UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

April 5, 1984

MEMORANDUM FOR: Dennis L. Ziemann, Chief
Procedures and Systems Review Branch
Division of Human Factors Safety

FROM: H. Brent Clayton, Section Leader
Section A - Procedures
Procedures and Systems Review Branch
Division of Human Factors Safety

SUBJECT: MEETING SUMMARY - TASK ANALYSIS REQUIREMENTS OF SUPPLEMENT 1 TO NUREG-0737
MARCH 29, 1984 MEETING WITH WESTINGHOUSE OWNERS GROUP (WOG) PROCEDURES SUBCOMMITTEE AND OTHER INTERESTED PERSONS

Staff representatives met with representatives of the WOG Procedures Subcommittee and others on March 29, 1984, to discuss the task analysis requirements of Supplement 1 to NUREG-0737 (Generic Letter 82-33). The purposes of the meeting were (1) for the Subcommittee to discuss how operator information and control needs have been addressed by the Emergency Response Guideline (ERG) development effort, and (2) for the staff to identify any additional analysis or documentation needed for review.

Mr. Doug McKinney, Subcommittee Chairman, made a brief presentation on the background of the ERG development program as it relates to the issue of task analysis. His presentation included a description of the ERG background documents, development of Revision 1 to the ERG, interactions with NRC, Supplement 1 to NUREG-0737 requirements, and an overview of how the WOG had responded to the requirements. A copy of Mr. McKinney's transparencies is enclosed (Enclosure 1).

Mr. Ralph Surman of Westinghouse made a presentation which described in some detail the development of the ERG and the accompanying background documentation for both the Basic version and Revision 1. He emphasized that one of the main objectives of the ERG is to identify the operator tasks necessary to perform functions which are identified in the background documentation. A copy of Mr. Surman's transparencies is enclosed as Enclosure 2.

After a caucus, the staff made the following comments to the meeting attendees:

(1) Based on the presentations by Mr. McKinney and Mr. Surman, it appears that Revision 1 of the ERG and background documents do provide an adequate basis for generically identifying information and control needs.

(2) Each licensee and applicant, on a plant-specific basis, must describe the process for using the generic guidelines and background documentation to identify the characteristics of needed instrumentation and controls. For the information of this type that is not available from the ERG and background documentation, licensees and applicants must describe the process to be used to generate this information (e.g., from transient and accident analyses) to derive instrumentation and control characteristics. This process can be described in either the PGP or DCRDR Program Plan with appropriate cross-referencing.

(3) For potentially safety-significant plant-specific deviations from the ERG instrumentation and controls, each licensee and applicant must provide in the PGP a list of the deviations and their justification. These should be submitted in the plant-specific technical guideline portion of the PGP, along with other technical deviations.

(4) For each instrument and control used to implement the emergency operating procedures, there should be an auditable record of how the needed characteristics of the instruments and controls were determined. These needed characteristics should be derived from the information and control needs identified in the background documentation of Revision 1 of the ERG or from plant-specific information.

(5) It appears that the Basic version of the ERG and background documentation provide an adequate basis for generically deriving information and control needs. However, because of the differences in the organziation of the material in the background documents between Basic and Revision 1, it is apparent that it would be easier to extract the needed information from the Revision 1 background documents.

At the conclusion of the meeting, there was general agreement with the staff's comments among the owners' representatives present.

Enclosure 3 is a list of attendees.

H. Brent Clayton, Section Leader
Section A - Procedures
Procedures and Systems Review Branch
Division of Human Factors Safety

Enclosures:
As stated

cc w/enclosures:
[redacted]
D. McKinney

Attachment 2A

to

AEP:NRC:0773H

D. C. COOK CONTROL ROOM INSTRUMENTATION AND CONTROL CHARACTERISTICS IDENTIFICATION AND DOCUMENTATION

The following will define the instrumentation and control characteristics that are necessary for proper operator response to emergency transients. Supporting basis documentation will also be developed.

The documentation developed as part of this program will complement the documentation being developed as part of the existing D. C. Cook Task Analysis Program in satisfying the needs of the CRDR review team and the requirements of the NRC.

