52-001

GE Nuclear Energy

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ABWR

Date 5/15/92

To 0024

Fax No. —

Clare Goodman

This page plus 29 page(s)

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Subject HFE DAC - REVISED ELEMENTS F, G & H.

Message Please pass a copy of this along to Chet Poslusny

Thanks,

Jack

D050
1/1

HFE Design Team Evaluation [teport

[Tier 2 criteria only]

5. The results of the HFE Design Tean:'s evaluation of the conduct and results of the Human Factor Verification and Validation (V&V) shall be documented in a report that includes ~~report shall address~~ the following:

a.- The review methodology and proceduresused by the HFE Design Team in their re,,ew of the Human Factor V&V

b.- The HFE Design Team's evaluation of the completed Human Factor V&V, including an evaluation of the compliance with the Human Factors V&V Implementation Plan, and ~~Procedures~~

c.- The HFE Design Team's evaluation of the completed Human Factor V&V, including an evaluation of the presentation and discussion of the HFE Design Team's review findings.

6. The Human Factors Verification and Validation (V&V) of the Human System Interface (HSI) design shall be conducted in accordance with the requirements of the Human Factors Engineering Program Plan and the Human Factor V&V Implementation Plan

Analysis Results Report(Tier 2 criteria only)

The results of the Human Factor Verification and Validation (V&V) activities shall be documented in a report that includes ~~shall address~~ the following:

a. → Objectives of the Human Factor V&V

b. → Description of the methods employed in the conduct of the Human Factors V&V

c. → Identification of any deviations from the Human Factors V&V Implementation Plan

d. → Presentation and discussion of the Human Factor V&V results, including discussion of any design change recommendations derived from the Human Factors V&V tests and evaluations and/or any significant negative implications that the current HSI design may have on safe plant operations which may have been identified ~~and Discussion~~

e. → Conclusions regarding the conduct of the Human Factors V&V and the results

~~→ Recommendations/Implications for HSI Design~~

e. - Methods for defining scope and configuration of the prototypical HSI required to support testing description

f. - Methods for defining criteria and performance measures to be used in evaluating test results

g. - Method for conducting analysis of test data Data analysis

- Criteria for evaluation of results (included in "f" above)

- Utilization of evaluations (2)

- Documentation requirements

h. requirement that the HSI design shall be reviewed and confirmed (i) to have incorporated the inventory of controls, displays and alarms presented in Tables 18E-13.1, 2 and 3 of the ABWR Standard Safety Analysis Report (SSAR) and (ii) that the implemented design is consistent with the standard design features and technologies as presented in Sections 18.4.2 and 18.4.3, respectively, of the SSAR

i. requirements for the development of documented - test & evaluation plans and procedures

j. requirements for documenting - Test Reports results

~~• Dynamic performance evaluation of fully integrated HSI~~

a. ~~General~~ Definition of Test Objectives

b. Definition of Test ~~methodology~~ and procedures

c. ~~Test~~ Identification of the participants in the dynamic task performance testing which shall include licensed operators as test subjects ~~(operators to participate in the test program)~~

d. Definition of dynamic task performance test conditions which shall include:

(i) plant startup operations

(ii) plant power operations)

(iii) plant shutdown operations

(iv) plant ~~refurbish~~ REFUELING and maintenance operations

(v) individual plant system and equipment ~~facilities~~ FAILURES

(vi) individual HSI equipment failure (e.g., loss of VDU functions)

(vii) design basis transient (e.g., turbine trip, loss of feedwater)

(viii) design basis accidents (e.g., LOCAs)

(ix) execution of symptom based emergency procedures

(x) execution of task scenarios which contain critical tasks as identified in the task analyses

a. (From BNL later)

b. (From BNL later)

...

...

x. (From BNL later)

Note that within the set of documents listed above, differences may exist regarding the specific methods and criteria applicable to the conduct of Human Factor V&V. In situations that such differences exist, all of the methods and criteria presented within those documents are considered to be equally appropriate and valid and, therefore, any of the above listed documents may be selected as thge basis for Human Factors V&V.

