

Response to

Request for Additional Information No. 336 (4016, 4043), Revision 1

02/02/2010

U. S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 18 - Human Factors Engineering

Application Sections 18.5 and 18.8

**QUESTIONS for Operating Licensing and Human Performance Branch
(AP1000/EPR Projects) (COLP)**

Question 18-71:

Additional information is needed in the following two areas:

a. Criterion 1 of NUREG-0711 section 5 states that the scope of the review of the task analysis should include:

- Selected representative and important tasks from the areas of operations, maintenance, test, inspection and surveillance
- Full range of operating modes, including startup, normal operations, abnormal and emergency operations, transient conditions, and low-power and shutdown conditions
- HAs that have been found to affect plant risk by means of PRA importance and sensitivity analyses should also be considered risk-important. Internal and external initiating events and actions affecting the PRA level I and II analyses should be considered when identifying risk-important actions.
- Where critical functions are automated, the analyses should consider all human tasks including monitoring of the automated system and execution of backup actions if the system fails.
 1. 1. The implementation plan does not contain a list of which risk-important tasks will be analyzed, nor does it describe the MTIS activities which will be included in the task analysis. Without a description of how these activities will be included, the staff cannot make a safety determination. Please provide information as to how the MTIS activities will be included in the task analysis.
 2. 2. The applicant expands the minimum scope described in NUREG-0711 to include tasks identified as 'problematic' during OER and HRA. Staff requires more information on the definition of 'problematic' tasks.

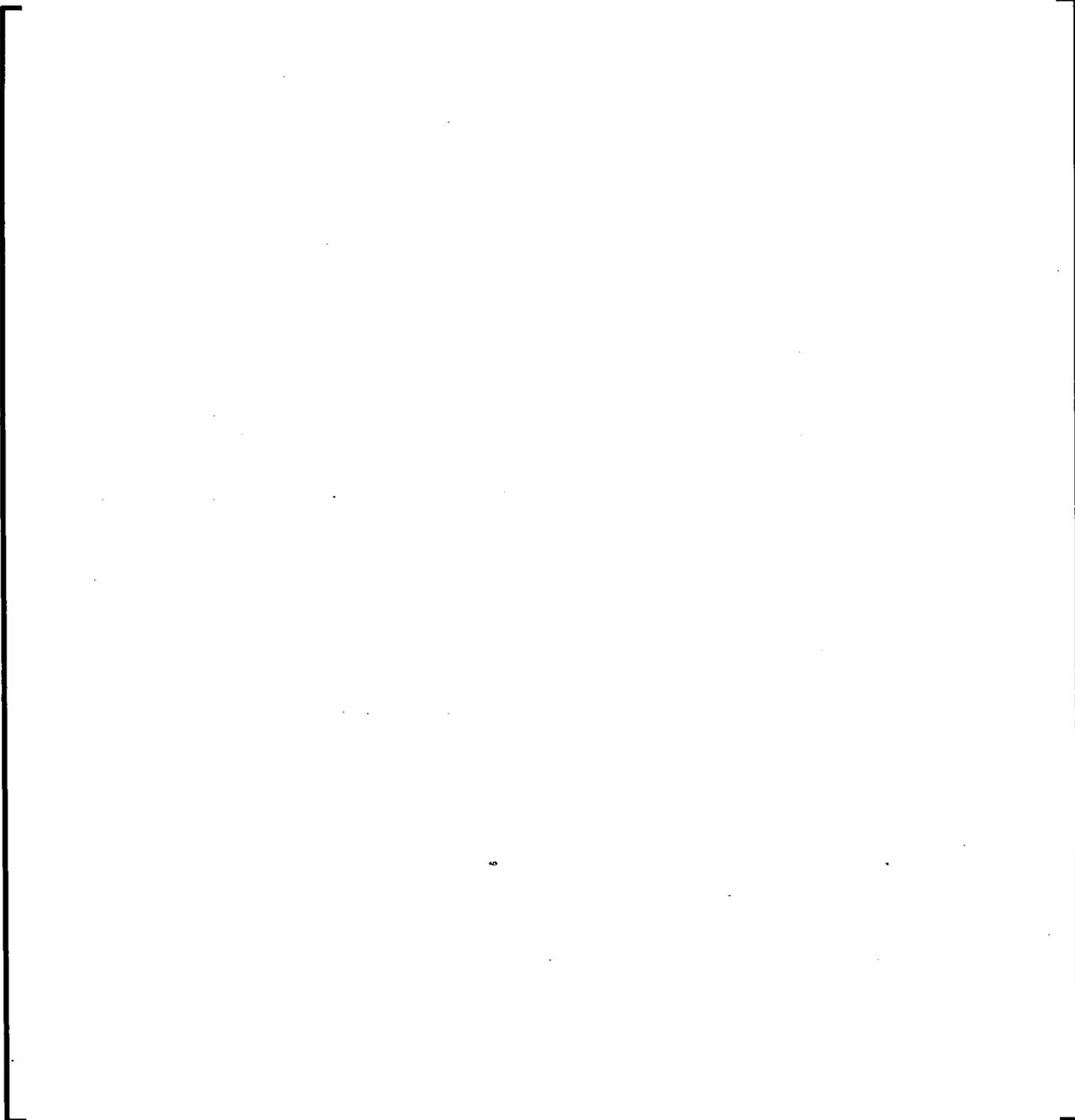
b. Criterion 2 of NUREG-0711 Section 5 states: Tasks should be linked using a technique such as operational sequence diagrams. Task analyses should begin on a gross level and involve the development of detailed narrative descriptions of what personnel have to do. The analyses should define the nature of the input, process, and output needed by and of personnel.

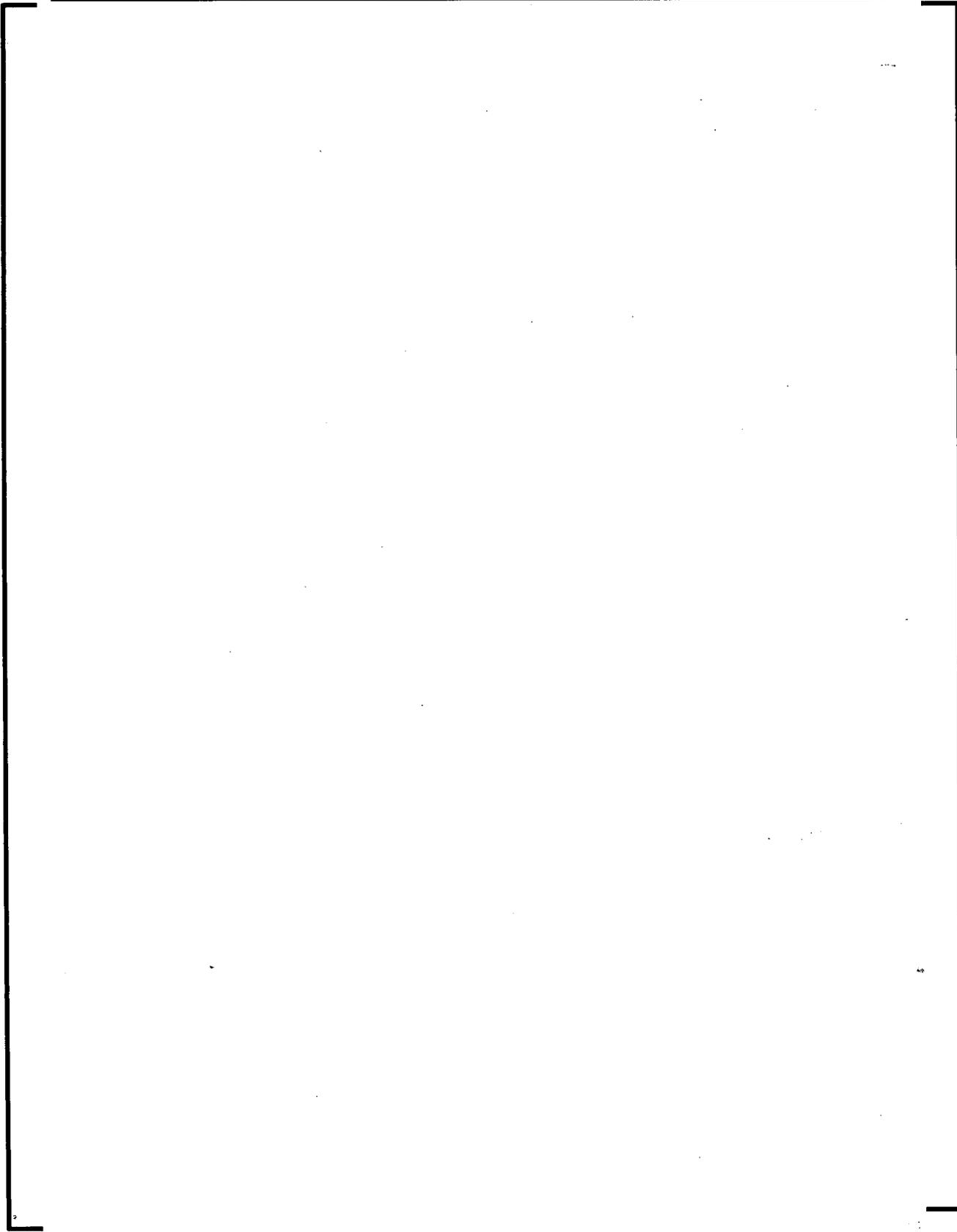
This level of detail has not been included in the task analysis implementation plan. Please provide, at a minimum, a set of plant scenarios by name, (start-up, normal operations, LOCA, SGTR, etc.). In addition, for a sample of these named scenarios, provide the tasks associated with each function, the estimated time requirements, and sufficient detail to analyze the tasks during implementation. This example set will be used to exemplify the level of detail which will be provided during implementation. The process provided in Section 4.2.1 may be sufficient to derive the task narratives. For the remaining tasks to be described, staff requires the process that will be followed.