Scope

The program scope includes the definition of a process and the development of documentation to identify instrumentation and control characteristics based on operator information and control needs during emergency operations. The process and documentation will be based on the same representative event sequences (Table 2A-1) and emergency operating procedures (Table 2A-2) that the present D. C. Cook Task Analysis Program is based.

Process

The process for identification of instrumentation and control characteristics will be as follows:

1. The set of operator functions for response to emergency transients will be reviewed and finalized.

2. The selected subset of D. C. Cook Emergency Operating Procedures (EOP's) will then be reviewed and procedure steps will be mapped into the operator functions in a manner similar to that shown in Figure 2A-1.

3. For each operator function, the generic background documentation (Step Description Tables) will be reviewed to identify:

   - o Operator information and control needs necessary to support the operator functions.
   - o Plant systems necessary to provide information and control needs.
   - o Plant instrumentation and controls necessary to provide information and control needs.

4. For each operator function, instrumentation and control characteristics will be identified based on the required information and control needs.

   a. Characteristics for instrumentation will include:

      - o Units
      - o Range
      - o Resolution/Sensitivity
      - o Accuracy
      - o Response Time
      - o Type - Discreet values and/or continuous (trending)

   b. Characteristics for indications and controls will include:

      - o Type - Discreet (on-off) and/or continuous (variable)

Documentation

The results of the evaluation process will be provided in an INSTRUMENTATION AND CONTROL CHARACTERISTICS FOR EMERGENCY RESPONSE document. This document

will consist of the following major sections:

1. Introduction
2. Description of Operator Function Evaluation Process
3. Description of Operator Function Information and Control Needs
   For each operator function, summary documentation will be provided to describe:

   a. information and control needs.
   b. plant systems required to provide information and control needs.
   c. instrumentation and controls required to provide information and control needs.
   d. characteristics of instrumentation and controls required to provide information and control needs.

4. Description of Instrumentation and Control Characteristics

   For each instrument and control, summary documentation will be provided to identify the required characteristics. The basis for the identified characteristics will be established by referencing appropriate discussion in Section 3 above, and/or the appropriate information in the generic ERG Revision 1 background documentation or appropriate D. C. Cook documentation.

The instrumentation and control characteristics will also be included on the Instrument Requirements Tables and Control Requirements Tables being developed as part of the present task analysis documentation.

Development of the INSTRUMENTATION AND CONTROL CHARACTERISTICS FOR EMERGENCY RESPONSE document may result in the redefinition of the change on the CRDR results. Although such changes are possible, a significant number of such changes are not expected.

TABLE 2A-1

EVENT SEQUENCES SELECTED FOR D. C. COOK TASK ANALYSIS PROGRAM

- Spurious Safety Injection
- Loss of reactor coolant (small break - 1 inch diameter)
- Loss of reactor coolant (small break - 4 inch diameter)*
- Loss of reactor coolant (large break)
- Loss of secondary coolant
- Combined loss of reactor and secondary coolant
- Steam generator tube rupture (design basis)
- Steam generator tube rupture (multiple ruptures in one steam generator)*
- Steam generator tube rupture (ruptures in more than one steam generator)*
- Anticipated Transient without Scram*
- Inadequate core cooling (resulting from failures in emergency core cooling system)*
- Inadequate core cooling (resulting from loss of secondary heat sink)
- Pressurized thermal shock