Implementation Plan (Tier 2 criteria only)

3. ~~The plan shall describe the designer's approach to Human Factors Verification and Validation.~~ The Human Factors Verification and Validation Implementation Plan shall include ~~address~~:

~~- HSI element evaluation~~

~~Control, Data Processing~~

~~Display audit~~

~~Comparison of HSI element design to HFE guidelines, standards, and principles~~ (Already covered by Item #5 as revised)

g.9. The methods to confirm that HFE ~~A verification shall be made that all~~ issues identified and documented in the Human Factors Issue Tracking System have been resolved ~~addressed~~ in the integrated HSI design, and

h. 10. The methods and criteria to be used to confirm~~A verification shall be made that all~~ critical human actions, as defined by the task analysis, ~~and PRA/HRA have~~ been addressed be ~~adequately supported~~ in the integrated HSI design in a manner consistent with accepted HFE practices and principles. ~~The design of tests and evaluations to be performed as part of HFE V&V activities shall specifically examine these actions.~~

(i) The methods and criteria to be used to confirm that the operating technical procedures are correct and can be executed within the realm of accepted human performance capabilities

2. (Tier 2 criteria only)

The Human Factors Verification and Validation (V&V) shall be performed using methods and criteria which are consistent with accepted HFE practices and principles. Within the context of performing human factor V&V, accepted HFE methods and criteria are presented in the following documents:

~~FW, Loss of Service Water, Loss of power to selected buses/GR power supplies , and SFW transients)~~

(v) ~~-~~ Postulated plant Accidents conditions ~~(e.g., Main steam line break, Positive Reactivity Additions, Control Rod Insertion at power, Control Rod Ejection, ATWS, and various sized LOCAs)~~

f.8. The HFE performance measures to be used as the basis for evaluating the ~~for~~ dynamic task performance test results, ~~evaluations shall be adequate to test the achievement of all objectives, design goals, and performance requirements and~~ These performance measures shall include, ~~at a minimum:~~

~~-System performance measures relevant to safety~~

(i) ~~-~~ Operating crew primary task performance characteristics, ~~(e.g., such as~~ task times, and procedure violations),

(ii) ~~-~~operating crew errors and/or error rates,

(iii) ~~-~~operating crew situation awareness,

(iv) ~~-~~operating crew workload,

(v) ~~-~~operating crew communications and coordination,

(vi) ~~-~~anthropometry evaluations, and

(vii) ~~-~~physical positioning and interactions

(iv) ~~Adequacy of~~ Confirmation that Operations Technical Procedures are complete and accurate

(v) Confirmation that ~~the adequacy of the~~ dynamic aspects of the HSI are sufficient ~~all interfaces~~ for task accomplishment

(vi) Confirmation that the integrated HSI design is conducive to eliminating the potential for operator errors ~~Evaluation and demonstration of error tolerance to human and system failures~~

e.7 That dynamic task performance test evaluations shall be conducted ~~evaluate HSI under a~~ over the full range of operational conditions and upsets, ~~and shall include:~~ including:

(i) Normal plant operations, such as plant ~~evolutions (e.g.,~~ start-up, ~~full power, and~~ shutdown, full power operations), and plant maintenance activities;

(ii) Plant system and equipment ~~instrument~~ Failures ~~(e.g., Safety System Logic & Control (SSLC) Unit,Fault Tolerant Controller(NSSS), Local "Field Unit" for MUX system, MUX Controller (BOP), Break in MUX line)~~

(iii) HSI equipment ~~and processing~~ failures ~~(e.g., loss of VDUs, loss of data processing, loss of large overview display)~~

(iv) Plant transients and ~~(e.g.,Turbine Trip, Loss of Offsite Power, Station Blackout, Loss of all~~

objective. A fully functional HSI prototype and plant simulator shall be used as part of these evaluations. If an alternative to a HSI prototype is proposed its acceptability shall be documented in the implementation plan. The dynamic task performance testing and evaluations shall be performed over the full scope of the integrated HSI design using dynamic HSI prototypes (i.e., prototypical HSI equipment which is dynamically driven by real time plant simulation computer models), other evaluation tools and past dynamic task performance test and evaluation results. The methods for defining the scope and application of the dynamic HSI prototype, past test results and other evaluation tools shall be documented in the implementation plan. The dynamic task perform-ance tests and evaluations shall have as their objectives:

(i) Adequacy of entire Confirmation that the integrated HSI configuration for design facilitates achievement of the identified safety functions and critical functions goals

(ii) Confirmation that the allocation of function and the structure of tasks assigned to personnelis consistent with accepted HFE principles

(iii) Confirmation Adequacy of established main control room staffing and the HSI to design and configuration provided to support that staff in to accomplishing their assigned tasks.