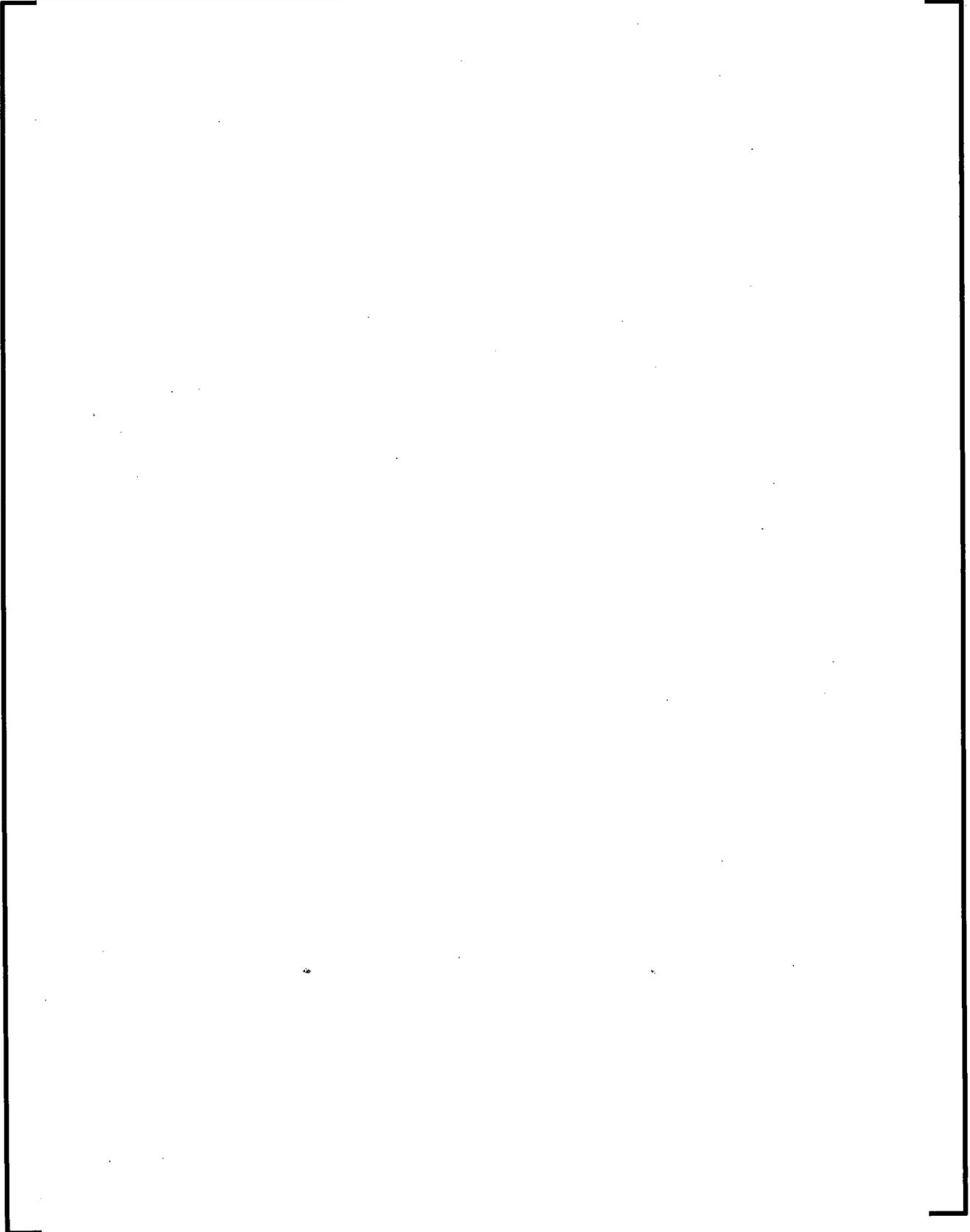
Response to Question 18-71:

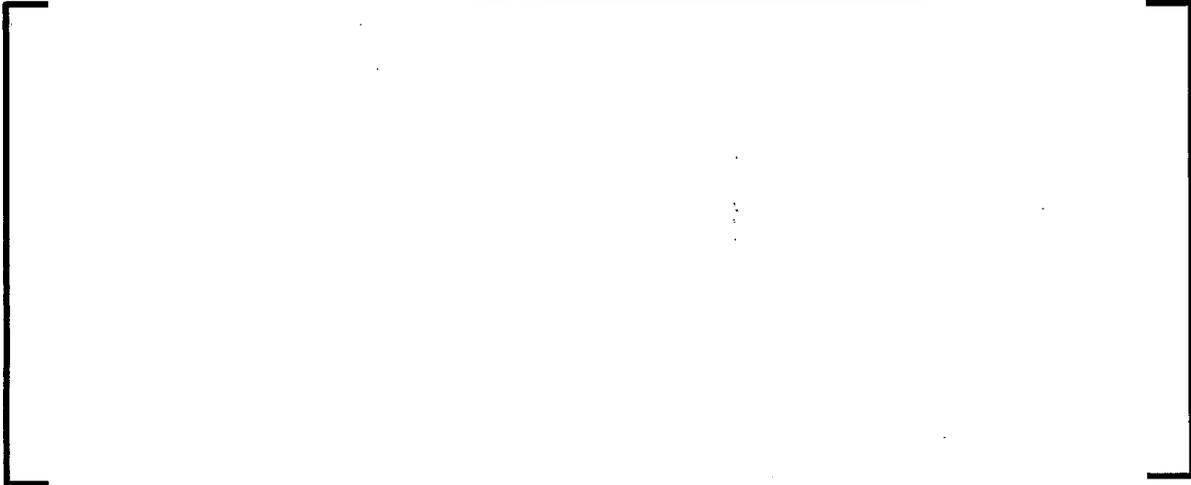
a.1.

Risk-significant tasks are evaluated from a task analysis (TA) perspective (See the Response to RAI 328, Supplement 3, Question 18-56, Part 5). The list of risk-significant tasks is located in the attachments to the U.S. EPR Implementation Plan (IP) for the Integration of Human Reliability Analysis (HRA) with the Human Factors Engineering (HFE) Program.









Task Sequencing

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See the Response to Question 18-75 for a sample TA worksheet. The functional branch tree is available for NRC inspection at AREVA NP offices.

References for Question 18-71:

1. Abdolmonhamadi, M. J. & Usoff, C. A. (2001). The Assessment of Task Structure, Knowledge Base and Decision Aids for a Comprehensive Inventory of Audit Tasks Quorum: Westport, CT.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-72:

Criterion 2 of NUREG-0711 Section 5 states:

Tasks should be linked using a technique such as operational sequence diagrams. Task analyses should begin on a gross level and involve the development of detailed narrative descriptions of what personnel have to do. The analyses should define the nature of the input, process, and output needed by and of personnel.

Section 3.0 of the task analysis implementation plan discusses the methodology to be used for conducting the U.S. EPR task analysis. The report says that a sampling process similar to the Operational Conditions Sampling (OCS) process described in V&V will be used to select the functions to be subject to task analysis.

- A. Describe OCS and identify the guidelines used to determine tasks and provide examples of the functions and asks to be analyzed.
- B. Specify which HFE task analysis methodology they plan to use, i.e., operational sequence analysis, hierarchical task analysis, etc.
- C. In section 3.0, the Applicant states that a process "similar" (and thus not exact) to the process used in verification and validation will be used. However, section 4.1 states that "the identification of tasks will be derived from those functions following the guidelines set for OCS." This implies an exact match, and thus contradicts the earlier statement. The contradiction needs to be resolved. Describe the OCS and clarify the process for identification of tasks.
- D. The staff notes that sequencing of tasks is not equivalent to linking tasks using a task analysis methodology. Therefore, staff requests information as to how tasks will be linked and interact with one another.

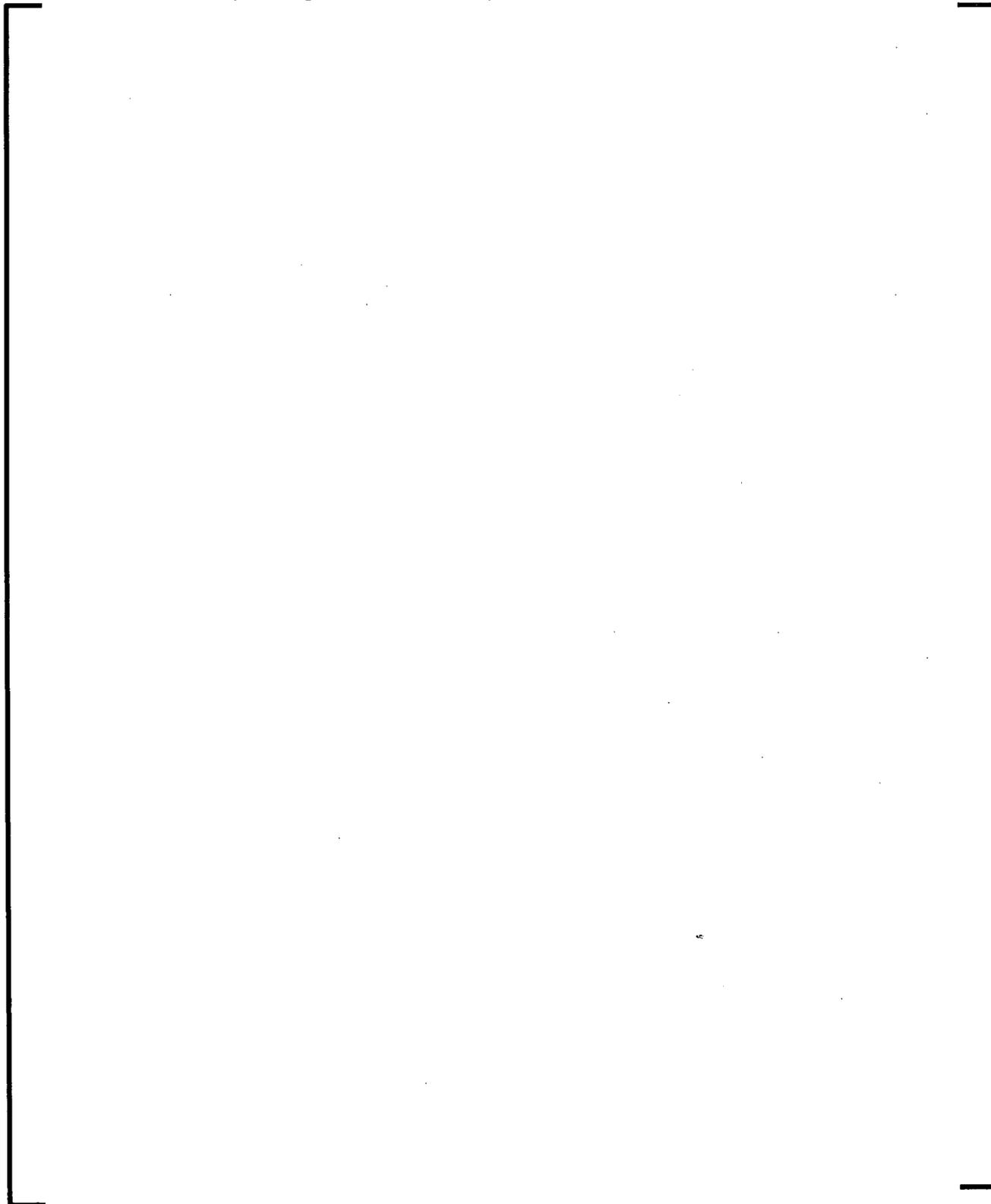
Response to Question 18-72:

- a) The U.S. EPR Verification and Validation (V&V) Implementation Plan (IP) describes the OCS. The criteria sampled must be identical for the other tasks analyzed. See the Response to RAI 328, Supplement 3, Question 18-70 for more information.
- b) AREVA NP human factors engineering (HFE) determines the task analysis (TA) methods and applications. AREVA NP understands that tasks may require the administration of more than on tool, instrument, or method.

