

INFORMAL TECHNICAL COMMUNICATION

Date February 6, 1987

TO: R. Ramirez

FROM: R.T. Liner, Jr. *RT*

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Science Applications International Corp.
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Reference: SAIC Project 1-263-03-020-XX
NRC Contract NRC-03-82-096
NRC TAC No. _____

SAIC Task FWA-17/19 1-263-07-557-XX

Title: Detailed Control Room Design Review Evaluations, Phases III-V

Attachment: Preliminary evaluation of Indiana & Michigan Electric Company's Summary Report of the Detailed Control Room Design Review (DCRDR) of D. C. Cook Nuclear Plant - Units 1 and 2

Message: The Indiana & Michigan Electric Company (IMEC) has submitted to the NRC a letter dated December 30, 1986, with an attached Summary Report of the DCRDR conducted for D. C. Cook Nuclear Plant, Units 1 and 2. This submission was forwarded to Science Applications International Corporation (SAIC) January 16, 1987, for technical evaluation.

A preliminary review of the DCRDR process presented in the D. C. Cook Summary Report indicates that the licensee has performed the following DCRDR activities:

1. The licensee has established a multidisciplinary and qualified review team as required by NUREG-0737, Supplement 1. Particularly, in response to previous NRC comments, the licensee has augmented the level of participation of the human factor specialist (HFS) in the assessment and implementation phases of the DCRDR program. Thus, it appears that the licensee has completed this requirement satisfactorily.

2. The licensee has performed a System Function and Task Analysis (SFTA) that was based on the generic Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs) and supplemented with plant-specific EOPs. A brief review of the Summary Report indicates that the licensee has provided adequate information detailing a process for developing information and control requirements, identifying instrumentation and control characteristics independent of the existing control room, and incorporating differences between generic and plant-specific information into the task analysis. Based on the information provided, it appears that the licensee has met successfully this requirement of Supplement 1 to NUREG-0737.

3. The licensee has conducted a control room inventory (CRI) independent of the SFTA. Using the information gathered during the CRI, the licensee has performed a comparison of the existing instrumentation and control characteristics with those established during the SFTA. This comparison effort was

performed during the "verification and validation" (V&V) phase of the licensee's DCRDR program. Additionally, during this V&V phase, the licensee has also conducted a validation of the control room functions using walk-through and talk-through techniques. This V&V effort has resulted in the identification of 93 human engineering discrepancies (HEDs). Based on the information provided, SAIC believes that the licensee has met this requirement of NUREG-0737, Supplement 1.

4. A control room survey was conducted as part of the DCRDR program at D. C. Cook. Based on NUREG-0700 guidelines, a static survey of the control room and operator interviews were conducted as part of the survey effort. All identified deviations from the guidelines were recorded as checklist observations (CLOs), and most of them were later converted to HEDs. A brief review of the Summary Report indicates that the control room survey was complete and thorough, resulting in the identification of 294 CLOs. Thus, it appears that the licensee has satisfied this requirement of Supplement 1 to NUREG-0737.

5. The licensee has performed an assessment of HEDs identified during the review phase of the DCRDR program. As noted above, all guideline deviations were recorded as CLOs rather than as actual HEDs. This approach was a point of concern that was raised during the review of the Program Plan. In the Summary Report, the licensee indicated that all CLOs were treated as HEDs and were assessed accordingly, except for those that were found to have resulted from a misinterpretation of the guidelines or a duplication of another HED. A review of the assessment process indicates that only a few (14 out of 387) CLOs were not considered as HEDs due to the above reasons.

Each HED was assessed for its potential for error (PFE) and consequence of error (COE), and ranked using a high, medium, or low scale. The criteria used to assess the PFE and COE were based on the probability of committing the error, and the impact on plant and public safety, and were listed in Tables 5.1 and 5.2 of the Summary Report, respectively. A review of these criteria indicates that they are appropriate for this assessment process. However, there is a concern regarding the PFE and COE ranking process. It appears that there are no real guidelines for relating criteria being violated to the ranking scale of high, medium, or low. It is suggested that the licensee provide additional information to clarify this concern.