(i) The Human System Interface (including both the interface of the operator with the HSI equipment hardware and the interface of the operator with the HSI equipment's software driven functions) ~~- Human Hardware interfaces - Human software interfaces~~

(ii) ~~-~~ The plant and emergency operating technical procedures, and ~~- Workstation and console configurations- Control room design- Remote shutdown system~~

(iii) ~~- Design of~~ The overall HSI work environment

c.5 ~~Individual HSI elements shall be evaluated in a~~ That static and/or "part-task" mode evaluations of the HSI equipment shall be conducted to confirm ~~assure~~ that the ~~all~~ controls, displays, and data processing functions identified in the task analyses are provided ~~that are required are available~~ and that those controls, displays and data processing functions ~~they~~ are designed ~~according to~~ in accordance with accepted HFE practices ~~guidelines, standards~~, and principles.

d.6 The integration of HSI equipment ~~elements~~ with each other, ~~and with~~ the operating personnel and with the Operations Technical Procedures shall be evaluated ~~and validated~~ through the conduct of dynamic task performance testing ~~evaluation using evaluation tools which are appropriate to the accomplishment of this~~

ITAAC/DAC
Element H - Human Factors Verification and Validation

DESIGN COMMITMENT:

The ~~successful incorporation of human factors engineering into the final~~ HSI design ~~and the acceptability of the resulting HCI~~ shall be ~~thoroughly~~ evaluated as an integrated system using HFE evaluation procedures, guidelines, standards, and principles.

INSPECTION/TEST/ANALYSIS:

- A Human Factors Verification and Validation Implementation Plan shall be developed to assure that the evaluation of the integrated HSI Design ~~is analysis is~~ conducted ~~according to~~ in accordance with accepted HFE principles.

- ~~An~~ A human factors engineering analysis of the integrated HSI design ~~Human Factors Verification and Validation~~ shall be conducted in accordance with the Human Factors Verification and Validation Implementation Plan and the findings will be documented in Human Factors Verification and Validation ~~an Analysis~~ Results Report.

- The analyses of the integrated HSI design shall be reviewed by the HFE Design Team and the results of that review shall be documented in an Human Factors Verification and Validation Evaluation Report.

DESIGN ACCEPTANCE CRITERIA:

General Criteria

~~1. The analysis shall meet all 10CFR regulatory requirements as specified under Element H in Table X.~~

1. The Human Factors Verification and Vlidation (V&V) Implementation Plan shall establish:

a. Human Factors V&V Methods and Criteria which is consistent with accepted 2. ~~The activity shall be based upon state of the art~~ HFE practices and principles ~~at the time of its development (as defined in Element A) including those documents under Element H in Table X.~~

b.3. the methods and evaluation criteria for confirming ~~evaluation shall verify~~ that the performance of the integrated HSI (which includes the HSI equipment, the operators and the technical procedures that define the actions to be taken by the operators in execution of their assigned functions) ~~when all elements are fully integrated into a system,~~ meets ~~(1)~~ all the HFE design goals as established in the program plan ~~; and (2) all system functional requirements and support human operations, maintenance, test, and inspection task accomplishment.~~

c.4. the scope of the evaluations of the integrated HSI shall ~~address~~ include:

HFE Design Team Evaluation Report

(Tier 2 criteria only)

6.The results of the HFE Design Team's evaluation of the conduct and results of the technical procedures development shall be documented in a report that includes ~~report shall address~~ the following:

a.- The methods ~~review methodology~~ and procedures used by the HFE Design Team in their review of the operating technical procedures development.

b.- The HFE Design Team's evaluation of the completed technical procedures development, including an evaluation of the compliance with the Plant and Emergency Operating Procedure Development Implementation Plan ~~Procedures~~, and

c.- Presentation and discussion of the HFE Design Team's review findings.

2. The development of the plant operations technical procedures shall be conducted in accordance with the requirements of the Human Factors Engineering Program Plan and the Plant and Emergency Operating Procedure Development Implementation Plan.

a. Objectives of the technical procedure development

b. Description of the methods employed in the development of the technical procedures Used

c. Identification of any deviations from the Plant and Emergency Operating Procedure Development Implementation Plan

d. Presentation and discussion of the results, including a list of the procedures developed, and a discussion of a representative the resulting procedures including sample of procedures, and a discussion of any design change recommendations derived during the course of technical procedure development and/or any negative implications that the current design may have on safe plant operations, and

e. Conclusions regarding the conduct of the procedures development and regarding the resultant procedures

- Recommendations/Implications for HSI Design

~~- Literature and current practices review~~

~~a.~~ - Identification of ~~the~~ task analyses' definition of required human actions as ~~the~~ data source ~~data/information~~ to be used as ~~the~~ a basis for procedure development.