To achieve subjective and objective data collection, quantitative and qualitative data requisite for reliability, and internal and external validity, different tasks have varying methods applied (this is also applicable to scenarios and functions). Three general methods used are operational sequence diagrams (OSD), goals, operators, methods, and selection rules (GOMS), and hierarchical task analysis (HTA).

- See the Response to Question 18-71 for information on task sequence analysis.
- See the Response to RAI 328, Supplement 3, Question 18-62 for information on GOMS.
- HTA assigns a hierarchy of goals, operations, and plans to the TA. Goals are the unobservable task goals associated with operation of the device. Operations are the

observable behaviors or activities that accomplish the goals. Plans are unobservable decisions and planning on behalf of the operator.



References for Question 18-72:

1. Rasmussen, J. (1985). The role of hierarchical knowledge representation in decision making and system management. *IEEE Transactions on Systems, Man, and Cybernetics, SMC-15*, 234-243.
2. Bisantz, A. M., & Vicente, K. J. (1994). Making the abstraction hierarchy concrete. *International Journal of Human Computer Studies*, 40, 83-117.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-73:

Section 4 of NUREG-0711, Criterion 4 states "The task analysis should address issues such as:

- the number of crew members
- crew member skill
- allocation of monitoring and control tasks to the (a) formation of a meaningful job, and (b) management of crew members' physical and cognitive workload."
 - a. The task analysis implementation plan states that following the assignment of the workload values referenced in section 4.2.3, an operator workload analysis is performed on selected sets of tasks to evaluate the physical and cognitive demands on the operator based on the HSIs assigned, the allocation of the function, and the staffing levels. The applicant continues to say that the allocation of monitoring and control tasks to the formation of a meaningful job and management of crew member's physical and cognitive workload is addressed.
 1. Describe how the formation of a meaningful job will be assessed, and how the management of crew member's physical and cognitive workload will be evaluated.
 2. Also, provide information on the approach to definition of cognitive workload and the techniques that will be used to assess cognitive workload.
 - b. In section 4.4 of the task analysis implementation plan, the applicant continues to state that for tasks where there is a concern about the successful completion of the task, a task timeline is created. While the time to perform the task is defined as part of the task description, overall timelines for the tasks and sequences of tasks is used to determine if the tasks can be successfully completed to meet response requirements if the tasks overlap in a time creating operator workload.
 1. Provide a description of the task timeline and an example of what it will look like.
 2. How will the timeline be used to address issues of operator workload and response timing.

Response to Question 18-73:

Response to Question 18-73, a.1:

The definition of a "meaningful job" is subjective, but it can be objectively evaluated. The operator must balance "challenge" and "confidence." The challenge is operating and monitoring the plant to verify safety and productivity. The challenges must be contained to feasible activities without avoidable time pressure or stress. If a job is monotonous, it becomes challenging and stressful and has a negative effect on "meaningful."



There is a correlation between motivation and meaningful. The attempt to design jobs that increase worker motivation is called "job enrichment" or "enlargement." The two most applicable theories regarding relations of job design to motivation are those of Herzberg (Reference 2) and of Hackman and Lawler (Reference 3).

Reference 2 states that jobs are motivating to the extent that they are "vertically loaded" (i.e., allow opportunities for greater responsibility, challenge, and self-fulfillment). Reference 2 does not regard the "horizontal loading" of jobs, such as by increasing diversity or social relations, as relevant to motivation. Other "hygiene" factors, such as adequate pay or working conditions, do not have an effect on motivation. Their absence may generate dissatisfaction and withdrawal, but their presence does not create satisfaction and motivation to perform the job well.

Reference 3 describes four "core dimensions" to jobs, which must be present for workers to be maximally motivated and satisfied:

1. Autonomy or self-direction.
2. Diversity or variety.
3. Wholeness or identity.
4. Feedback or knowledge of results.

Reference 3 states that:

".When jobs are high on the four core dimensions, employees have the opportunity to find out (feedback) that they personally (autonomy) have accomplished something meaningful and worthwhile (variety and task identity) when they perform well."

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Response to Question 18-73, a.2:

See the Response to RAI 328, Supplement 3, Question 18-62 for the description of GOMS and measurement of mental workload.

Response to Question 18-73, b.1. and b.2.:

Techniques for addressing workload issues involve timeline analysis. This analysis demonstrates how workload may be predicted at a relatively early stage in the system development.

The human operator has a limited capacity to process and respond to information. If the processing and response demands of a task exceed available capacity, overload can lead to reduction in operator performance. Under these conditions, increases in task difficulty lead to increases in resources or capacity expenditure.

The term "workload" refers to the portion of the operator-limited capacity required to perform a particular task. Workload measurements specify the amount of expended capacity. This quantification can be used to avoid existing or potential overloads and to verify adequate operator performance. Demand may correspond with performance.

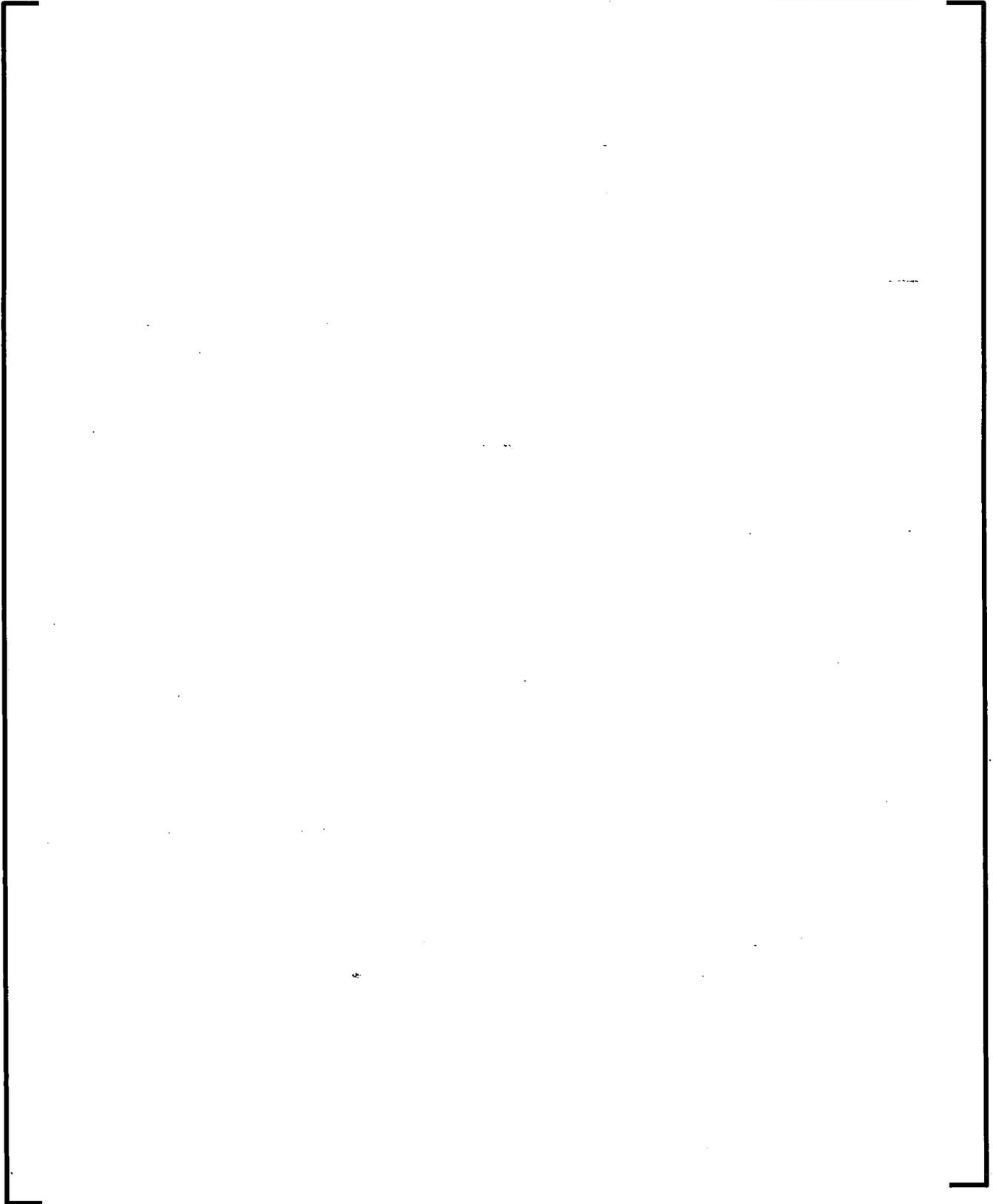
The importance of mental workload may be viewed in two different contexts:

- Workload estimation.
- Assessment of workload imposed by the system or experienced by the human operator.

Different techniques have been proposed as workload estimation and assessment procedures, and their use depends on the TA phase.