Once the HED has been assessed, it was then categorized (as Cat. I, II, III, IV) according to a combination of PFE and COE ranking. A review of the categorization process indicates that it is adequate. It is also noted that the licensee has considered the cumulative or interactive effects of HEDs during the assessment of HEDs.

In summary, it appears that the licensee has performed an assessment of identified HEDs that, in general, should meet the requirement of Supplement 1 to NUREG-0737. However, the licensee is still required to provide additional clarifications to resolve the concern raised above. This issue remains an open item.

6. The licensee has provided information on the process used to select design improvements for HEDs identified during the review phase of the DCRDR. After the assessment of the HEDs, the assessment team (AT) developed solutions for the HEDs using enhancement techniques such as demarcation, mimics, or color

coding, and engineering panel modifications. The potential HED solutions were developed and tried on a full-scale photomosaic mock-up of the control room that was available to the review team. This approach was used until the best overall solutions could be achieved.

With regard to the disposition of the HEDs, the licensee employed an iterative process which involved both the AT and the project review team (PRT) (i.e., management). The AT developed HED solutions, and submitted them to the PRT for review. The PRT made the decision as to whether the resolutions should be disposed of as recommended. If the resolution was rejected, it would be returned to the AT for further consideration. The AT would then reach a consensus to concur with the management position, to reiterate the original resolution, or to develop alternate solution. As a result, this iterative process would help increase the role of the DCRDR review team in the HED disposition decision-making process.

Based on the information provided in the Summary Report, it appears that the licensee has established a process for selecting design improvements for HEDs that should satisfy the requirement of NUREG-0737, Supplement 1.

7. As described above, the solutions for HEDs were developed and tried on the full-scale photomosaic of the control room available to the AT. During this selection process, all potential design improvements for HEDs were fully analyzed and criticized before the best solutions were obtained. This "run and try" process also entailed a verification that the solutions proposed would correct the HEDs, and would not introduce new HEDs. The guidelines that were used for this verification effort were those of NUREG-0700. Additionally, a D. C. Cook operating crew was invited to review the mocked-up HED resolutions, and was solicited for comments. When appropriate, the operator inputs were incorporated into the final HED resolution recommended for implementation. Based on this information, it is believed that the licensee has implemented a process for verifying HED resolutions that should conform with the requirement of NUREG-0737; Supplement 1.

8. The licensee has also provided information detailing the interaction between the DCRDR project and other control room upgrade programs such as the upgrade of Emergency Operating Procedures (EOPs), Safety Parameters Display System (SPDS), Regulatory Guide 1.97 instrumentation (R.G. 1.97), and Emergency Operating Facility (EOF). Based on the information provided, it appears that the licensee has established a process that would facilitate the integration of the DCRDR with other upgrade programs as required by Supplement 1 to NUREG-0737.

In addition to the evaluation of the Summary Report for determining the level of compliance with the requirements of NUREG-0737, Supplement 1, we have also performed a preliminary review of the HEDs presented in the Summary Report. This brief review reveals a general lack of detailed documentation of the HEDs that would hamper a full evaluation of the nature, the category, and the resolution of the HEDs. It is suggested that additional information be provided for further evaluation.

An implementation schedule for HED resolutions was also provided in the Summary Report. In general, the schedule appears to be appropriate, with most of the DCRDR upgrade projects started either in 1986 or in 1987.

In summary, it appears that the licensee has generally satisfied most of the requirements of NUREG-0737, Supplement 1. However, some concerns were identified during the preliminary review of the Summary Report, and are listed below:

1. In the HED assessment methodology, it appears that there is no guideline for relating the PFE and/or COE criteria violated to the ranking scale of high, medium, or low.

2. It appears that there is a general lack of detailed information on the description of the HEDs and their resolutions. As a result, full evaluation of the documented HEDs cannot be accomplished at this time.

