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J. Phillip Bayne
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August 31, 1984
JPN-84-57

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. Domenic B. Vassallo, Chief
Operating Reactors Branch No. 2
Division of Licensing

Subject: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
Supplement No. 1 to NUREG-0737, Item I.D.1,
Detailed Control Room Design Review (DCRDR)

References: 1. NRC letter, D. B. Vassallo to J. P. Bayne, dated February 22, 1984 regarding NRC staff comments on the FitzPatrick DCRDR Program Plan.

2. NYPA letter, J. P. Bayne to D. B. Vassallo, dated October 24, 1983 (JPN-83-90), regarding DCRDR Program Plan.

3. NRC June 27, 1984 Summary of the Detailed Control Room Design Review Program Plan Meeting on May 10, 1984 for FitzPatrick.

Dear Sir:

The Authority submitted a Program Plan for the FitzPatrick Detailed Control Room Design Review (DCRDR) as an attachment to Reference 2. This Program Plan was written to describe the essential elements of the program while considering the work previously completed during the BWROG Control Room Survey Program.

Via Reference 1, you provided NRC staff comments on the Program Plan. In general, these comments focused on a lack of detail, as opposed to an incomplete or ineffectual program. The Authority considers the level of detail provided in the FitzPatrick DCRDR Program Plan appropriate and necessary at this stage in the development of any major plan.

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As you suggested in Reference 1, a meeting was held May 10, 1984 to discuss the plan and your comments (Reference 3). Although a written response was not requested, the Authority has prepared a DCRDR Program Plan Supplement to address your comments and to clarify the program. This supplement is Attachment 1 to this letter; Attachment No. 2 is a revised Section 4.3 of our DCRDR Program Plan (Reference 2).

The DCRDR Program Plan Supplement was written to reflect the results of our meeting with members of your staff May 10, 1984. However, as a participating member of both the BWROG and INPO NUTAC's, we understand that different NRC staff positions have been stated at other meetings with licensees. These differing positions deal specifically with the requirements for a system function and task analysis (SF&TA). As of this date, a formal NRC position on the requirements for, and a definition of a SF&TA has not been issued. As described in Generic Letter No.83-18, the BWROG clearly stated it's proposed methodology for the planning and review phases of the CRDR. The Authority plans to use the methods described by the BWROG in this supplement, and in the Program Plan to conduct the FitzPatrick DCRDR.

Each of the schedules the Authority has submitted for items associated with Supplement 1 to NUREG-0737 are based on the requirements delineated in Generic Letter 82-33. Changes or additions to those requirements may require that new schedules be prepared. This is especially true in this case due to the close relationship of the five Supplement 1 items. The Authority has formally committed to submit a DCRDR Summary Report by November 15, 1985 (Reference 2). This date was subsequently confirmed by the Commission's June 12, 1984 order.

In addition to the information described in Section 6 of the DCRDR Program Plan, the DCRDR Summary Report will detail DCRDR methodologies, personnel assignments, criteria and coordination with other improvement programs as summarized by Reference 3. Appendix B to the Program Plan (resumes of DCRDR team members) will be provided as soon as all members have been selected.

If you have any questions, please contact Mr. J. A. Gray, Jr. of my staff.

Very truly yours,

J. P. Bayne

J. P. Bayne
First Executive Vice President
Chief Operations Officer

cc: Office of the Resident Inspector
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NEW YORK POWER AUTHORITY
James A. FitzPatrick Nuclear Power Plant

Supplement to Detailed Control
Room Design Review (DCRDR)
Program Plan dated October 19, 1983

Attachment No.1 to JPN-84-57

This attachment responds to each of the issues discussed in Reference 1.

I. Background

No additional information is required for this section.

II. Discussion

No additional information is required for this section.

III. General

Comment: "The JAF Program Plan does not describe the proposed review program in enough detail to allow staff reviewers to fully understand how the DCRDR objectives will be accomplished."

Response: The JAF Program Plan was based on the BWROG Control Room Survey as reviewed by the NRC in Generic Letter 83-18 (Reference 6). Supplement 1 to NUREG-0737 and NUREG-0700 request that the methodologies for conducting all DCRDR phases should be summarized.

The Authority considers the level of detail provided in the DCRDR Program Plan appropriate for other reasons. A program plan is necessarily the first step in developing any major program. It's purpose should be to describe the essential elements of the program without becoming burdened with details at this early stage. Procedures must prescribe precise methods for accomplishing specific tasks if they are to be effective. This level of detail is clearly inappropriate for a program plan.