~~- Methodology for the evaluation of procedures (plan shall describe tests and analyses that will be used to evaluate procedures)~~(covered by V&V)

b.- Requirements for ~~the effective~~ development and use of a ~~Procedural~~ Technical Procedure Writer's Guide

c. Definition of the methods through which specific operator skills and training needs, as may be considered necessary for reliable execution of the procedures, will be identified and documented as part of the technical procedures development activities ~~- Procedures for training program - procedure integration~~

~~- Verification and validation procedures~~ (Covered by V&V)

~~- Procedure development documentation requirements~~(Covered by revised Item #6)

Procedure Development Report

(Tier 2 criteria only)

5. The results of the technical procedure development activities shall be documented in a report ~~shall address~~ that includes the following:

methods and criteria. Within the context of operating procedure development, accepted HFE methods and criteria are presented in the following documents:

a. (From BNL later)

b. (From BNL later)

x. (From BNL later)

Note that within the set of documents listed above, differences may exist regarding the specific methods and criteria applicable to the development of operating technical procedures. In situations that such differences exist, all of the methods and criteria presented within those documents are considered to be equally appropriate and valid and, therefore, any of the above listed documents may be selected as the basis for the operating technical procedure development.

Implementation Plan

4. (Tier 2 criteria only)

The Plant and Emergency Operating Procedure Development Implementation Plan shall ~~address~~ include:

(vi) Identification of any operational limitations ~~and Actions~~

(vii) ~~Required~~ Definition of the specific human actions steps required, and

(viii) Identification of the specific ~~Acceptance~~ Criteria that the operator may use to judge that the goals of the procedure have been achieved

~~• Checkoff Lists~~

~~7. All procedures shall be verified and validated. A review shall be conducted to assure procedures are correct and can be performed. Final validation of operating procedures shall be performed in a simulation of the integrated system as part of V&V activities described in Element J.~~

(Covered within V&V element)

~~8. An analysis shall be conducted to determine the impact of providing computer-based procedures and to specify where such an approach would improve procedure utilization and reduce operating crew errors related to procedure use.~~

(Such analyses, as appropriate, would be addressed within the scope of the task analysis)

3. (Tier 2 criteria only)

The methods and criteria established in the Plant and Emergency Operating Procedure Development Implementation Plan for the development of the plant and emergency operating technical procedures shall be consistent with accepted HFE

sufficiently objective criteria which will require that the operations technical so that procedures developed in accordance with the Guide shall be are consistent in organization, style, and content and usage of terms. The Guide shall be used for all procedures within the scope of this Element. The Writer's Guide shall provide instructions for procedure content and format (including the writing of action steps and the specification of acceptable acronym lists and acceptable terms to be used).

e. 6. (Move to Tier 2 Criteria regarding Implementation Plan) requirement that the documented technical The content of the procedures developed shall incorporate the following elements include:

(i) Title of the procedure

(ii) Statement of the procedure's goal and applicability

(iii) Identification of any reference material necessary to support execution of the procedure

(iv) Identification of any prerequisites conditions which must be satisfied prior to execution of the procedure

(v) Identification of any precautions (including i.e., warnings, cautions, and notes) that must be considered in the execution of the procedure

~~3. The procedures and their development plan shall be based upon accepted HFE practices at the time of their development. The plan shall be based upon a review and identification of current practices and literature, including those documents under Element I in Table X.~~ ~~(Replaced with new Item 2)~~

~~4. The basis for procedure development shall include:~~

~~———— • Plant design bases~~

~~———— • system based technical requirements and specifications~~

~~———— • the task analyses for operations (normal, abnormal, and emergency)~~

~~———— • significant human actions identified in the HRA/PRA~~

~~———— • initiating events to be considered in the EOPs shall include those events present in the design bases.~~ (This item is covered by Items 1a and 1b)

~~d.~~5. That a Writer's Guide shall be developed ~~which~~ to establishes the process for developing the technical procedures for normal plant and system operation, abnormal plant operations, emergency plant operations and for responding to plant alarm conditions, ~~that are complete, accurate, consistent, and easy to understand and follow.~~ The Writer's Guide shall contain