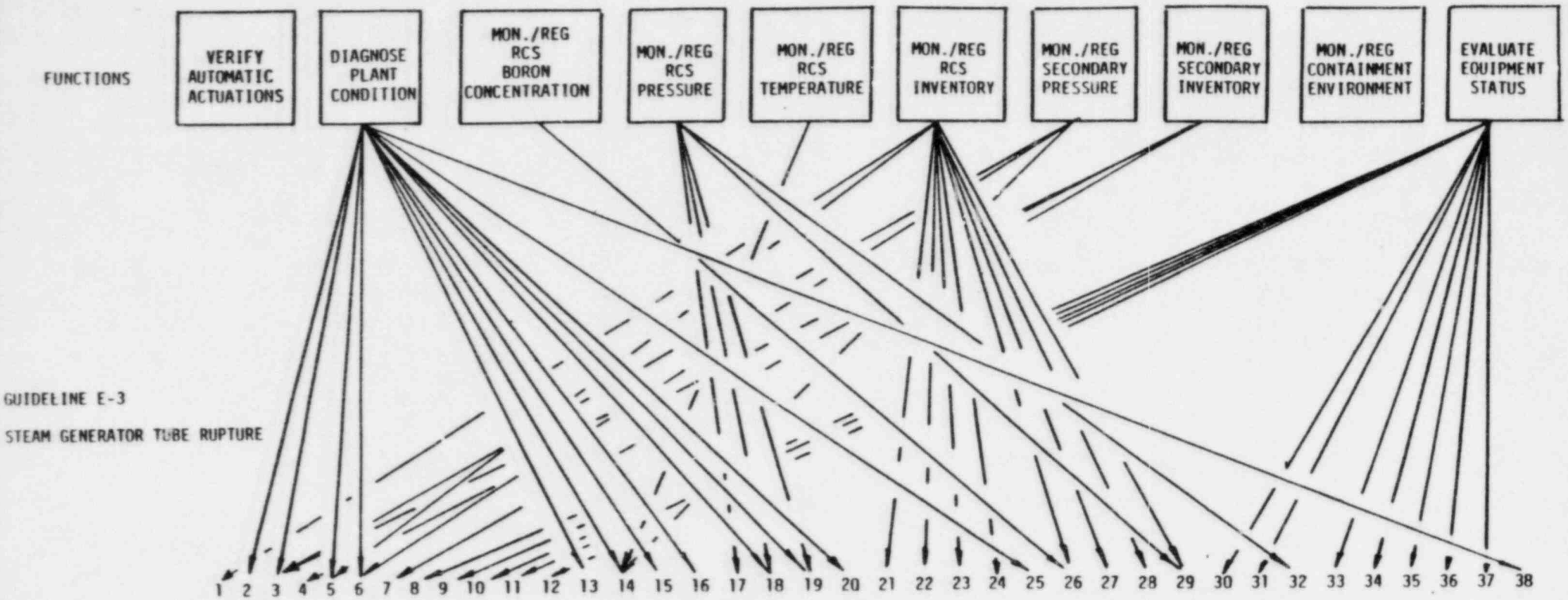
*Event sequences recommended in NUREG-0700

TABLE 2A-2

EMERGENCY OPERATING PROCEDURES SELECTED
FOR D. C. COOK TASK ANALYSIS PROGRAM

- Reactor Trip or Safety Injection
- SI Termination
- Loss of Reactor or Secondary Coolant
- Post-LOCA Cooldown and Depressurization
- Transfer to Cold Leg Recirculation
- Transfer to Hot Leg Recirculation
- Faulted Steam Generator Isolation
- Steam Generator Tube Rupture
- Post-SGTR Cooldown Using Steam Pump
- Critical Safety Function Status Trees
- Response to Nuclear Power Generation/ATWS
- Response to Inadequate Core Cooling
- Response to Loss of Secondary Heat Sink
- Response to Iminent Pressurized Thermal Shock Conditions

FIGURE 2A-1



NOTE: The blocks along the top are the various Functions a control room operator would be expected to perform during a Steam Generator Tube Runture transient condition. The numbers at the bottom indicate the various steps in the Generic Guideline E-3 for a Steam Generator Tube Rupture. In order to perform the Functions along the top, monitor/regulate RCS Boron Concentration for example, the operator will use information various Emergency Operating Procedures, in this case from step 26 in the Generic Guideline E-3 for a Steam Generator Tube Rupture.

FIGURE 2A-1

Attachment 3

to

AEP:NRC:0773H

D. C. COOK EMERGENCY RESPONSE CAPABILITY INTEGRATION PLAN

In accordance with NUREG-0737, Supplement 1, American Electric Power Service Corporation (AEPSC) proposes to integrate the overall Emergency Response Capabilities in the following manner.