When the FitzPatrick DCRDR Program Plan was developed, a human factors contractor had not been selected. Therefore, specific methodologies and personnel assignments could not be included in the program plan. When a contractor has been hired, the Authority will be able to finalize program details.

Procedures will developed during the initial phases of the DCRDR and are dependent on the contractor selected and on management approval during the actual conduct of the DCRDR.

The Authority has formally committed to submit a DCRDR Summary Report by November 15, 1985 (Reference 2). In addition to the information described in Section 6 of the Program Plan, the DCRDR Summary Report will describe in detail:

- o Personnel (or discipline) assignments to DCRDR activities. (Preference will be given to a matrix or table style format for this information).
- o System Function and Task Analysis methodology (including verification of task performance capabilities).
- o Methodology and criteria used for assessing HEDs.
- o Methodology and criteria used to select HED correction.
- o How HED corrections were assured not to introduce new HEDs.
- o How DCRCR was coordinated with EOP and SPDS programs.
- o How continuity was assured between 1981 BWROG Survey work and DCRDR.

Comment: "A human factors evaluation of the design of the remote shutdown capability provided to meet 10 CRF Part 50, Appendix A, GDC-19, and 10 CFR Part 50, Appendix R is not specifically identified as a requirement in Supplement 1 to NUREG-0737. Staff review of this issue is not complete. In the interim, we recommend that the scope of the DCRDR include a human factors evaluation of the design of the remote shutdown capability. To the extent practicable, without delaying completion of the DCRDR, it should also address and control room modifications and additions (such as controls and displays for inadequate core cooling and reactor system vents) made or planned as a result of other post-TMI actions, and the lessons learned from operating reactor events such as the Salem ATWS events."

Response: Modifications to install remote shutdown capabilities are currently in the design and engineering phases. A human factors engineer will review the panel using the criteria of NUREG-0700. This review will be conducted using criteria similiar to that planned for use on the DCRDR.

Therefore, the remote shutdown panel is specifically excluded from the DCRDR program's scope.

Control Room modifications directly resulting from the Salem ATWS event or post-TMI items will be included in the DCRDR if the actual modifications to the control room have been completed or, if the modification is sufficiently complete, to allow meaningful review. A list of all "open" modifications that were reviewed as part of the DCRDR will be included in the DCRDR Summary Report.

IV. Qualifications and Structure of the Review Team

Comment: "The qualifications of the proposed review team are adequate. However, the qualifications of the instrumentation and control engineer(s) were not described. The staff recommends that the person or persons filling this role: (1) have a bachelor's degree in engineering, (2) have five years of applied experience, (3) be familiar with regulations, standards and design constraints that have an impact on nuclear power Plant control room design, and (4) be a full-time member of the review team."

Response: The Authority will assign an electrical engineer with a bachelor's degree in engineering and several years experience in nuclear plant applications to be a full-time member of the review team.

Comment: "The assignment of individual disciplines (e.g., human factors engineering, reactor operations, etc.) to each activity in the DCRDR, and their levels of effort per activity were not presented."

Response: DCRDR Summary Report will include a description of those individuals or disciplines associated with each DCRDR activity. Preference will be given to a matrix or table style format for this information. The disciplines described in Section 2 of the DCRDR Program Plan will be involved in those phases of the DCRDR where their discipline is relevant to that portion of the program. Involvement by any one individual will necessarily vary depending on the HEDs identified. While some individuals will be specifically "part-time", the Summary Report will describe in general terms the extent of involvement of each individual.

Comment: "There is no mention in the Program Plan of whether personnel involved in the 1981 BWROG Survey will be included on the review team. If possible, this should be done to provide continuity to the JAF Program."

Response: Mr. Fish (Assistant Superintendent of Power at FitzPatrick) was involved as an Owner's Group Team Leader in five 1981 BWROG surveys (including the 1981 FitzPatrick survey) and is anticipated to provide the continuity desired. The other participants in the 1981 survey, each of whom worked for a different company, are no longer available.

V. System Function and Task Analysis

Comment: "PASNY states that the task analysis portion of the SF&TA will use the INPO NUTAC CRDR Task Analysis Guidelines as a reference. Since the NRC has not reviewed the NUTAC document, reference to that document is not descriptive or meaningful to the staff. The licensee should submit the INPO NUTAC CRDR Task Analysis Guideline on its docket if that document will be used to support the PASNY/NRC briefing."

