NRC and its consultant Science Applications International Corporation (SAIC) generally concurred with TVA's proposed implementation schedule. In Section 2.6 of the Technical Evaluation Report (enclosure to the safety evaluation), SAIC makes the following observations and comments related to the implementation schedule for Sequoyah:

> "In many cases, Category 1, 2, and 3 HECs [sic, should be HEDs] are being grouped into integrated corrective actions that will take place during Cycle 4, 5, and 6 refueling outages. . . ."
>
> "Based on Summary Report Figure 6, TVA indicated that the proposed DCRDR modifications would not be completed until 1992. This five year DCRDR implementation schedule was of concern to the audit team. In order to help resolve the audit team's concern regarding implementation of control room modifications, TVA provided NRC with Figure 1, CRDR Project Schedule."

The Cycle 4 outages are the next refueling outages scheduled for each SQN unit. Figure 6 of the Summary Report (Ref. 35) scheduled HED modifications as follows:

- Unit 1 HEDs
  - Category 1 - January 1989 (Cycle 4)
  - Category 2 - August 1990 (Cycle 5)
  - Category 3 - March 1992 (Cycle 6)
- Unit 2 and Common HEDs
  - Category 1 - July 1989 (Cycle 4)
  - Category 2 - February 1991 (Cycle 5)
  - Category 3 - September 1992 (Cycle 6)

TER Figure 1, CRDR Project Schedule, depicts a more detailed breakdown of the HED modification implementation schedule. On the basis of a July 1987 restart for SQN unit 2, with unit 1 restarting 6 months later, this schedule indicates that physical implementation of the corrective actions will take place

4 months later than reported in the Summary Report for most of the HEDs. Since this implementation schedule is keyed to refueling outages, and since, as of September 30, 1987, SQN restart had not been authorized, the schedule in Figure 6 of the Summary Report can be expected to slip at least 6 months.

However, as stated in Section 2.6 of the TER:

> "TVA committed to correct, to the maximum extent possible, lower priority Category 2 and 3 HEDs during refueling outages 4 and 5, rather than Cycles 5 and 6 respectively. TVA also committed to submit to NRC a revised schedule for modification implementation reflecting this commitment, once it has been approved by TVA management."

The actual TVA management commitment to this accelerated implementation schedule was pending at the time of issuance of the TER and is listed as a confirmatory item in the safety evaluation.

Browns Ferry. TVA's proposed implementation schedule is compared with a schedule approved for another utility.

TVA's Proposed Implementation Schedule for BFN. Proposed corrective actions for TVA Category 1 and 2* HEDs have been prepared, reviewed, and approved by Browns Ferry plant management. (TVA Category 1 and 2 HEDs are considered "safety significant.)"

TVA has scheduled Category 1 HED corrective actions for completion by the end of the second refueling outage on a per-unit basis following restart of each unit. Category 2 HEDs are scheduled for completion by the end of the third refueling outage following restart of each unit. The Summary Report indicates that corrective actions for some Category 1 and 2 HEDs will be implemented on an earlier schedule. The Summary Report also states that "implementation of Category 3 corrections will be on a case-by-case basis pending further resource requirements, schedule constraints, and cost benefits." (Ref. 36)

Specific corrective actions for Category 4 HEDs were not made because "they were evaluated as being very unlikely to result in an operator error or to affect plant safety." However, some Category 4 HEDs will be corrected incidentally during the process of implementing corrective actions for Category 1, 2, or 3 HEDs.

A few HEDs required additional evaluation to determine the corrective action.

Documentation of proposed corrective actions for TVA Category 1 and 2 HEDs is included in the DCRDR Summary Report.

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* Note: There is no direct correlation between the HED categorization scheme in draft NUREG-0801 and TVA's categories.

Comparison with Cooper Nuclear Station's Implementation Schedule. Because the proposed Browns Ferry implementation schedule appears marginal with respect to the NRC criteria given above, the evaluation team compared the TVA commitments with the implementation schedule proposed by another utility. The comparison plant is Nebraska Public Power District's (NPPD's) Cooper Nuclear Station, licensed on January 18, 1974. Cooper was selected for this comparison because it is a similar plant (i.e., BWR with a Mark I containment) of comparable vintage (i.e., operating license granted about the same time as Browns Ferry's).