K. J. Toth, of the Nuclear Engineering Division, has been appointed as the overall project coordinator (indicated on Figure 3-1). As overall coordinator, K. J. Toth is responsible for the integration of all the NUREG-0737, Supplement 1 elements designed to enhance the control room operators ability to comprehend plant conditions and cope with emergencies. These elements, the Safety Parameter Display System (SPDS), Detailed Control Room Design Review (DCRDR), Emergency Operating Procedures (EOPs), Regulatory Guide 1.97 (RG 1.97), and the Emergency Operating Facilities (EOF) including the Technical Support Center (TSC), all have appointed Lead Engineers (also indicated in Figure 3-1). These Lead Engineers, or their designated alternates, form the Emergency Response Capabilities Council which will meet at periodic intervals and according to need. Plans and schedules have been developed for each of the elements (Figure 3-2). Functions of each element have been established and discussions held to determine how each of the elements relate to each other and how they must interface to provide Emergency Response Capability. Each Lead Engineer is responsible for the scheduling and coordination of activities within his project, and the coordination of his project as it interfaces the other emergency response capabilities projects.

Figure 3-3 shows the interfaces that will be considered between the basic elements of the emergency response capability implementation plan. Each element and its relation to previous and succeeding elements is discussed in the following plan descriptions.

CRDR ELEMENT

The AEP/I&MEC Detailed Control Room Design Review Program Plan Report provides the method for performing the entire review.

The Control Room Inventory task has been accomplished. The Operating Experience Review has been performed and has identified and documented some operational problems. The Control Room Human Factors Survey is almost complete and has also identified and documented some problems.

The Systems Function and Operator Task Analysis Review is being conducted by a Consultant. The required instruments and controls determined by this review will be compared with the Control Room Inventory in the Verification of Task Capabilities Review to determine availability and human engineering suitability. The control room information and control functions will be validated by the upgraded EOP walk-through-talk-through process using selected EOP's.

Control Room additions associated with the SPDS and incorporation of RG 1.97 recommendations will be given human factors evaluation.

The Control Room improvements will be coordinated with changes resulting from other programs such as EOP, RG 1.97, SPDS, and ERF.

EOP ELEMENT

The Cook Plant EOPs are being developed for the purpose of mitigating the consequences of a broad range of initiating events, and subsequent multiple failures or operator errors, without the need to diagnose a specific event. These procedures are function-oriented and are being written with human factors considerations to improve human reliability. These EOPs are being developed based upon a writer's guide, NSSS generic technical guidelines and a plant specific analysis.

The adequacy of these procedures are dependent upon the trained operator's needs. EOPs will be checked for completeness, understandability, technical correctness, usability, and compatability with the control room. In

order for operators to have confidence in the EOPs, all of these criteria must be met. A walk-through of the initial EOPs has been scheduled for the purpose of evaluating these criteria. The EOP walk-through will be conducted in the control room and by using a full-sized photographic mock-up of the control room. Although Figure 3-3 shows only one EOP walk-through, we intend to repeat the process as necessary.

Plant specific EOPs will be incorporated in an iterative process with Control Room HEDs, the application of RG 1.97 recommendations, SPDS design bases, and Emergency Response Facility criteria. This interactive process will be used to determine what changes can be made to the EOPs to accommodate deficiencies in other areas without impacting the effectiveness of the EOPs. Because all of the elements that impact EOPs will not be available at the same time, the interaction process between EOPs and the other impacting elements will be conducted as each element is developed.

Both the upgraded plant specific EOP's and the SFTA of selected EOPs are being performed by W and, except for refinements, are complete. The EOP group at Cook will begin the verification of those upgraded procedures and the DCRDR Design Review Team will begin the verification of operator task capability with the SFTA and CRI. Control Room operator walk-through/talk-through of plant specific upgraded EOPs for validation of the procedures will also involve DCRDR human factors specialists on selected procedures to satisfy the DCRDR validation of control room function review task.