Response: An April 11, 1984 letter (Reference 5) from Mr. Voss Moore, Jr. (NRC Human Factors Engineering Branch Chief) to Mr. H. Fish of the Power Authority, states that the NRC staff has reviewed and commented on the INPO NUTAC "Control Room Design Review and Task Analysis Guideline" (INPO 83-046) and three other INPO NUTAC documents on CRDRs.

Comment: "The inputs for SF&TA, such as types of events or transients, are mentioned in the Program Plan, but lack detailed information. The staff recommends that the scope of the SF&TA be comprehensive enough to result in an analysis of all operator tasks necessary to successfully implement all emergency functions, and that all operator interfaces involved in these tasks are defined in terms of operator information and control requirements."

Response: The Authority has based the FitzPatrick DCRDR on the work of both the BWROG Control Room Survey and the BWROG's generic Emergency Procedure Guidelines (EPGs).

The EPGs were developed as symptom-oriented procedures to mitigate (as opposed to diagnosis) an accident. EPGs therefore address all operator tasks necessary to perform emergency functions. Because these guidelines were prepared by the BWROG for use on many different BWR plants, they describe the operator information and control requirements in generic terms rather than referring to a specific instrument or switch. This assures that these information and control requirements were developed independently of any specific plant control room. A meeting was held May 4, 1984 between the NRC and members of the BWROG, EPG and CRDR committees to discuss the task analysis requirements of Supplement No. 1 to NUREG-0737 (Reference 10). At that meeting, the Owners' Group described how the EPG development effort and CRDR program addressed operator information and control needs. Reference 10 summarized the NRC staff's conclusions as a result of this meeting as follows:

". . . Revision 3 of the EPG provides a functional analysis that identifies on a high level, generic information and control needs. . . Because detailed plant-specific information and control needs cannot be extracted directly from the EPGs, plant-specific analysis is required" (emphasis added).

In addition, the FitzPatrick plant specific EOPs (Emergency Operating Procedures, which are based on the generic EPGs) will also be used during the DCRDR as one means of determining precisely how the information and control requirements of the EPGs are fullfilled by the EOPs.

In some instances, EOPs reference other normal plant operating procedures. The Authority does not intend to review all portions of procedures referred to in this way as part of the DCRDR program. Rather, referenced procedures will be logically followed to accomplish the intentions of the EOP.

Using the approach outlined above, the benefits of an independent SF&TA will be realized in the DCRDR program.

Comment: "The Program Plan proposes to identify systems and subsystems and functions by using the JAF FSAR. However, detailed information on the methodology for performing this task is not provided by the licensee, thus no evaluation could be made at this time."

Response: The updated FitzPatrick FSAR clearly state the functions of plant systems. The methodology for identifying these functions is simply to reference the applicable sections of the FSAR. The FSAR has been totally revised and updated in 1982 and revised annually since.

Comment: "The Program Plan also does not describe how the systems/functions identification will be used as a reference base for the subsequent task analysis. In other words, it is not clear how the functions, identified from the FSAR will be actively used as part of the analytical process. The licensee mentions "discrete tasks" in the task analysis process (p. 32), but an operational definition of this term is not given to clarify its role in the task analysis. The licensee does not describe how required information and control capabilities and characteristics will be identified. There is some doubt that this last step will be done at all. The task analysis form presented on page 35, does not provide spaces for recording the detailed information needed by the operator to make decisions, take corrective actions, etc.

In summary, the depth, scope, and methodology to be used in the JAF System Function and Task Analysis were not sufficiently described." (emphasis added)

Response: As previously described, the FitzPatrick DCRDR will be based on the work of both the BWROG Control Room Survey, the BWROG's generic EPGs and plant-specific EOPs. Generic EPGs and plant-specific EOPS together will be used to identify how the information and control requirements of the EPGs have been fulfilled. (A revised Section 4.3 of the Program Plan, "Systems Function Review and Task Analysis" is attached). The program plan indicates specifically that the information and controls required to execute EOPs will be identified (pages 31-39, 8 pages) and references the INPO NUTAC Task Analysis Guidelines (INPO 83-046 NUTAC) that also describes how this will be done. The comment "There is some doubt that this last step will be done at all" is unwarranted. NYPA intends to conduct a technically sound DCRDR project.

The FitzPatrick DCRDR Program Plan used the terminology "instrumentation and control requirements" as opposed to "information and control requirements." The NRC staff's comments indicate that the task analysis form does not provide space to note the above information. This is a preliminary form (p. 33) to be revised as the DCRDR progresses. This form has space to record operator decisions or actions etc. and will be used as such. A revised preliminary form is attached to address this concern.