ITAAC/DAC

Element G - Plant and Emergency Operating Procedure Development

DESIGN COMMITMENT:

Plant and Emergency Operating Procedures shall be developed to support and guide human interaction with plant systems and to support and guide human interactions in the control of plant operations. ~~related events and activities.~~ Human engineering principles and criteria shall be applied ~~along with all other design requirements to develop~~ in the procedures development ~~that are technically accurate, comprehensive, explicit, easy to utilize, and validated. The types of procedures covered in the element are:~~

~~- plant & system operations (including start-up, power, and shutdown operations)~~

~~- abnormal & emergency operations~~

~~- preoperational, start-up, and surveillance tests~~ (Out of scope)

~~- alarm response~~

(Move list of specific procedures to acceptance criteria)

INSPECTION/TEST/ANALYSIS:

- A Plant and Emergency Operating Procedure Development Implementation Plan shall be developed to assure that the development of the Plant and Emergency Operating Procedures is conducted according to accepted HFE principles.

- The Plant and Emergency Operating Procedures shall be developed in accordance with the Plant and Emergency Operating Procedure Development Implementation Plan and the results will be documented in a Plant and Emergency Operating Procedure Development Report.

- The Plant and Emergency Operating procedure development results shall be reviewed by the HFE Design Team and the results of that review shall be documented in an a Plant and Emergency Operating Procedure Development Evaluation Report.

DESIGN ACCEPTANCE CRITERIA:

~~General Criteria~~ 1. The Plant and Emergency Operating Procedure Development Implementation Plan shall establish :

a. That ~~the~~ Operator actions identified in the task analysis shall be used as the basis for specifying ~~to specify the~~ procedures for operations.

b. That the procedures to be developed shall address normal, abnormal, and emergency plant operations including consideration of plant operations during periods when primary operator interface (i.e., main control room and remote shutdown system) equipment is undergoing test, maintenance and or inspection.

~~1. The analysis shall meet all 10CFR regulatory requirements as specified under Element G in Table Y.~~

c.2. Methods and criteria for development of the operating technical procedures which are consistent with accepted ~~activity shall be based upon state-of-the-art HFE practices and principles at the time of its development (as defined in Element A) including those documents under Element G in Table X.~~

HFE Design Team Evaluation Report

(Tier 2 criteria only)

6. The results of the HFE Design Team's evaluation of the conduct and results of the HSI Design analyses shall be documented in a report that includes ~~report shall address~~ the following:

a.~~-~~ The methods ~~review methodology~~ and procedures used by the HFE Design Team in their review of the HSI design analyses.

b.~~-~~ The HFE Design Team's evaluation of the completed HSI design analyses, including an evaluation of the compliance with the HSI Design Implementation Plan, ~~Procedures~~ and

c.~~-~~ Presentation and discussion of the HFE Design Team's review findings.

2. The Human System Interface (HSI) Design Analyses shall be conducted in accordance with the requirements of the Human Factors Engineering Program Plan and the HSI Design Implementation Plan

Analysis Results Report (Tier 2 criteria only)

5. The results of the Human System Interface (HSI) Design Analyses shall be documented in a report that includes ~~shall address~~ the following:

a.- Objectives of the HSI design analyses

b.- Description of the methods employed in the conduct of the HSI design analyses

c.- Identification of any deviations from the HSI Design Implementation Plan

d.- Presentation and discussion of the results ~~and discussion~~ of the HSI design analyses, including discussion of any design change recommendations derived from these analyses and/or negative implications that the current design may have on safe plant operations, AND

e.- Conclusions regarding the conduct of the analyses and the analysis results.

~~f.- Recommendations/implications for HSI Design~~

~~- HSI detailed design and evaluations~~

d. Definition that the standard design features, presented in Section 18.4.2 of the Standard Safety Analysis Report (SSAR), and the Standard HSI equipment technologies, presented in Section 18.4.3 of the SSAR, shall be incorporated as requirements on the HSI design.

e. ~~- Definition~~Use of the design/evaluation tools (e.g., ~~such as~~ prototypes) which are to be used in the conduct of the HSI design analyses, the specific scope of evaluations for which those tools are to be applied and the rationale for the selection of those specific tools and their associated scope of application, ~~shall be specifically identified and rationale for selection~~

(TIER 2 CRITERIA ONLY)