RG 1.97 ELEMENT

A complete set of design criteria is being developed to form a basis for the plant instrument selection. Utilizing the design criteria, as well as the post-accident instrumentation requirements identified from the CRDR task analysis and EOPS's, a specific list of accident monitoring instrumentation, including qualification criteria and locations will be developed. The list will also provide feedback to the control room design review. ERF design

criteria will provide additional input to the RG 1.97 list. Once the list is finalized in design, an iterative process will be conducted to consider changes associated with EOPs, Control Room improvements, SPDS design and ERF design.

Regulatory Guide 1.97 Type A instrumentation, which is critical to the emergency response capability of the Control Room, will be identified when the upgraded EOPs are available in July, 1984. Evaluation of the Type B through E Categories 1 through 3 will begin approximately August 1, 1984. Any new instrument that is added to the Control Room to satisfy RG 1.97 requirements will undergo human engineering analysis by the DCRDR Design Review Team or will be verified for acceptable human engineering practice by reviewing the guidelines established by the DCRDR Program.

SPDS ELEMENT

The SPDS installation is well under way and was developed with cognizance of current NRC and other generic guidelines. Interfaces with other NUREG-0737, Supplement 1 elements are defined and understood, which will enhance integration.

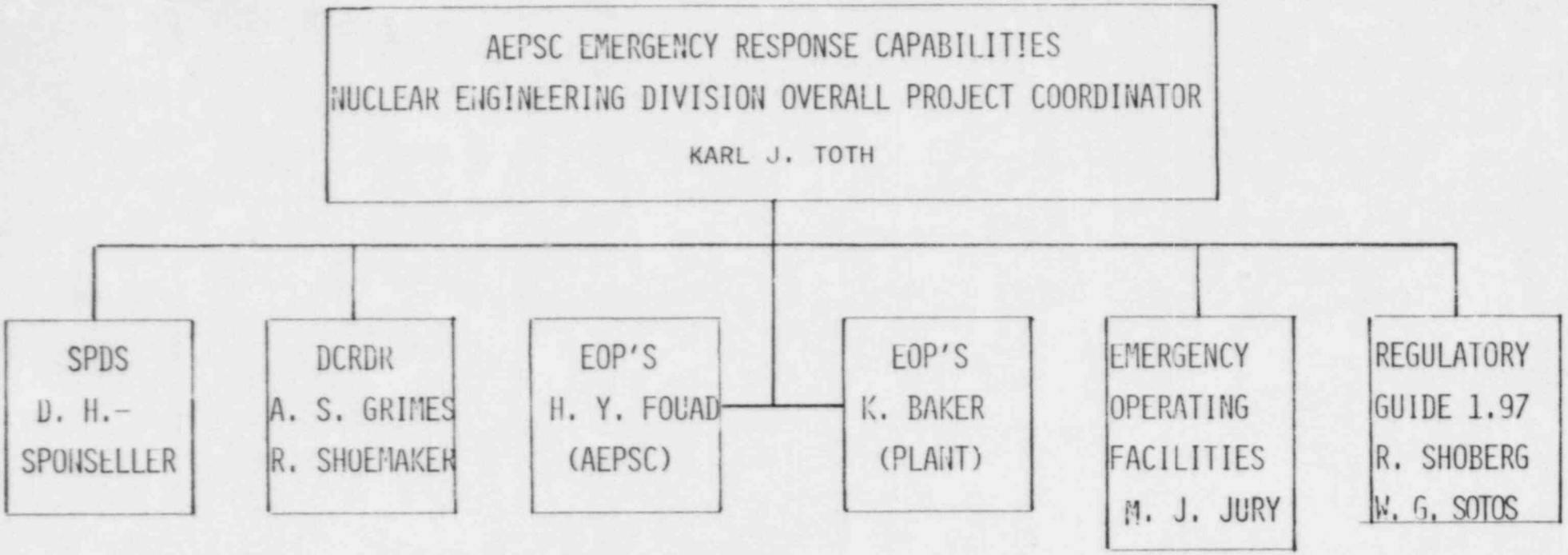
To ensure an effective SPDS, the design specified hardware, inputs, software, and identified SPDS user(s), locations, and availability were evaluated. The SPDS at the Cook Plant is designed to serve as an operator aid in monitoring and analyzing the critical safety functions. The SPDS design considers operator usability and compatibility with plant-specific EOPs.