A discrete task is defined as a single unique behavior by a member of the operating crew. Discrete tasks will be identified from the plant-specific EOPs which were derived from the NRC approved EPGs. EPGs were developed from symptoms (not necessarily events or functions) that an operator must respond to and control.

VI. Comparison of Display and Control Requirements with the Control Room Inventory

Comment: "The licensee proposes to accomplish this function 'as part of the task analysis effort and the related verification and validation efforts.' On page 34 the licensee states that in the first phase of the verification, 'the presence or absence of the Instrumentation and Controls that were noted in the Task Analysis will be confirmed.' Since the method by which the required instrumentation and controls were "noted" was not described, the staff is uncertain whether this function will be effectively accomplished. The acceptability of this approach is contingent on performance of an adequate function and task analysis, since it is the function and task analysis which should actually define the appropriate characteristics of instrumentation, controls and equipment required for emergency operation."

Response: Section 4.4.2.1 ("I&C Availability" on page 36) of the Program Plan describes how the required instrument and controls will be noted. The presence or absence of any particular instrument or control will be recorded on a Task Analysis Form. Instruments or controls not available to the operator will be identified as an HED.

As discussed during our May 10, 1984 meeting, a new column labeled "Information and Control Requirements" will be added to the CRDR Task Analysis Worksheet. Appropriate instrument and control characteristics will be recorded on Task Analysis forms.

VII. Control Room Survey

Comment: "The licensee states that the 1981 BWROG Control Room Survey will be updated using the 1983 BWROG Supplement checklist which is drawn from guidelines provided in NUREG-0700 (pp. 30-31). If in fact this is the case, the staff concludes that the proposed control room survey will be comprehensive in coverage and detail, and if appropriately implemented by qualified personnel, should result in an effective survey of the JAF control room. Our single area of concern regarding the survey is the identification of HEDs from the 1981 BWROG survey. It was not stated how the BWROG data would be used to identify HEDs. The staff recommends that any item which was not found to be in 'full compliance' during the 1981 survey be considered to be an HED."

Response: A final approved version of the BWROG Control Room Survey "Checklist Supplement" has been distributed to members of the owners' group (Reference 11). The Authority will use this checklist supplement as described in the Program Plan.

The relationship between the BWROG control room checklist and NUREG-0700 was described on pages 10 and 11 of the enclosure to Generic Letter No.83-18 (Reference 6). The "Checklist Supplement" was compiled to address those NUREG-0700 items not directly addressed by the BWROG Control Room Survey Program.

The "raw data" sheets for this survey consist of the BWROG Check List forms. Each check list sheet (including those from the 1981 survey) will be reviewed by appropriate disciplines of the CRDR team including a human engineering consultant. Following this individual review, the team will then meet as a group to determine which discrepancies from the check list should be formally identified as HEDs. As described on pages 25 and 26 of the Program Plan, all instances of non-compliance are documented at the time of review on the check list, regardless of the "potential for error" multiplier value assigned to that particular item.

It is the CRDR team, including a human engineering consultant, which will review these checklists and identify HEDs which require formal resolution. This team has not assembled at this time. Therefore, it is inappropriate to prescribe, in advance, any specific formal procedures or criteria for identification of HEDs from the raw data. We expect that the team, as a whole, will review all data and reach mutual agreement on the identified HEDs. Since a human engineer consultant will be a member of the team we feel confident that a fully professional review and identification of HEDs will be accomplished.

IIX. Assessment of Human Engineering Discrepancies

Comment: "The methodology for assessing and categorizing HEDs is not described. The categories proposed for the assessment process seem to be appropriate. However, since the methods and criteria for judging the potential for error and the possible consequences of error were not described, the staff cannot ascertain whether the proposed assessment process will be effective. On page 8, Section F, the Program Plan states that 'HEDs identified as having safety implications or potential for safety implications will be categorized.' However, it does not seem that this criterion is implemented in the methodology presented in Section 5, page 40. Also, the definitions of certain terms used in the categorization of HEDs such as 'significant' operating error (Category I, p. 40) and 'serious' consequences (Category III, p. 41) are not provided."

Response: A complete description of the methods used to categorize and assess HEDs will be included in the DCRDR Summary Report. This information was not provided as part of the Program Plan because a human factors contractor had not been selected when the plan was written.

The methods and criteria used to assess HEDs will generally follow the guidance of draft NUREG-0801 (Reference 18). Draft NUREG-0801 was used to develop portions of the DCRDR Program; however, a statement to this effect was not included in the Program Plan.

In keeping with this point, the terms "significant" and "serious" are also defined in NUREG-0801.