At an early stage of the design process, where there is available data from the criteria for staffing in the U.S. EPR FSAR tabletop analysis, it is useful to utilize a technique for the workload estimation. In the next phases, in which other support and a part-task simulator are available, other techniques to assess the workload are more adequate. [

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References for Question 18-73:

1. Katzell, R. A. & Yankelovich, D. (1975). *Work, productivity, and job satisfaction: An evaluation of policy-related research*. New York: Psychological Corporation.
2. Herzberg, F. *Work and the Nature of Man*. Cleveland: World, 1966.
3. Hackman, J.R., & Lawler, E.E. III. "Employee reactions to job characteristics". *Journal of Applied Psychology*, 1971, 55, 259-286.
4. Wickens, C. D., Todd, S., and Seidler, K. (1989). *Three-dimensional displays: Perception, implementation, and applications* (Tech. Report ARL49 II/CSERIAC49-1). Savoy, IL: University of Illinois, Institute of Aviation, Aviation Research Lab.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-74:

Section 5 of NUREG-0711, Criterion 5 states:

The task analysis results should be used to define a minimum inventory of alarms, displays, and controls necessary to perform crew tasks based on both task and instrumentation and control requirements.

Section 4.4 of the task analysis implementation plan discusses workload analysis and adequacy of staffing assumptions but provides very little detail to describe the identification of alarms, displays and controls.

The staff is requesting the process for identifying a minimum inventory of alarms, displays and controls necessary to perform crew tasks based on both task and instrumentation and control requirements.

Response to Question 18-74:

The term "minimum inventory" denotes a specific set of alarms, displays, and controls. The process for identifying the minimum inventory of alarms, displays, and controls is discussed in the U.S. EPR Human System Interface (HSI) Design Implementation Plan (IP). The task analysis (TA) process provides the alarms, displays, and controls of tasks in the U.S. EPR systems. TA IP, Section 4.4 is the workload analysis section and states that the analysis provides the following in relation to the operator's workload:

- Is it realistic to assume that the operator has the ability to perform the task (are the control and display elements present)?
 - Are interfaces easily accessible or are there burdens with secondary tasks (navigating between displays)?
- Does the task limit the operator's ability to take on an additional task?
- Does the task limit the operator's ability to cope with an emergency situation?
- Can the task be altered to reduce/increase workload?

The analysis section is not designed to develop a list of minimum inventory, but revises the list that was provided from earlier steps in the procedure.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-75:

- a. NUREG-0711 section 5 provides criteria to use during the review of an applicant's task analysis. AREVA submitted the "U.S. EPR Task Analysis Implementation Plan" (118-9101668-000) to provide a methodology for performing and analyzing task analysis for the U.S. EPR design. However, in Table 1-1 of the implementation plan, the applicant states that it plans to use a separate task analysis process to identify required staff knowledge, skills and attributes for the personnel training programs that differ from the task analysis used to assess interface needs. In addition table 1-1 show that a separate task analysis will be used to develop procedures.

Additionally, the U.S. EPR Verification and Validation Implementation Plan identifies using a "limited scope" task analysis for the verification and validation process.

Based on these discrepancies, it is unclear to the Staff how AREVA plans to use the U.S. EPR task analysis, and how the training program task analysis, the procedures development task analysis and, the limited scope task analysis and the full task analysis are related, if at all.

- b. Section 5 of NUREG-0711, criterion 6 states:

The task analysis should provide input to the design of HSIs, procedures, and personnel training programs.

There is not enough information provided for the Staff to perform a detailed evaluation of this criterion.

Provide detailed information as to how the task analysis results will be used as input into the HSI design, procedures and training programs.

- c. In section 1.5 of the implementation plan, the applicant says that the sequencing of tasks provides the steps for the plant operating procedures and defines the activities that plant personnel should be trained to execute. The bases for the task sequencing become training objectives and questions for the training program.

In Section 4.3 of the task analysis implementation plan, the applicant says that during the HSI design phase, evaluations are performed to assess the HSI design, procedures, as well as verify operator workload is at an acceptable level.

Provide detailed information describing the evaluation process for developing procedures, and training programs including who conducts the evaluations, and how the results are dispositioned.

Response to Question 18-75:

- a) The notes in Task Analysis (TA) Implementation (IP), Table 1-1 have been removed. The TA procedure will be used for the human system interface (HSI) procedure group and the training department. One TA IP exists, and the term "limited scope" is described in the Response to RAI 328, Supplement 3, Question 18-69.

- b) The requested information is found in the TA work instruction. The TA work instruction implements a structured approach for analysis and gathers the results. These inputs are collected in the data sheet provided in the U.S. EPR TA Work Plan. Section 5.5 of the data collected forms a procedure outline for the task. Section 5.6 of this data sheet contains the expected information requirements necessary for the HSI design. This will not necessarily conclude the relation of each item on the display but will identify displays and controls that the operator will need to successfully complete the task, including the characterizations of the interface items (see TA IP Section 1.5).

The characterization of the task, along with the remaining information in the data sheet, can be used for training development.

Table 18-75-1 provides an excerpt from the TA Work Plan and is a copy of the data sheet that will be collected for each task (plant-level or system-level).

Table 18-75-1 is available for use by necessary personnel from HSI, procedures, and training groups. This method allows the different divisions of work to use the same origin, which increases understanding of the information that the different groups are given for each task.

Table 18-75-2 is an example of the TA data sheet for Emergency Feedwater System, task 1.

- c) This item is described in the U.S. EPR Human Factors Training Development IP and the U.S. EPR Human Factors Procedure IP.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Table 18-75-1—Excerpt from the TA Work Plan