SPDS usability is essential to the effectiveness of the system. The human factors engineering for the SPDS, as well as guidance for other factors that influence usability, have been provided by the vendor, Westinghouse.

Iteration is an ongoing process, as long as significant HEDs exist or any changes that could impact the SPDS or any of the other NUREG-0737, Supplement 1 elements. Coordination is essential to effectively determine modifications to the SPDS (or any of the other elements) without creating additional discrepancies.

ERF ELEMENT

The D. C. Cook Emergency Response Facilities and the Emergency Response Plan have been completed/developed in cognizance of current NRC guidelines. The facilities and plan have been tested and satisfactorily demonstrated functionality. However, the ERF and the Emergency Response Plan will continue to be included in an iterative process with other elements of NUREG-0737, Supplement 1. These include Control Room improvements, plant-specific EOPs, specific RG 1.97 application and SPDS design. This iterative process will continue as an ongoing commitment. The AEP/I&MEC DCRDR Program has been conceptually promulgated as a living program, whereby all future additions or revisions to the Control Room will be subjected to a review process established by the DCRDR. All functional requirements of each of the elements of the Emergency Response Capabilities will be reviewed by as many of the DCRDR - Design Review and/or Assessment Teams as necessary to assure Human Factors engineering evaluation and assessment of any given improvement.


AEPSC EMERGENCY RESPONSE CAPABILITIES
NUCLEAR ENGINEERING DIVISION OVERALL PROJECT COORDINATOR
KARL J. TOTH
SPDS
D. H.-
SPONSELLER
DCRDR
A. S. GRIMES
R. SHOEMAKER
EOP'S
H. Y. FOUAD
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EOP'S
K. BAKER
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EMERGENCY
OPERATING
FACILITIES
M. J. JURY
REGULATORY
GUIDE 1.97
R. SHOBERG
W. G. SOTOS