4. The Human System Interface Design Implementation Plan ~~shall address~~ include:

~~- literature and current practices review~~

~~- I&C requirements analysis and design~~

~~Compare Task Requirements to I&C Availability~~

~~Modifications to I&C Inventory~~

~~a. General The HFE evaluation methods and criteria to be applied in the conduct of the HSI approach selection design evaluations~~

(Covered by the new item # 3)

~~Trade Studies~~

~~Analyses~~

~~b. The criteria to be used to meet General Criterion #8 (selection and design of HSI hardware and software approaches), described above~~ Identification of the specific HFE standards and guidelines documents which substantiate that the selected HSI Design Evaluation Methods and Criteria are based upon accepted HFE practices and principles.

~~c.~~ Definition of standardized HFE ~~design guidance development and documentation~~ conventions including:

(i) Video Display Unit (VDU) display format conventions

(ii) Color conventions

(iii) Alarm conventions

~~maintainability, testing and inspection.~~ (Scope should be defined once and in Element A)

3.12 (Tier 2 criteria only) The HSI Design ~~Implementation~~ Plan shall establish that the methods and criteria for evaluation of the HSI equipment design ~~elements~~ and performance, ~~shall be evaluated~~ Those HFE methods and criteria shall be consistent with accepted HSI design evaluation practices. Within the context of performing HSI design evaluations, accepted HFE methods and criteria are presented in the following documents:

a. (from ENL later)

b. (from BNL later)

... x. (from BNL later)

Note that within the set of documents listed above, differences may exist regarding the specific methods and criteria applicable to the conduct of HSI design evalua-tions. In situations that such differences exist, all of the methods and criteria presented within those documents are considered to be equally appropriate and valid and, therefore, any of the above listed documents may be selected as the basis for the HSI design evaluations.~~to ensure their acceptability for task performance and HFE, criteria, standards, and guidelines.~~

~~**Implementat**'on Plan~~~~The plan shall describe the designe 's approach to Human System Interface Design~~

standards, and quantitative (e.g., anthropometric) and qualitative (e.g., relative effectiveness of differing types of displays for different conditions) data. (Covered by rewritten 1c., above) Procedures shall be employed to ensure HSI adherence with standards of 10. The test and evaluation methods for resolving HFE/HSI design issues. These test and evaluation methods shall include the criteria to be used in selecting HFE/HSI design and evaluation tools which; problems shall be resolved using studies, experiments, and laboratory tests, e.g.;

(i) – may incorporate the use of static mockups and models; may be used to resolve access, and workspace and related HFE issues, and problems and incorporating these solutions into system design

(ii) – shall require dynamic simulations and HSI prototypes shall be evaluated for use to for conducting evaluations design details of the human performance associated with the activities in the equipment requiring critical human tasks identified in the task analysis, performance

– The rationale for selection of design/evaluation tools shall be documented

11. Human factors engineering shall be applied to the design of equipment and software for

~~9. HFE standards shall be employed in HSI selection and design. Human engineering guidance regarding the design particulars shall be developed by the HSI designer to (1) insure that the human-system interfaces are assigned to currently accepted HFE guidelines and (2) insure proper consideration of human capabilities and limitations in the developing system. This guidance shall be derived from sources such as expert judgement, design guidelines and standards, and quantitative (e.g., anthropometric) and qualitative (e.g., relative effectiveness of differing types of displays for different conditions) data. (Covered by rewritten Item 1e., above) Procedures shall be employed to ensure HSI adherence with standards.~~ equipment (i.e., hardware or software function) ~~be free of elements~~ which has ~~are~~ not been specifically evaluated in the task analysis, ~~required for the accomplishment of any task.~~

~~g.8. The selection and design of HSI hardware and software approaches shall be based upon demonstrated criteria that support the achievement of human task performance requirements. Criteria can be based upon test results, demonstrated experience, and trade studies of identified options.~~ (Already covered by rewritten Item 1a, above)

c. 6. The methods and design evaluation criteria which will assure that the HSI human performance design and associated workplace factors are in compliance with accepted HFE guidelines and are consistent with those modeled and evaluated in the completed task analysis. and working environment shall be adequate for the human performance requirements it supports. The HSI shall be capable of supporting critical operations under the worst credible environmental conditions.

d.7. That the HSI design shall not incorporate any equipment (i.e., hardware or software function) be free of elements which has are not been specifically evaluated in the task analysis required for the accomplishment of any task.

e. The HSI design criteria and guidance for control room operations during periods of maintenance, test and inspection of control room HSI equipment and of other plant equipment which has control room personnel interface.