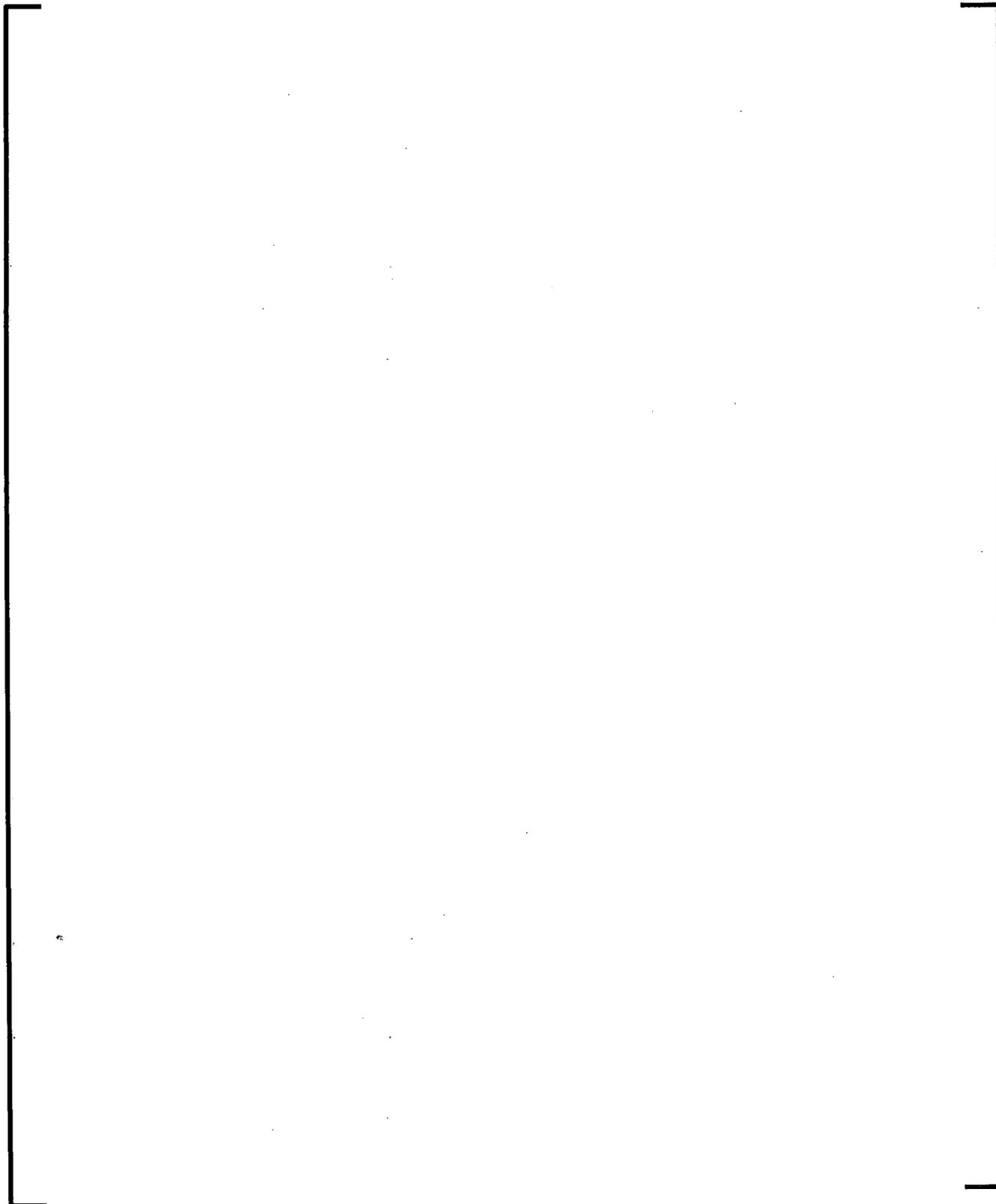
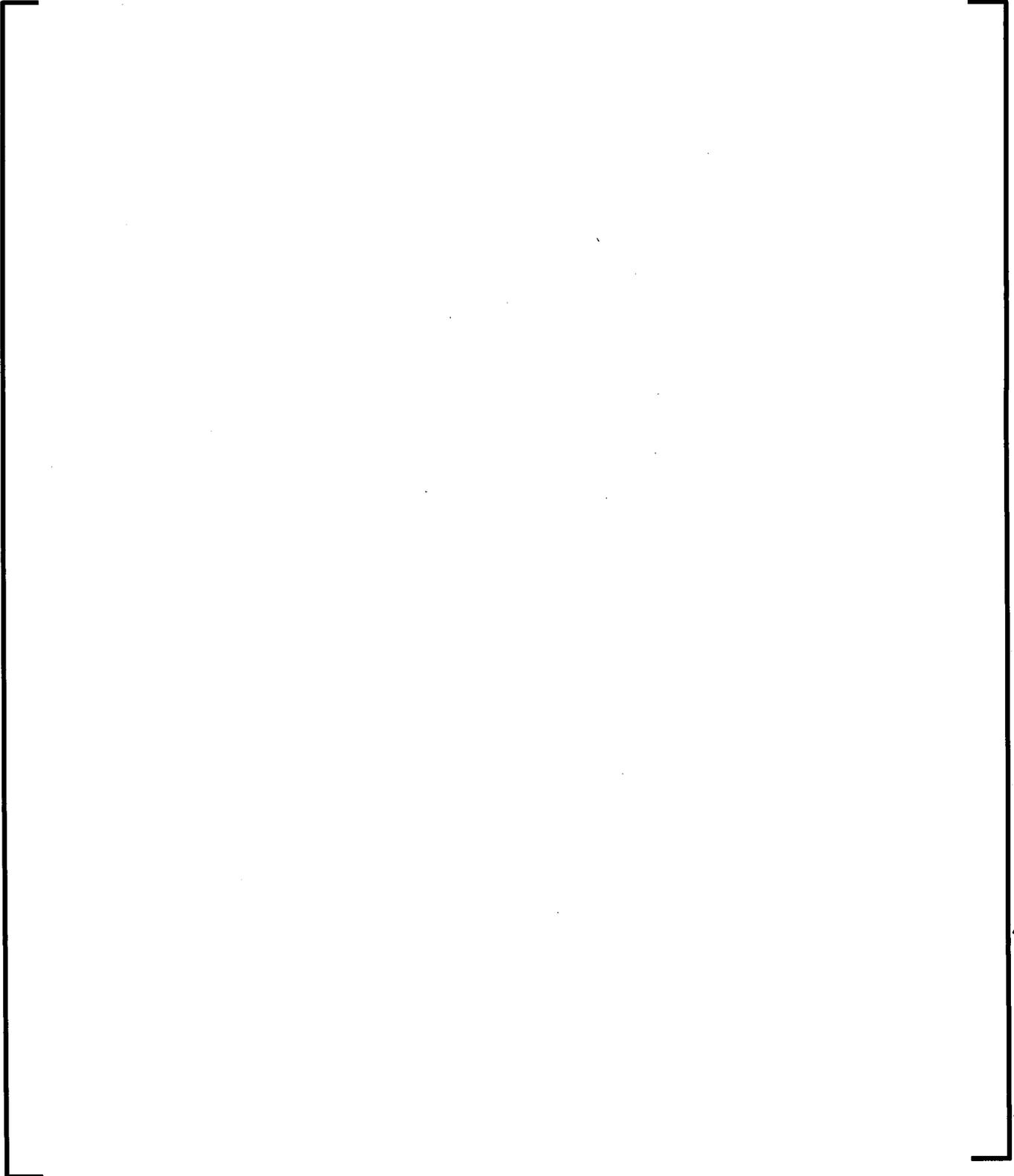
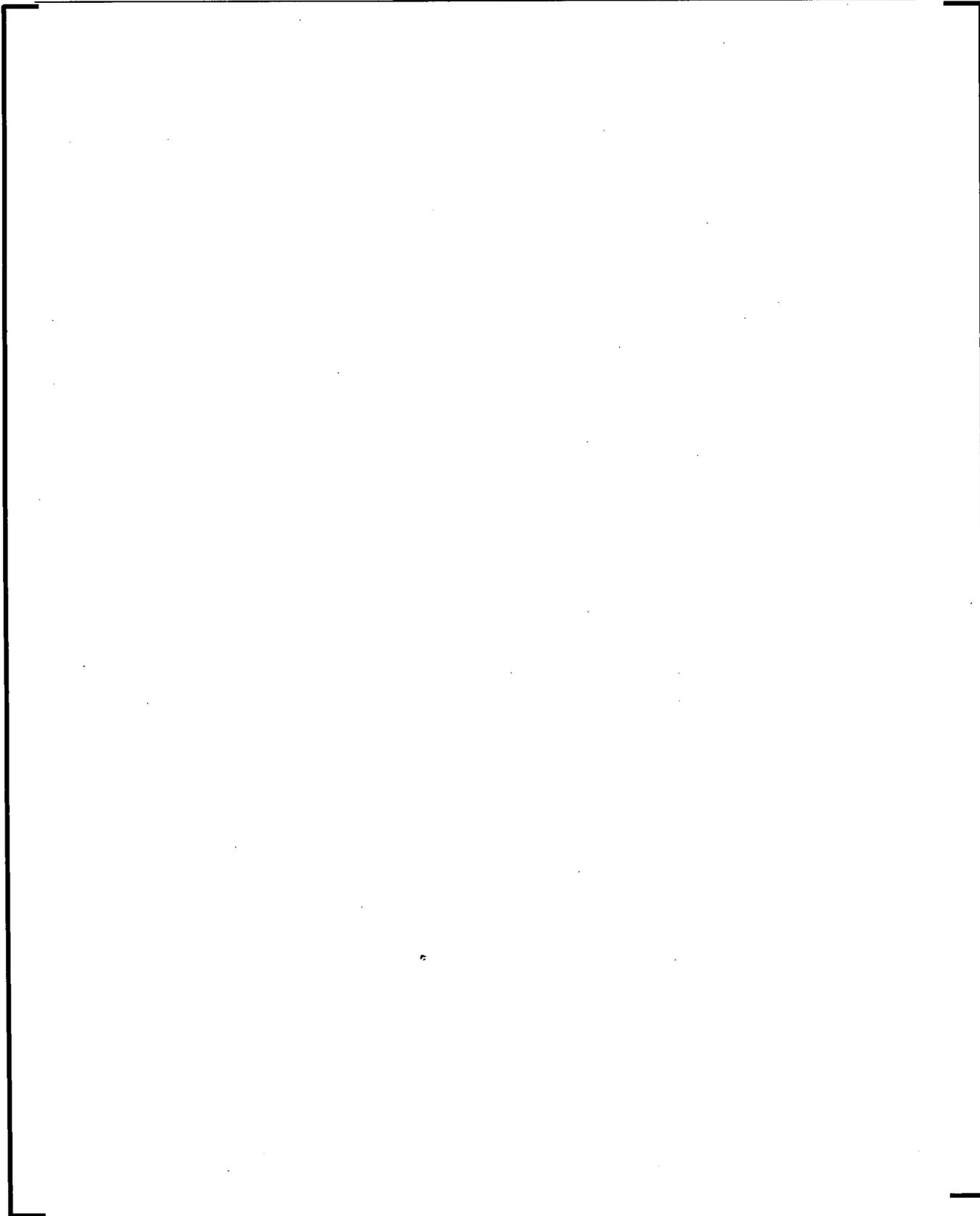
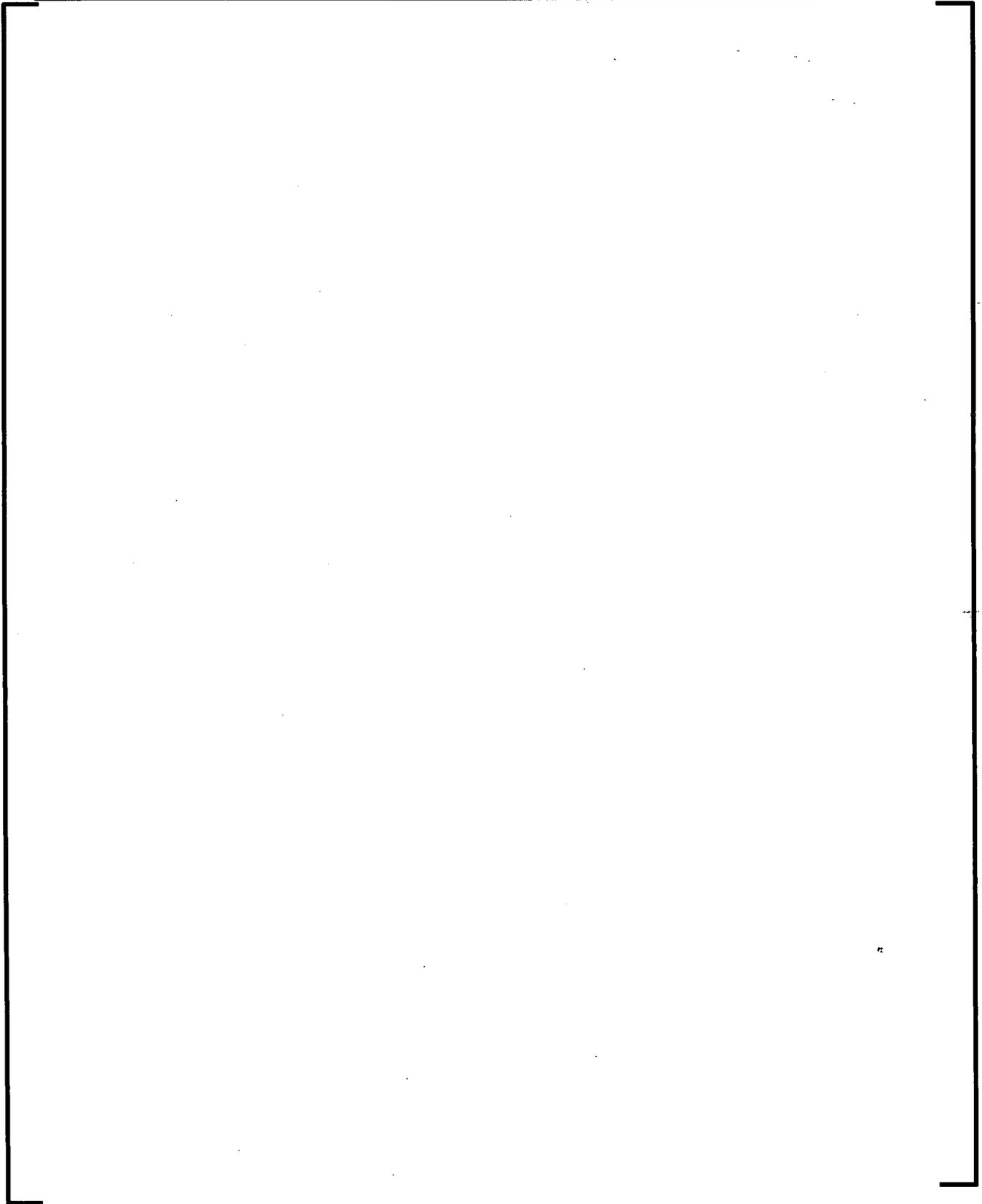