FIGURE 3-1

AEPSC – D.C. COOK EMERGENCY RESPONSE CAPABILITIES FLOW CHART

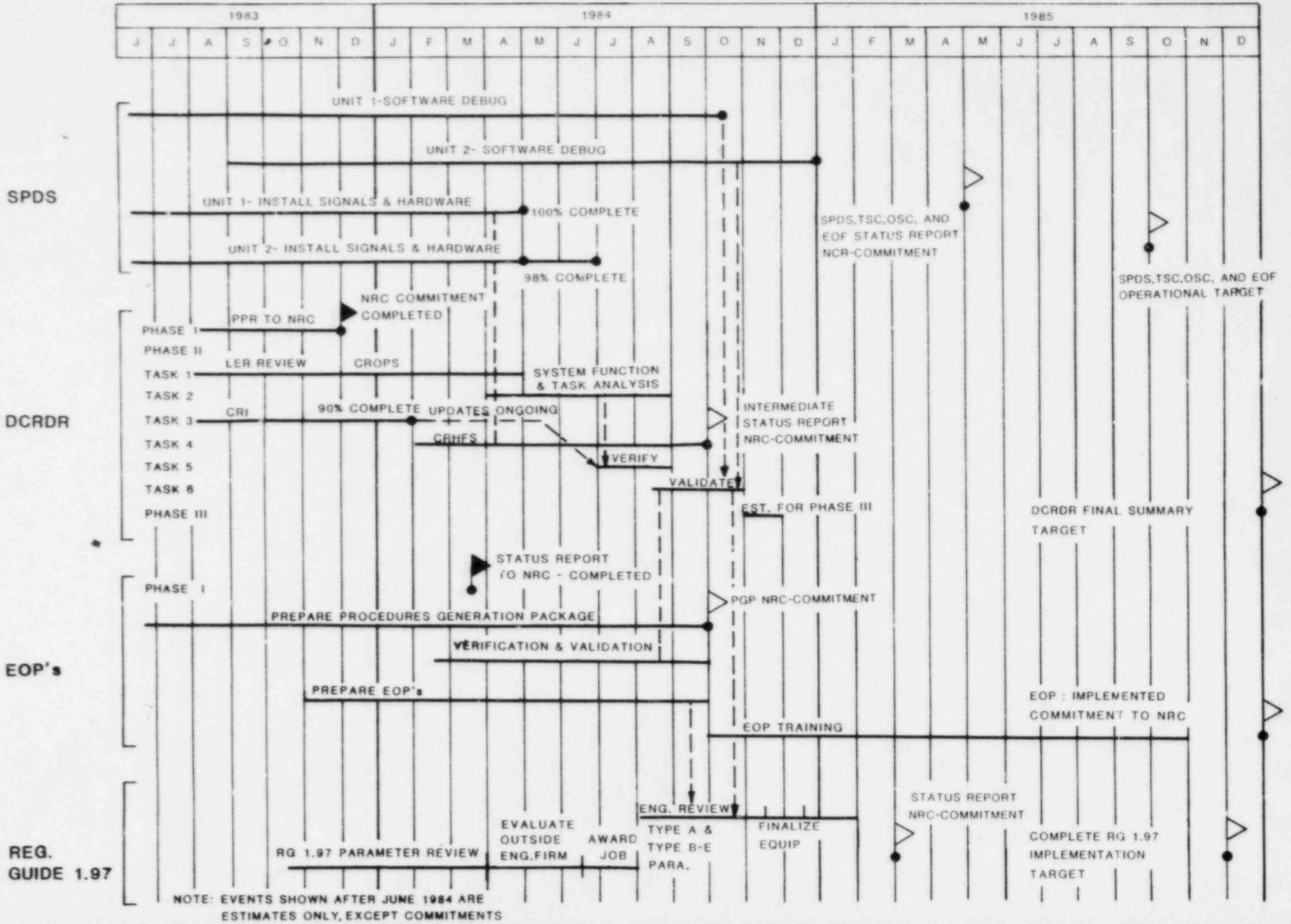

FIGURE 3-2

AEPSC - D.C. COOK
EMERGENCY RESPONSE INTERFACE

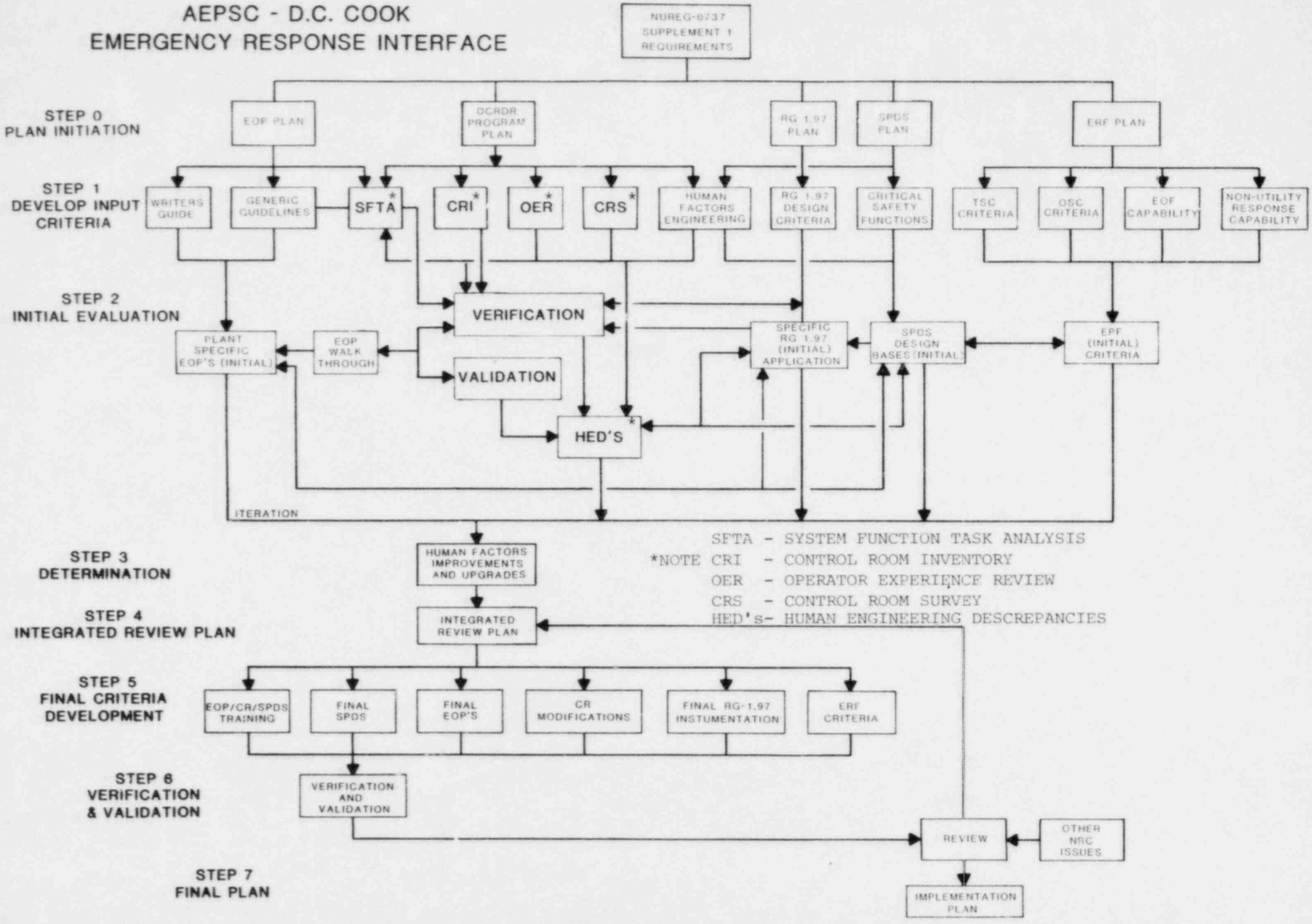

FIGURE 3-3

Attachment 4 to AEP:NRC:0773H

COOK DCRDR ACRONYMNS/ABBREVIATIONS

AEPSC	AMERICAN ELECTRIC POWER SERVICE CORPORATION
AIT	ACTION ITEM TRACKING
ASST. MGR.	ASSISTANT MANAGER
AT	ASSESSMENT TEAM
CLO	CHECKLIST OBERSERVATION
COOR.	COORDINATOR
CRHEC	CONTROL ROOM HUMAN ENGINEERING CRITERIA
CRHFS	CONTROL ROOM HUMAN FACTORS SURVEY
CRI	CONTROL ROOM INVENTORY
CROPS	CONTROL ROOM OPERATING PERSONNEL SURVEY
CRS	CONTROL ROOM SURVEY
CTF	COMMITMENT TRAVELER FORM
DCRDR	DETAILED CONTROL ROOM DESIGN REVIEW