8. The selection and design of HSI hardware and software approaches shall be based upon demonstrated criteria that support the achievement of human task performance requirements. Criteria can be based upon test results, demonstrated experience, and trade studies of identified options. (Already covered by rewritten Item 1a. above)

5/15/92

CLARE -

A. ATTACHED ARE THE REVISED ELEMENTS F, G AND H. THIS COMPLETES ACTION ITEM #1 FROM OUR MAY 6TH MEETING. ALSO INCORPORATED INTO THE ATTACHED IS THE CLOSURE OF ITEMS 6d, 6f, 6g, 6h, 6i, AND 6l.

B. ACTION ITEM #3 WAS CLOSED BY A SEPARATE FAX TO YOU TODAY WHICH INCORPORATES THE LIST OF HSI EQUIPMENT TECHNOLOGIES DIRECTLY INTO SECTION 18.4 OF THE SSAR.

C. ACTION ITEM #5 IS PARTIALLY ADDRESSED. WITHIN EACH OF THE ATTACHED ELEMENTS, WE HAVE ADDED TIER 2 REFERENCES TO THE STANDARDS TO BE DEFINED LATER.

D. ACTION ITEM #6j HAS CLOSED EARLIER THIS WEEK WHEN WE MAILED A COPY OF THE DISC TO JOHN.

E. ACTION ITEM #6n HAS BEEN DELETED PER MY CONVERSATIONS WITH YOU AND GREG TODAY.

AS WE DISCUSSED EARLIER THIS WEEK, THE PLAN IS TO UPDATE ELEMENTS A, C, D AND E, TO REFLECT THE RESULTS OF OUR DISCUSSIONS, AND WE SHOULD BE SENDING THOSE UPDATE DRAFTS TO YOU BY NEXT FRIDAY (ie 5/22/92). THOSE UPDATES WILL ADDRESS: ITEM #4 (IF WE GET INPUTS FROM BNL), ITEM #5 (IN A MANNER SIMILAR TO THAT IN THE ATTACHED), ITEM #6a, ITEM #6b (AGAIN, IF WE GET INPUTS FROM BNL), ITEM #6c, AND ITEM #6e (AGAIN, IF WE GET INPUTS FROM BNL).

Regards,

Monty Barr

5/15/92

ITAAC/DAC
Element F - Human-System Interface Design

DESIGN COMMITMENT:

Human engineering principles and criteria shall be applied in the design definition and evaluation of the Human-System Interface (HSI). ~~also with all other design requirements to identify, select, and design the particular equipment to be operated/maintained/controlled by plant personnel.~~

INSPECTION/TEST/ANALYSIS:

- A Human-System Interface (HSI) Design Implementation Plan shall be developed to assure that the human factors analyses of the HSI Design is ~~are~~ conducted according to accepted HFE principles.

- An analysis of the human-system interface design shall be conducted in accordance with the HSI Design Implementation Plan and the findings will be documented in an a HSI Design Implementation Analysis Results Report.

- The analyses of the HSI Design Implementation shall be reviewed by the HFE Design Team and the results of that review shall be documented in an HSI Design Implementation Evaluation Report.

~~- The Human-System Interface Design Implementation Plan, Analysis Results Report, and HFE~~

DESIGN ACCEPTANCE CRITERIA:

~~1. The analysis shall meet all 10CFR regulatory requirements as specified under Element F in Table V.~~

1. The HSI Design Implementation Plan shall establish:

a. ~~HSI 2. The activity shall be based upon state of the art~~ equipment design criteria which is consistent with accepted HFE practices and principles, ~~at the time of its development (as defined in Element A) including those documents under Element F in Table X.~~

~~3. The design configuration shall satisfy the functional and technical design requirements and insure that the HSI will meet the appropriate HFE guidance and criteria.~~ (Duplicate of others - as modified)

~~4. The HFE effort shall be applied to HSI both inside and outside of the control room (local HSI).~~ (Scope should be addressed in Element A)

b. That the ~~5. HSI~~ design shall implement the information and control requirements developed through the task analyses, including the displays, controls and alarms necessary for the execution of those tasks identified in the task analyses as being critical tasks. ~~utilize the results of the task analysis and the I&C inventory to assure the adequacy of the HSI.~~