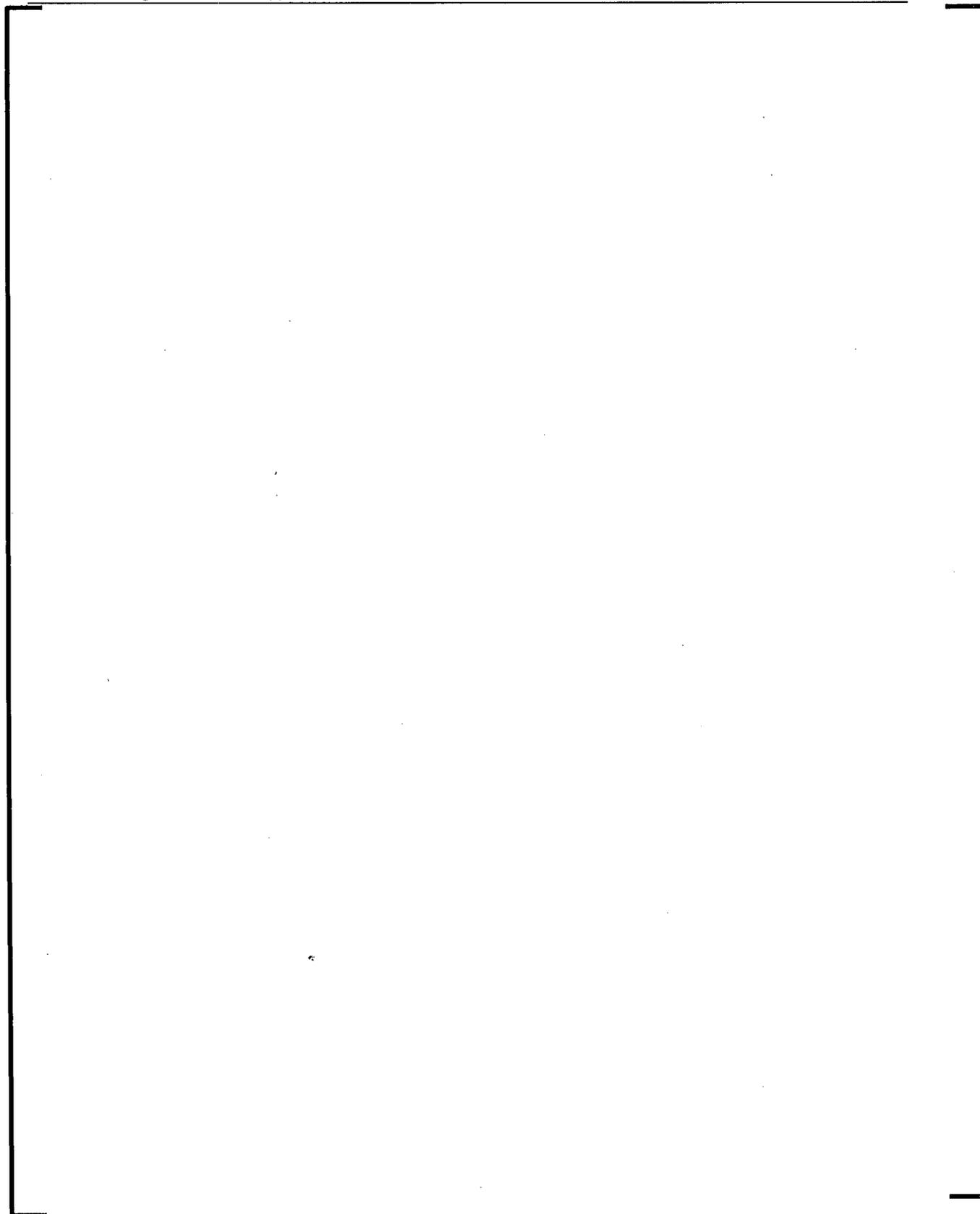


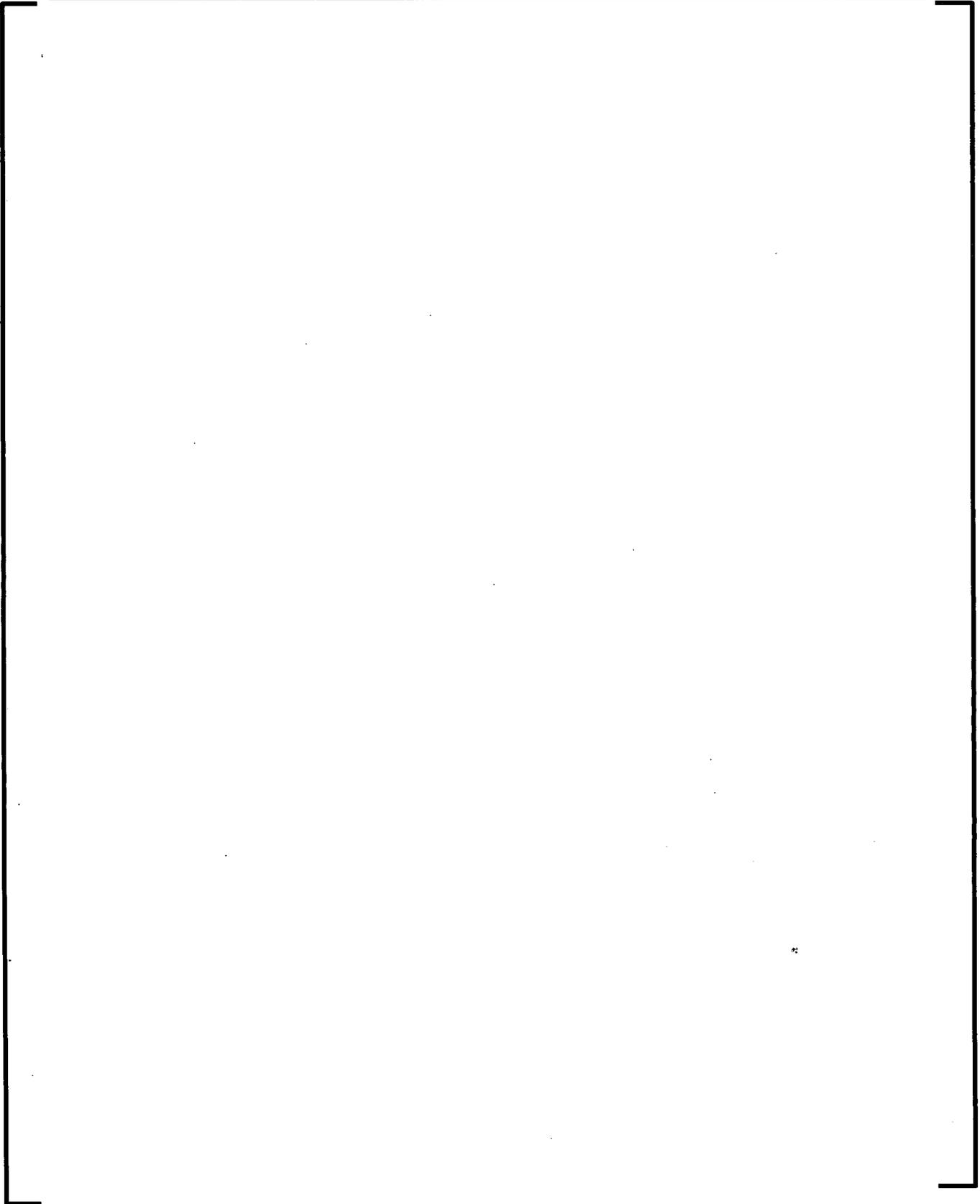
Table 18-75-2—TA Date Sheet for Emergency Feedwater System, Task 1