IX. Selection of Design Improvements

Comment: "Although the Program Plan states that recommendations will be provided for each identified HED, there is no mention made of who will make these recommendations.

The licensee states that enhancement-type corrections will be mocked up via drawings. The staff suggests that mock-ups, both part-task and full-scale, may be necessary for the design of control room improvements. Overall, the proposed approach seems appropriate, but some details are not explicitly described. For example, how are the criteria "weighted" to allow for reliable, unbiased selection of improvements, who recommends improvements, and what are the approval and quality control mechanisms?"

Response: The DCRDR team members will make initial recommendations for selection of design improvements. This point was not explicitly stated but was implied for all phases of the DCRDR.

Details concerning the selection of improvements and quality control mechanisms are not part of the DCRDR program. DCRDR team makes initial recommendations which will then be reviewed by normal engineering design change process personnel. Any modifications resulting from the DCRDR will be processed in accordance with Authority procedures. Approval and quality control mechanisms will also follow established procedures.

X. Verification that Selected Improvements Will Provide the Necessary Corrections and that Control Room Modifications Do Not Introduce New HEDs

Comment: "The Program Plan provides no description of formal, structured procedures to verify HED improvements before and/or after implementation. However, there are indications that the licensee has incorporated these procedures in the HED correction phase (p. 42). It is very difficul to determine the effectiveness of the verification phase without a clear cut, structured methodology. We suggest the licensee address the verification of improvements in a more structured way which clearly indicates how the licensee will conduct this activity, and how and when it will be integrated into the overall DCRDR process."

Response: Proposed improvements will undergo a human factors evaluation in addition to normal engineering evaluations prior to implementation. Final engineering design change packages will be reviewed by the DCRDR team and/or other qualified individuals. Operator feedback will also be solicited at this time.

XI. Coordination of the DCRDR with Other Improvement Programs

Comment: "The licensee seems to recognize that other improvement programs, such as SPDS, EOPs, etc., should be coordinated with the DCRDR. However, the actual procedures for such coordination are not given in the Program Plan. For example, there is no description of an information exchange procedure for integrating HEDs corrections with inputs from other improvement programs."

Response: As we have previously stated, procedures are outside of the level of detail appropriate for any program plan.

The Authority described its plans for integrating the five Supplement No. 1 items in our April 15, 1983 "Implementation and Integration Plan" (Reference 7). Specifically, our SPDS/EPIC program may (where appropriate) be used to correct HEDs identified during the DCRDR program. Control room modifications resulting from the post-accident instrumentation program will be included in the DCRDR if the actual modifications to the control have been completed, or if the modification is sufficiently complete to allow meaningful review. EPGs and EOPs form the basis for much of the DCRDR program.

The integration of these programs will be overseen by Authority plant and headquarters office management as an ongoing process.

XII. NRC Conclusion

Comment: "The staff's review of the Program Plan indicates that specific areas of the plan have not been described in enough detail to provide assurance that the licensee will meet the requirements. The licensee has not demonstrated in the Program Plan that appropriate review methodologies have been developed to fulfill all of the DCRDR requirements of Supplement 1 to NUREG-0737."

Response: The FitzPatrick DCRDR Program Plan as supplemented by this report and the references listed below provides a greater level of detail. Further details will be included in the DCRDR Summary Report.

XIII. References

1. NRC letter, D.B. Vassallo to J.P. Bayne, dated February 22, 1984 regarding review of Program Plan for Detailed Control Room Design Review. Includes attachment entitled "NRC Staff Comments on the James A. FitzPatrick Detailed Control Room Design Review Program Plan."

2. NYPA letter, J.P. Bayne to D.B. Vassallo, dated October 24, 1983 (JPN-83-90). Transmits FitzPatrick DCRDR Program Plan, dated October 19, 1983.

3. NYPA letter, J.P. Bayne to D.B. Vassallo, dated March 28, 1984 (JPN-84-20) regarding Supplement No.1 to NUREG-0737 Item I.D.1 - Control Room Design Review. Commits to provide DCRDR Summary Report and schedule for implementing final recommendations by November 15, 1985.

4. NRC Generic Letter No. 82-33, dated December 17, 1982, D.G. Eisenhut to All Operating Reactors transmits Supplement No.1 to NUREG-0737.

5. NRC letter, V.A. Moore to H.C. Fish, dated April 11, 1984 transmits NRC staff comments on: "Control Room Design Review Implementation Guide"-INPO 83-026 (NUTAC); "Human Engineering Principles for Control Room Design Review"-INPO 83-036 (NUTAC); "Control Room Design Review Task Analysis Guideline"-INPO 83-046 (NUTAC) and; "Component Verification and System Validation Guidance"-INPO 83-047 (NUTAC). Also requests meeting to discuss comments.