It is therefore suggested that additional clarification be provided to the NRC by means of a meeting or a pre-implementation audit of the plant. Attached to this preliminary review transmittal is a proposed agenda for the suggested meeting or audit of the plant.

NRC cc: S. Bajwa
J. Kramer

SAIC cc: R. Liner
B. Muzio
M. Jordan
P. Le
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Task File: 1-263-07-557-12/13

SUGGESTED AGENDA

D.C. Cook Nuclear Plant, Units 1 and 2 Detailed Control Room Design Review Pre-Implementation Audit

Day 1

- PM o NRC entry briefing (Kramer)
- o IMEC presentation on DCRDR
- o Discussion on DCRDR processes

1. Assessment of HEDs

The licensee should provide additional information regarding the PFE and COE ranking process. Discuss the relationship between PFE and/or COE criteria violated and the ranking scale of high, medium, or low.

Day 2

- AM o Discuss questions regarding the HEDs and proposed corrections that are outlined in the Appendix. The licensee should assure that the appropriate team members are available to discuss the HEDs.

Break for Lunch

- PM o Continue discussion on concerns regarding HEDs and proposed corrections that are outlined in the Appendix.

Day 3

- AM o Continue discussion on concerns regarding the HEDs and proposed corrections that are outlined in the Appendix.
- o Audit team caucus

Break for Lunch

- PM o Preliminary exit briefing

Day 4

- AM o Administrative processing for on-site access
- o Evaluate HEDs in the control room
- o Audit team will conduct a mini-survey of the control room

Break for Lunch

- PM o Audit the licensee's survey results in light of findings from mini-survey conducted by audit team. HED documentation should be provided.
- o Audit team meeting to evaluate and integrate material audited and to prepare a presentation for the exit briefing.

Day 5

- AM o Conduct exit briefing.

APPENDIX A

HEDS FOR WHICH CORRECTIVE ACTIONS OR JUSTIFICATIONS
FOR NONCORRECTION WERE PROPOSED BUT FOUND TO BE INADEQUATE

- A1. The HED disposition indicates that a study is being conducted and/or corrective actions are being considered. Additional information concerning the precise corrective action to be implemented must be provided to allow an adequate evaluation to be made.

HED No.

1.5-3
2.1-1
2.1-3
2.1-4
2.1-5
2.1-6
2.1-7
3.1-2
3.1-10
3.1-15
3.1-20
3.1-23
3.1-27
3.1-31
3.1-32
3.1-33
6.1-1
6.1-5
6.1-59
6.1-65
8.1-1
8.1-4
8.1-6
V1-16
V2-6

A2. The . description of the discrepancy and/or the corrective action or justification for not correcting the HED is too brief, ambiguous, or general to allow an adequate evaluation to be made.

HED No.

1.3-4
1.3-9
1.5-1
1.5-2
1.5-4
1.5-7
1.7-6
1.7-7
3.1-17
3.1-28
4.1-8
4.1-11
4.1-16
5.1-23
5.1-28
5.1-39
6.1-26
7.1-1
9.1-2

HED No.

V1-9
V1-10
V1-14
V1-15
V1-19
V1-21
V1-30
V1-42
V1-47
V1-54
V1-60
V1-63
V1-64
V2-11
V2-14
V2-15
V2-18
V2-24

A3. The corrective action or justification for not correcting the HED is not adequate for one or more of the following reasons:

1. It does not address operational or behavioral factors or issues.
2. It does not sufficiently address the discrepancy.
3. It contradicts the discrepancy.

HED No.

1.3-8
5.1-8
6.1-49
V1-6
V1-7
V1-27
V1-38
V1-40
V1-58
V1-61
V1-62

A4. The discrepancy and/or the corrective action must be seen on the panels to allow an adequate evaluation to be made.

HED No.

1.2-1

1.2-2

4.1-1

5.1-43

V1-29

V2-20