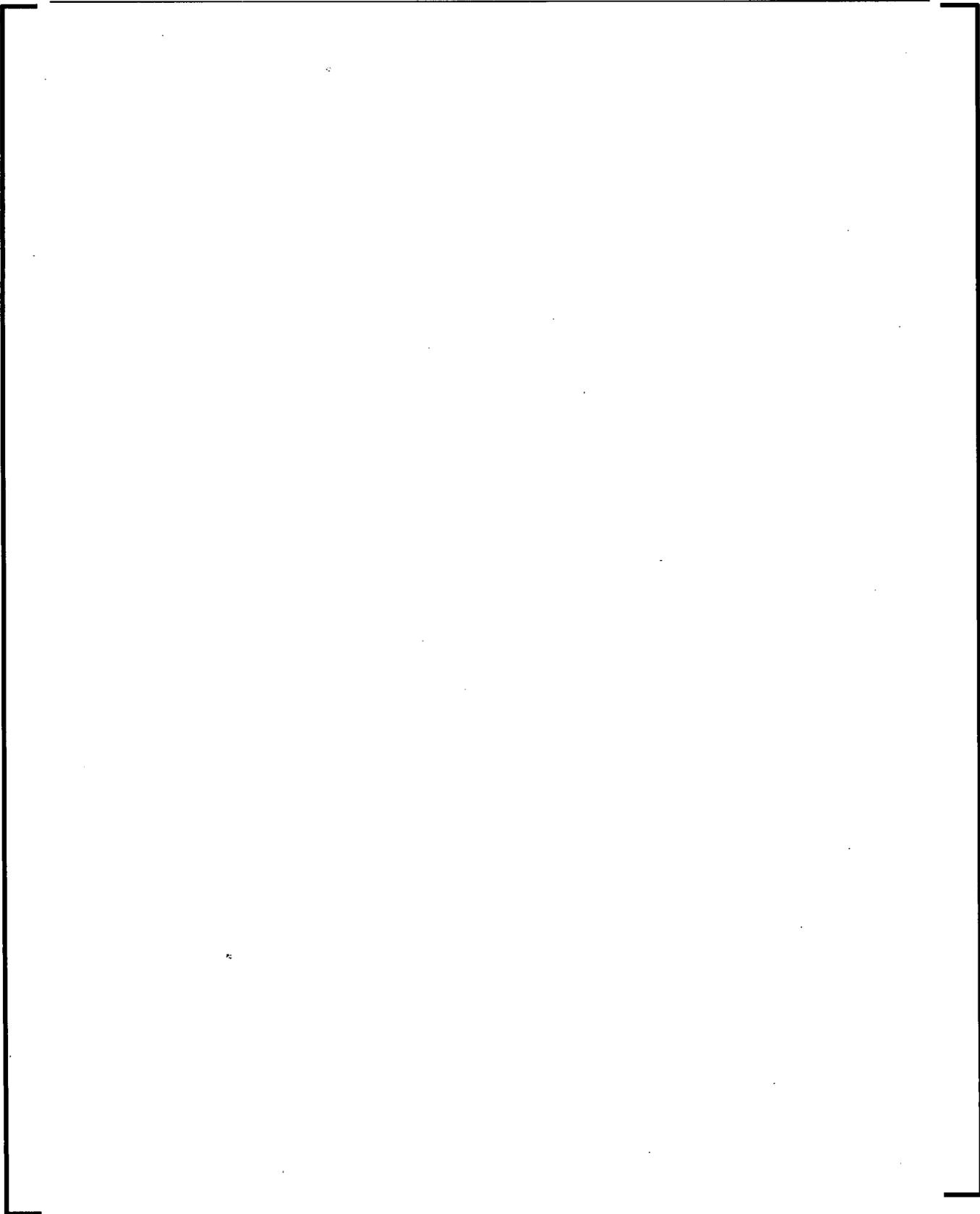
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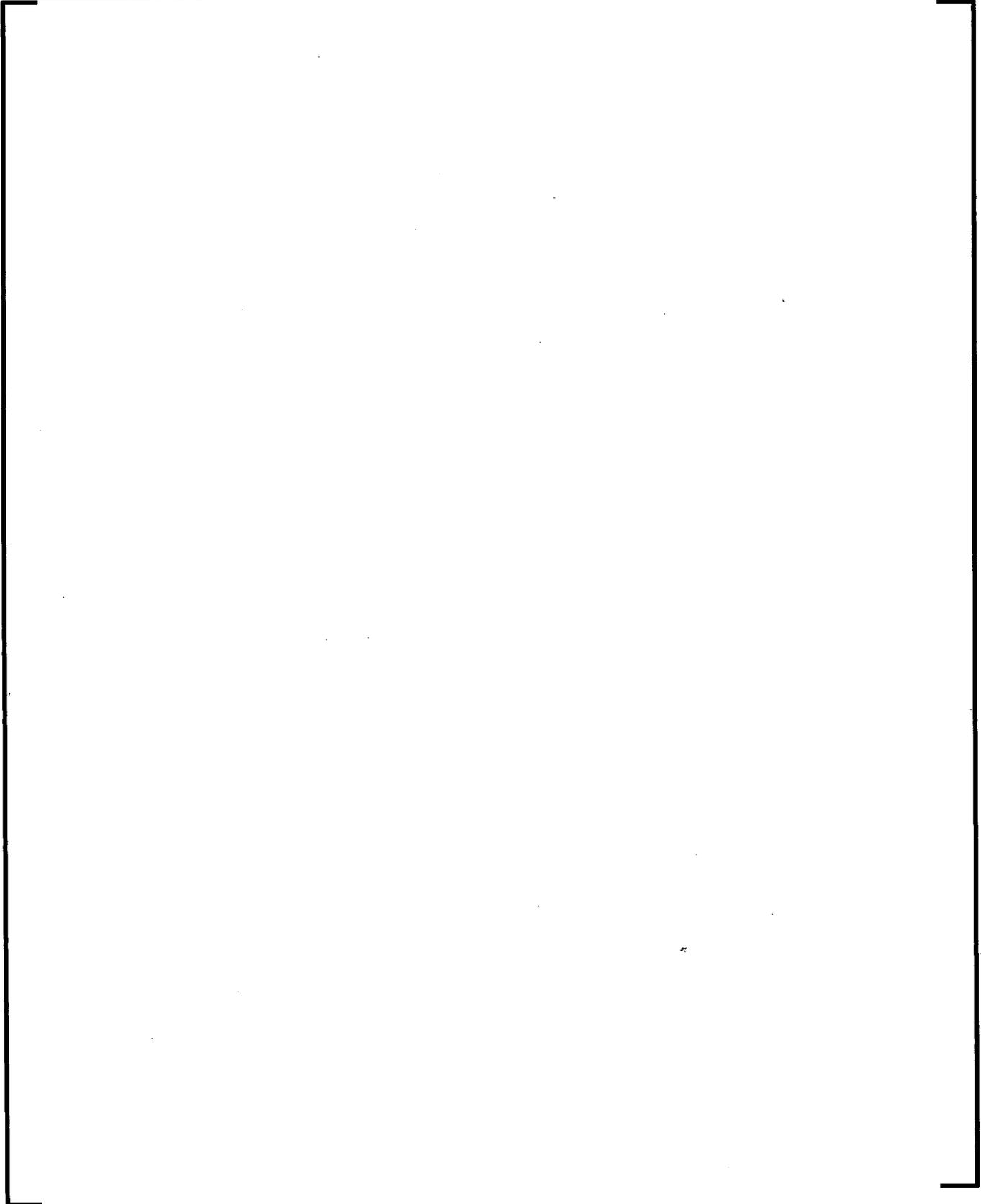












Question 18-76:

- a. Section 5 of NUREG-0711 Criterion 3 states: The task analysis should be iterative and become progressively more detailed over the design cycle. It should be detailed enough to identify information and control requirements to enable specification of detailed requirements for alarms, displays, data processing, and controls for human task accomplishment.

The U.S. EPR task analysis implementation plan has a process for identifying the plant and system/component level functions, but it does not identify the type or level of detail expected to be derived in each iteration of the plan.

Provide what information will be derived from each iteration, and how that information will be used in the next iteration.

- b. Sections 4.1.1 and 4.1.2 of the implementation plan provide a brief summary of how the applicant plans to conduct each iteration of the task analysis. The analysis is broken into two parts, a "high-level" analysis and a "lower level" analysis. First, the high level analysis is used to identify plant-level tasks used to perform plant-level functions.

Staff requests clarification on what is meant by "high-level" and "lower level" analysis and how these terms map to the plant and systems analysis. It is not clear whether "high level" analysis relates specifically to plant level analysis, and "lower level" refers exclusively to systems level, or whether "high level" and "lower level" will be performed for both plant and system level analyses. Provide clarification as to how these concepts are related.

Response to Question 18-76:

- a) The task analysis (TA) will be completed a minimum of three times: for normal operation, for outside of normal processes, and for maintenance, test, inspection, and surveillance (MTIS) functions. The U.S. EPR TA Implementation Plan (IP), Section 4.0, Paragraph 3 states that there are at least three iterations.

Regardless of the subject of the iteration (task, plant, system, function, and scenario), each iteration increases detail. As design progresses and more knowledge is gained, more details are added. The interim evaluations reduce the severity of design changes that might be required at each major stage. Each change cannot be defined because different stages of the system design descriptions progress at different rates.

Each iteration uses the final product from the iteration preceding it as a starting point. This builds a linear system instead of a design using parallel paths that may produce conflicts by simultaneous changes containing opposing elements for that design.

- b) High- and low-level refer to plant-level and system-level TA. They are produced through the same iterations of the TA. The words have been changed to plant-level and system-level TA. The TA is performed in the same manner (See part a) of this response). U.S. EPR TA IP, Section 4.0 describes how plant- and system-level TAs are completed.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-77:

The FSAR should contain all information (either directly or by reference) the staff uses in its evaluation. Provide a reference in the FSAR to the submitted Procedure Development Implementation plan (document no. 118-9101665-001) in DCD Section 18.8.

Response to Question 18-77:

The Response to RAI 322, Supplement 1, Question 18-52 revised U.S. EPR FSAR Tier 2, Chapter 18 to include references to the U.S. EPR Human Factors Procedure Implementation Plan (IP) and the other referenced human factors engineering (HFE) IPs.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-78:

The staff requests clarification for the following items in Section 4.0 of the Procedure Development Implementation Plan:

- a. It states (fourth bullet) that "data obtained from the design and development of other EPRs" is used as inputs into the TA, but the IP does not describe what type of data this is. Please provide clarifying information to address this discrepancy.
- b. Sec. 4.0 of the Procedures IP states that Ref. 6 is the EPR Technical Bases Document for EPGs but in Section 7.0, "References," the reference number [6] is listed as the U.S. EPR V&V Plan. Please address this discrepancy.
- c. Information describing high level goals for the computer procedure system was found in the Concept of Operations document (no. 117-9039988-001) but a reference to this document was not included.
- d. The IP provides multiple technical bases documents as input to procedures. Specifically, the U.S. EPR Technical Basis Document (for Emergency Procedure Guidelines), and the U.S. EPR EOP Technical Bases Document (Section 5.0). Provide information describing:
 1. Whether, these documents are the same document. If the documents are the same, the IP should be revised to reflect the correct document
 2. If they are different documents, provide clarification on the differences, and the relation of each document within the process

Response to Question 18-78:

- a) The five bullets describing inputs to task analysis (TA) will be removed from the U.S. EPR Procedure Development Implementation Plan (IP). The inputs to TA are described in the U.S. EPR TA IP. The following sentence is representative of information that will be added to the U.S. EPR Procedure Development IP:

The inputs to task analysis are described in the U.S. EPR Task Analysis Implementation Plan (Reference 1).

- b) The reference number for the U.S. EPR Technical Bases Document for emergency operating procedures (EOPs) will be removed from the U.S. EPR Procedure Development IP. The U.S. EPR Technical Bases Document for EOPs will be developed later in the design process.
- c) A section discussing the high level goals for computer based procedures (See the Response to Question 18-89) and a reference to the U.S. EPR Concept of Operations will be added to the U.S. EPR Procedure Development IP.
- d) The U.S. EPR Technical Basis Document and the U.S. EPR EOP Technical Bases Document are the same document. The correct document name is the "U.S. EPR EOP Technical Bases Document." This document name will be corrected in the U.S. EPR Procedure Development IP.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-79:

In section 5.0 of the IP it states that the B&W Owners Group Technical Bases document is used to develop the US EPR EOPs. The US EPR specific analysis will be incorporated into this document, and guidance will be developed to account for design differences between the US EPR and currently operating B&W plants. The staff requests clarification for the following:

- a. Is the process described in Section 5.0 used to solely develop the EOPs for the US EPR? If so, what process is used for development of the US EPR GTGs? If not, provide clarifying information for what will be developed.
- b. Overall, the process described in the procedure development implementation plan regarding if and how the US EPR GTGs are developed and how they relate to what is described in the IP is unclear. Provide clarifying information to address these issues.