6. NRC Generic Letter No.83-18, dated April 19, 1983, D.G. Eisenhut to All BWR Licensees regarding NRC staff review of the BWR Owners' Group (BWROG) Control Room Survey Program.

7. NYPA letter, J.P. Bayne to D.B. Vassallo, dated April 15, 1983 (JPN-83-33) transmits initial response to NUREG-0737, Supplement No.1.

8. NYPA letter, J.P. Bayne to D.B. Vassallo, dated June 3, 1983 (JPN-83-50) regarding NUREG-0737 Item I.D.1, Control Room Design Review.

9. General Electric Co. letter, G.W. Burnette to BWROG committee members and CRDR primary representatives, dated October 17, 1983 (OG3-271-3) transmits final approved version of "Human Factors Engineering Control Room Survey Supplement".

10. NRC memorandum, S.H. Weiss to V.A. Moore, regarding task analysis requirements of Supplement 1 to NUREG-0737, May 4, 1984 meeting with BWR Owners Group Emergency Procedures Guidelines and Control Room Design Review Committee.

11. BWROG letter, G.W. Burnette to BWROG members, dated October 17, 1983 (OG3-271-3) regarding NRC Generic Letter 83-18 includes final approved version of control room survey "Checklist Supplement".

12. PASNY letter, J.P. Bayne to S.S. Hanaver, dated January 5, 1982 (JPN-82-3) provides comments on draft NUREG-0801, "Evaluation Criteria for DCRDR-October 1981."

13. PASNY letter, J.P. Bayne to D.B. Vassallo, dated June 30, 1983 (JPN-83-60) transmits EOP Generation Package and Technical G idelines for EOPs.

14. INPO 83-036 (NUTAC), "Human Engineering Principles for Control Room Design Review".

15. INPO 83-026 (NUTAC), "Control Room Design Review Implementation Guide".

16. INPO 83-046 (NUTAC), " Control Room Design Review Task Analysis Guideline".

17. INPO 83-047 (NUTAC), "Component Verification and System Validation Guidance".

18. NUREG-0801, "Evaluation Criteria for Detailed Control Room Design Reviews," October 1981, draft report.

NEW YORK POWER AUTHORITY
James A. FitzPatrick Nuclear Power Plant

Attachment No.2 to JPN-84-57

Revised Section 4.3-"System Function Review and Task Analysis"-to "Detailed Control Room Design Review Program Plan for the James A. Fitzpatrick Nuclear Power Plant" dated October 19, 1983

4.3 Systems Function Review and Task Analysis

4.3.1 Purpose

The purpose of the Systems Function Review and Task Analysis portion of the Control Room Design Review is to determine the input and output requirements of the control room crew for emergency operation and to ensure that required systems can be efficiently and reliably operated under the conditions of emergency operation by available personnel. This will be accomplished by performing an analysis of tasks contained in the JAF Emergency Operating Procedures (EOPs).

The steps which comprise the System Function Review and Task Analysis are shown in Figure 1 and are described below.

4.3.2 Systems Functions Description

4.3.2.1 Identify Plant Safety Related Systems and Functions

Plant systems and subsystems in the JAF control room that the operator must access during emergency operations will be identified. Existing plant documentation (i.e., James A. FitzPatrick FSAR) relating to safety systems will serve as a prime information source.

Descriptions of the functions for each of the systems identified above will be prepared. These system descriptions will include:

- The function(s) of the system
- Under what conditions the system is used
- A brief explanation of how the system operates

The description of systems functions in this manner will serve as a reference base for subsequent task analysis. In addition, the systems list will be used to assist in the selection of operating scenarios for each walk-through.

4.3.2.2 Define Representative Scenarios

The BWR Owners Group Emergency Procedures Guidelines and the list of JAF safety and safety-related systems will be used to define a set of scenarios which adequately sample various emergency conditions and the plant systems and system functions used in those conditions. The related JAF plant-specific EOPs will be identified as well in this step.

In addition, a brief narrative description of each scenario will be prepared that establishes the limits and conditions of the events to be analyzed. This overview will be especially beneficial for orienting operators to the scenarios prior to walkthroughs. It will include:

- initial plant conditions
- sequence initiator
- progression of action
- final plant conditions
- major systems involved

4.3.2.3 Identify Residual Task

Residual operator tasks (unique tasks) from the plant specific EOPs not covered in the scenarios will be identified and later analyzed for associated information and control requirements. The analysis of residual tasks will be done to ensure that all operator interfaces have been examined even if those interfaces are not exercised in the sample of emergency scenarios selected for validation. Verification of equipment availability and suitability will be performed for these residual tasks as well as for tasks embedded in the emergency scenarios.