NPPD submitted the Cooper DCRDR Summary Report on February 4, 1985. A total of 269 HEDs were identified in this study. A total of 137 HEDs were resolved by relatively simple corrections or enhancements. Most of these enhancements were to have been completed by the end of the outage then in progress. All enhancements were to be completed by the end of the next refueling outage. The remaining 132 HEDs were assigned for correction by panel modifications. HEDs assigned for correction by modifications were subjected to a prioritization scheme that assessed their importance to safety.

The following scheduling philosophy was noted (Ref. 58):

"o The most safety significant HEDs should be corrected prior to return to power from the next refueling, if design and equipment lead times permit. All HEDs in this category are recommended for correction within two operating cycles.

o Correction of moderate significance HEDs is recommended prior to restart from the second refueling outage after the current one. A few items are deferred to the third refueling to allow coordination with other modifications.

o The less significant HEDs to be corrected are recommended for correction within three operating cycles."

Eleven "particularly intractable" HEDs required feasibility studies by NPPD after submittal of the Summary Report to identify appropriate modifications and to develop the ultimate schedule for their implementation.

The NRC and contractor personnel from the University of California's Lawrence Livermore National Laboratory reviewed the Cooper Summary Report and issued a safety evaluation on September 5, 1985 (Ref. 58). The NRC agreed with the plan to conduct feasibility studies but required that a Summary Report Supplement be submitted to the NRC to describe the corrective action and schedule for implementation. The NRC agreed that "the general philosophy for . . . completion dates is in compliance with the requirements of NUREG-0737, Supplement 1."

Even though the BFN Summary Report has been submitted, TVA still needs to conduct additional evaluation of current system capabilities and flexibility to accommodate a few HED modifications. The results of NRC's review of Cooper suggests that this approach is acceptable.

NUREG-0737 Supplement 1 states that "improvements that can be accomplished with an enhancement program (paint-tape-label) should be done promptly." TVA rates all labeling HEDs as Category 1 which have highest priority. All Category 1 HEDs at Browns Ferry are to be implemented by the end of the second refueling outage. This appears to satisfy Supplement 1 of NUREG-0737.

TVA has committed to have all of the Category 2 HEDs corrective actions completed by the third refueling outage. NPPD's approach for Cooper is similar.

Appendix A to SRP 18.1 states:

> "The SER will state whether the NRC staff concludes that the proposed modifications to the licensee's/applicant's control room equipment and operations as a result of the DCRDR will accomplish the basic requirements established by the Commission. Any additional corrections or schedule modifications necessary to comply with the basic requirements established by the Commission will be documented in the SER."

In assessing the BFN implementation schedule, the evaluation team has reviewed the Cooper Summary Report (Ref. 57), the NRC review of that Summary Report (Ref. 58), and SRP 18.1 Appendix A. The ultimate schedule for corrective action implementation for the Browns Ferry HEDs will be negotiated between TVA and the NRC. While the NRC may disagree with the proposed schedule for correcting individual HEDs, the general philosophy of Browns Ferry's schedule of corrective action implementation appears to meet NRC guidelines.

Watts Bar. The modification schedule is to be included in the Summary Report. The Watts Bar DCRDR Summary Report was scheduled for submittal by October 1, 1987, and actually was submitted October 2, 1987. The evaluation team was unable to obtain a copy of the WBN Summary Report for review prior to issuing this subcategory report. Inasmuch as WBN is not licensed to operate, it is unnecessary for the evaluators to conduct such a review. As described above, the NRC will review the proposed implementation schedule in the process of evaluating the Summary Report.

Bellefonte. As of May 1987, the Bellefonte DCRDR Summary Report is scheduled to be completed July 9, 1992; therefore, the implementation schedule for correcting HEDs has not yet been determined. Inasmuch as BLN is still under construction and is not licensed to operate, the lack of a defined implementation schedule has no immediate safety implications.