DRT	DESIGN REVIEW TEAM
DWGS	DRAWINGS
EED	ELECTRICAL ENGINEERING DIVISION
ENG	ENGINEER
ENGG	ENGINEERING
EOP	EMERGENCY OPERATING PROCEDURES
GEN. PROC. NO.	GENERAL PROCEDURE NUMBER
HED	HUMAN ENGINEERING DIVISION
MCR	MATERIAL CONTROL RECORD
MED	MECHANICAL ENGINEERING DIVISION
MGR	MANAGER
NED	NUCLEAR ENGINEERING DIVISION
NRC	NUCLEAR REGULATORY COMMISSION
NS&L	NUCLEAR SAFETY & LICENSING
OER	OPERATIONAL EXPERIENCE REVIEW
PPR	PROGRAM PLAN REPORT
PRT	PROJECT REVIEW TEAM
QA	QUALITY ASSURANCE
RFC	REQUEST FOR CHANGE
SECT	SECTION
SECTR	SECRETARY
SFTA	SYSTEM FUNCTION AND TASK ANALYSIS
SPDS	SAFETY PARAMENTER DISPLAY SYSTEM
W	WESTINGHOUSE
WOG/ERG	WESTINGHOUSE OWNERS GROUP/EMERGENCY RESPONSE GUIDELINES