4.3.3 Task Analysis

4.3.3.1 Develop Task Analysis Worksheets

Task Analysis Worksheets (see Figure 2) will be developed which indicates the operational steps required in each scenario along with the appropriate information and control requirements, means of operation, and I&C present on the control boards. The opertor tasks will be analyzed using generic EPGs and plant-specific EOPs as a starting point. The Task Analysis Worksheets will be prepared in the following manner:

1. Discrete steps in the JAF EOPs and corresponding EPGS will be identified in order of performance. These steps will be recorded in the "Procedure Number" column of the Task Analysis Worksheet, and branching points noted depending on the plant transient being analyzed in the "Scenario Response" column. Note that there may be more tasks subsequently identified in Step 2 below than there are procedural steps. In this case, a dash will be entered in the column when no explicit procedure step is present in the EOPs and/or EPGs.

2. A brief description of the operator's tasks (in order of procedural steps) will be recorded in the "Tasks/Subtasks" column of the Task Analysis Form. All tasks, both explicit and implicit, will be documented by SRO subject matter experts, human factors specialists using plant-specific EOPs, EPGs, JAF FSAR and System Descriptions.

3. The operator decisions and/or actions that are linked to task performance are then noted in the "Decision and/or Contingent Action Requirements" column. System functional response is described when appropriate in this column. This set of data also includes branching points in the EOPs that determine the outcome of the operating sequence.

4. Input and Output requirements for successful task performance are noted in the "Information and Control Requirements" column. These would typically be parameters, components or procedural information that are necessary for operators to adequately assess plant conditions or system status (e.g., reactor vessel water level, reactor coolant systems flow, pressure, etc.). Specific values for parameter readings or control selection will be noted. Several documents and sources, in addition to EOPs and Technical Specifications, will assist the task analyst in determining task information and control requirements. These are displayed in Figure 3.

5. Once the Tasks, Decision Requirements, and Information and Control requirements have been specified, the specific instrumentation and controls (I&C) that the operator requires per procedural step will be documented. All I&C needed to either (1) initiate, maintain or remove a system from service, (2) confirm that an appropriate system response has or has not occurred, i.e., feedback, or (3) make a decision regarding plant or system status will be listed. The "Means" column refers to how the information and control requirements are presented on the control boards (e.g., switch, meter, etc.). The "I&C Identification" column provides the specific panel number and identification number of the control or instrument.

   It is important to not that Step 1 through 4 are completed on the Task Analysis Worksheet using independent sources of data other than the actual I&C present in the control room. Step 5 essentially completes the first step in the Verification Process to identify whether or not the necessary I&C for task performance is <u>available</u> in the control room.

The remaining columns of the Task Analysis Workseet will be utilized during the Verification of Task Performance Capabilities, which is described in Section 4.4. These columns are briefly described below:

6. Verification column (used during V&V phase)
"Availability" of the necessary I&C for successful operator task performance is noted by a check in this column; "Suitability" of the I&C to meet the information and control requirements of operator task is noted by a check in this column.

7. Comments/Candidate HEDs
Comments or candidate HEDs can be noted in this column during any step of the Task Analysis of V&V phases. Data for HEDs will be recorded.

The Task Analysis Worksheet thus serves as the complete record of operator tasks, decisions, information and control requirements, and I&C availability and suitability during the selected emergency operating sequences. This record is developed through the series of steps described above.

4.3.3.2 Conduct Walk-through of Scenarios

Using the Task Analysis Worksheets, human factors engineers will perform a walk-through of each scenario with JAF control room operators. During this walk-through, the tasks required will be analyzed in terms of the presence of necessary instruments and controls or other equipment or job aids (the Verfification of Task Performance Capabilities specified in NUREG-0700) and the suitability of equipment, job aids and control room design for reliable execution of the required tasks (the Validation of Control Room Functions specified in NUREG-0700).

Real-time walk-throughs will then be conducted to fully document the tasks involved for all crew members. A complete description of the walk-through method is described in the validation process in Section 4.5 of the Program Plan. The task data is subsequently examined in both the verification and validation process described in the sections that follow.

4.3.3.3 Control Room Inventory

The function intended for a control room inventory in the DCRDR is to determine whether the instrumentation and controls needed to support operation under emergency conditions actually exist. (See INPO NUTAC

Implementation Guideline.) This function will be accomplished as part of the task analysis effort and the related verification and validation efforts. The determination of I&C availability is described in Section 4.4, Verification of I&C requirements.

In addition, a complete set of control board photgraphs will be taken to provide an as-built inventory of the JAF instrumentation and controls during the DCRDR.

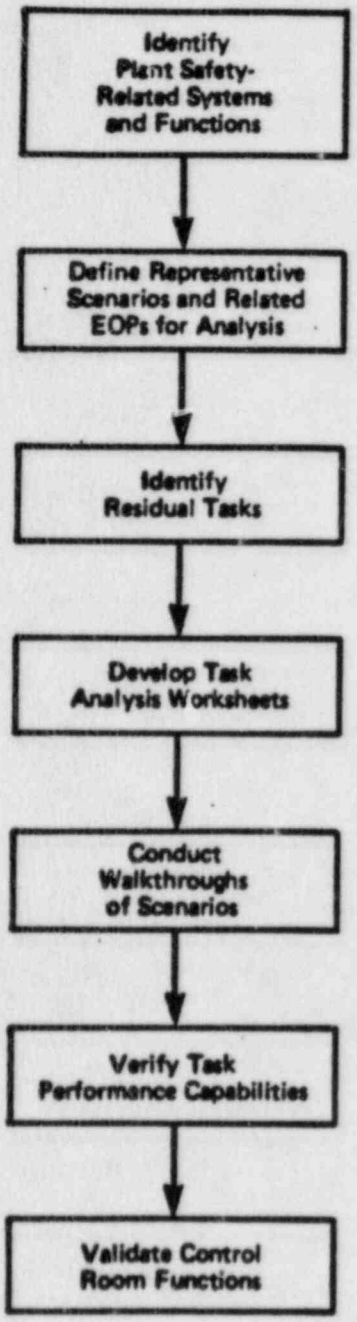

Figure 1. Systems Functions Review and Task Analysis Steps

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TASK ANALYSIS WORKSHEET

SCENARIO _____
PAGE ____ of ____

Procedure No.		Task/Subtask	Sam. Resp.	Crew Memb.	Loc.	Decision and/or Contingent Action Requirements	Information & Control Req.	Means	I&C Ident.		Verification		Comments/ Candidate HEDs
JAF	EPG								Panel	No.	Acpt.	Suit.	

G23-0680

Figure 2. Task Analysis Worksheet

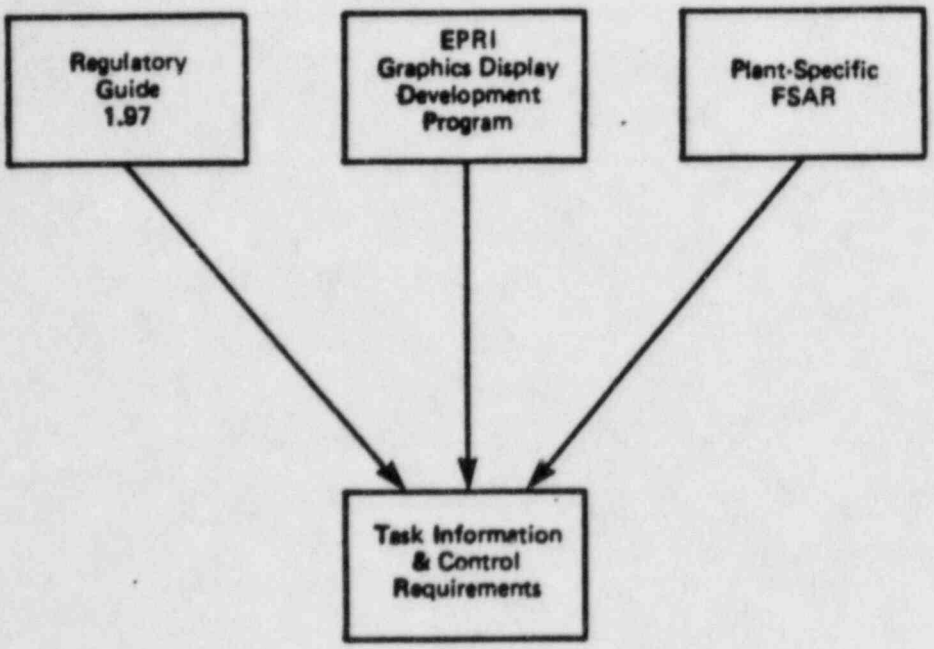

Figure 3. Task Information and Control Requirements