Response to Question 18-79:

The subject matter addressed in this response contains representative information from the revised U.S. EPR Human Factors Procedure Implementation Plan (IP), Section 5.0:

Emergency operating procedures (EOPs) are developed using the same process as other operating procedures. However, the EOPs use the U.S. EPR EOP Technical Bases Document for additional input. This document serves as emergency procedure guidelines (EPGs) or generic technical guidelines (GTGs) for U.S. EPR EOPs. The U.S. EPR EOP Technical Bases Document is developed by analyzing tasks associated with design and beyond design basis events, utilizing the generic Babcock and Wilcox (B&W) Unit EOP Technical Bases Document as a model.

The generic B&W Unit EOP Technical Bases Document serves as input to the Procedure Writer's Guide section regarding EPGs. This approach allows use of the same symptom-based approach and guideline structure approved for operating B&W power plants. EPGs and EOPs include clearly defined entry conditions.

The schedule for providing the revised U.S. EPR Human Factors Procedure IP is provided below:

Document Number	Commitment Date
U.S. EPR Human Factors Procedure Implementation Plan	3/18/2010

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-80:

The procedure development IP (document 118-9101665-001) provides information on some aspects of the procedure writer's guides. Some questions remain related to these writer's guides.

- a. Are there multiple writers' guides or just one? If multiple, list them and describe the purpose of each one.
- b. How will readability and accuracy be addressed in the writer's guide development process?
- c. Will writer's guides be developed for only those procedures mentioned within the scope of the IP (those listed in Section 3.0), or will writer's guides be developed for computer procedures as well?
- d. What will be the process to ensure that the electronic procedures and paper procedures have the same format?
- e. Lastly, have writer's guides been developed for the U.S. EPR? If so, are they available for review? If not, when will writer's guides be available for staff review?

Response to Question 18-80:

- a) There is one Procedure Writer's Guide developed for the procedures in the U.S. EPR Human Factors Procedure Implementation Plan (IP). The following paragraph contains representative information from the revised U.S. EPR Human Factors Procedure IP:

The Procedure Writer's Guide developed in this phase covers the scope of the procedures discussed in the scope of this plan. Procedures that fall outside the scope of this plan are the responsibility of each COL applicant. The COL applicant may incorporate the information from the Procedure Writer's Guide delivered as an output from this plan into a site-specific Procedure Writer's Guide that includes the site-specific procedures outside the scope of this plan. The site-specific Procedure Writer's Guide could replace the Procedure Writer's Guide developed in this plan to execute the procedure development process.

- b) Readability and accuracy are only two attributes considered in the writer's guide development process. AREVA NP produces consistency and standardization in the engineering products.





In addition to verifying overall correctness in style, grammar, syntax, and other writing aspects, AREVA NP has independent reviewers who are human factors specialists and subject matter experts that establish and maintain accuracy of writing styles and technical content.

- c) A Procedure Writer's Guide will be developed for the procedures within the scope of the U.S. EPR Human Factors Procedure Implementation Plan. Computer based procedures are within the scope of this plan.
- d) The Procedure Writer's Guide will verify that computer-based procedures and paper-based procedures have a compatible format. The following paragraph contains representative information from the revised U.S. EPR Human Factors Procedure IP:

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- e) The Procedure Writer's Guide will be developed before the commencement of procedure drafting and after completion of the Human System Interface (HSI) Style Guide.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-81:

The implementation plan does not address whether electronic procedures will also include the elements listed in NUREG-0711 criterion 4 in Section 9.4. Clarify this issue.

Response to Question 18-81:

The elements listed in NUREG-0711, Section 9.4, Criterion 4 are addressed in Section 5.2.2 of the revised U.S. EPR Procedure Implementation Plan (IP) and are included in the electronic- and paper- based formats because the procedure content is compatible. The subject matter addressed in the following paragraph contains representative information from the revised U.S. EPR Procedure IP:

These common elements are formatted consistently for the types of procedures and the procedure platforms (including both computer- and paper-based procedures).

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-82:

The staff requests clarification for the following items with regard to the Babcock & Wilcox EOP Technical Basis Document described in the Procedure Development Implementation Plan:

- a. A reference to the Babcock & Wilcox EOP Technical Basis Document was not provided in the IP, yet this is an integral part of the procedure development process. Please include in the list of references in section 7.0 of the IP.
- b. In Figure 4-1 of the IP, are the Legacy Procedures Analyses the same as the B&W EOP Technical Basis Document? Also in Fig. 4-1, will staffing considerations have input to the procedure process?
- c. In Section 5.0, of the IP it states that the B&W Owners Group EOP Technical Basis Document will be modified "using the same approach and guideline structure approved for operating plants." The phrase "approved for operating plants" is unclear. Provide information to clarify this aspect.

Response to Question 18-82:

- a) A reference to the Babcock and Wilcox (B&W) Unit Emergency Operating Procedure (EOP) Technical Bases Document will be provided in the next revision of the U.S. EPR Human Factors Procedure Implementation Plan (IP).
- b) In Figure 4-1 of the U.S. EPR Human Factors Procedure IP, the Legacy Procedures Analyses are the same as the B&W EOP Technical Basis Document. This figure will be revised for clarity (see Figure 18-82-1).

Staffing considerations are addressed in the task analysis (TA) (workload analysis) as described in U.S. EPR TA IP, Section 4.4. TA outputs (procedure development inputs) have been evaluated to verify that staffing levels are adequate prior to drafting the procedure. The final staffing levels will be validated as part of the human factors verification and validation (V&V) process.

- c) The U.S. EPR Human Factors Procedure IP will be modified for clarity as follows:

This approach allows use of the same symptom-based approach and guideline structure approved for operating B&W nuclear power plants.

The schedule for providing the revised U.S. EPR Human Factors Procedure IP is provided below:

Document Number	Commitment Date
U.S. EPR Human Factors Procedure Implementation Plan	3/18/2010

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Figure 18-82-1—Revision of U.S. EPR Human Factors Procedure IP, Figure 4-1



Question 18-83:

Neither the implementation plan nor the FSAR provide a description of how the US EPR GTGs and EOPs will provide entry conditions to the operators. Provide clarifying information describing how the GTGs and EOPs provide entry conditions.

Response to Question 18-83:

Both the emergency procedure guidelines (EPGs) and the emergency operating procedures (EOPs) will contain defined entry conditions. This commitment will be added to the U.S. EPR Human Factors Procedure Implementation Plan (IP) in the next revision.

The schedule for providing the revised U.S. EPR Human Factors Procedure IP is provided below:

Document Number	Commitment Date
U.S. EPR Human Factors Procedure Implementation Plan	3/18/2010

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

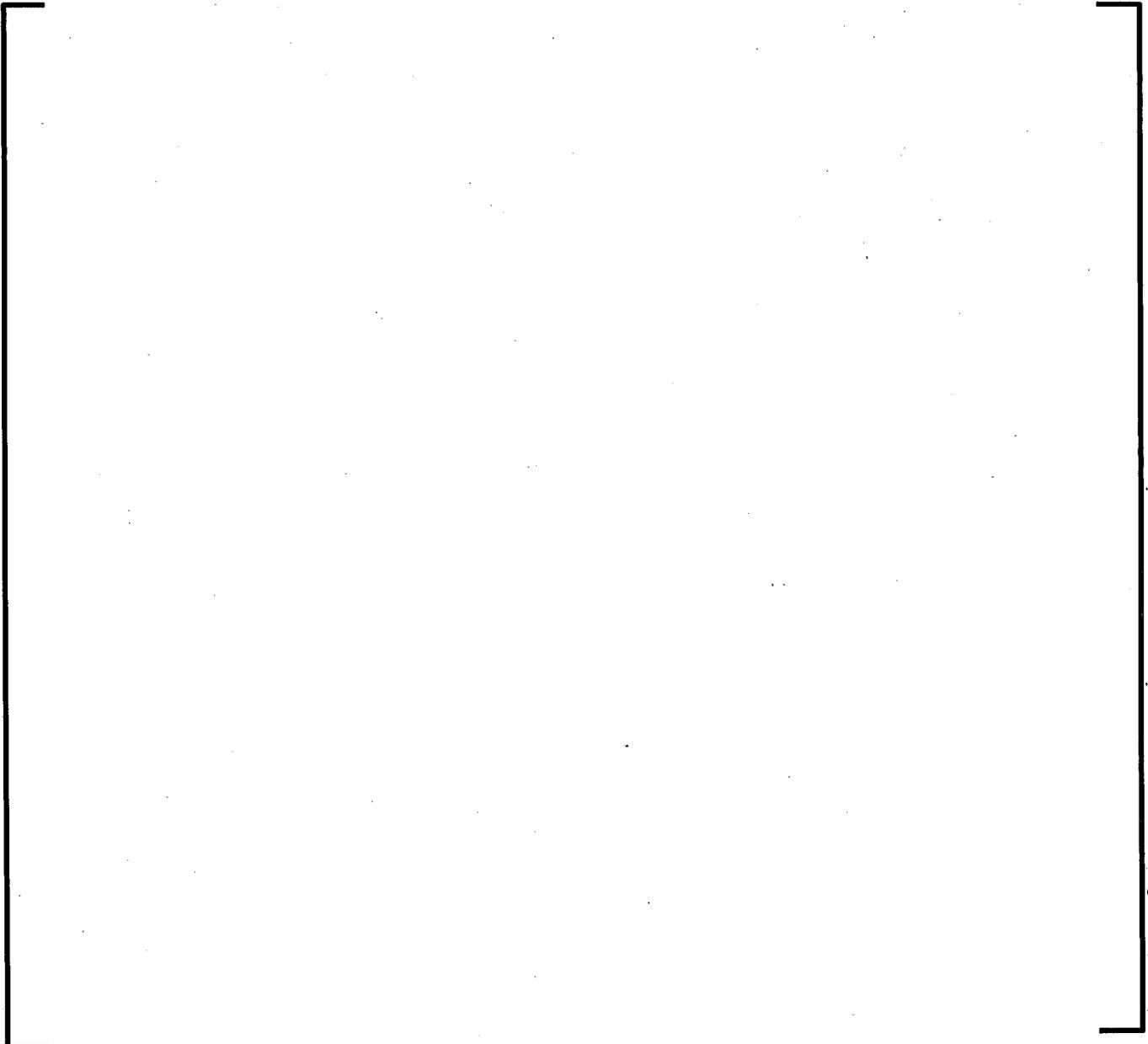
Question 18-84:

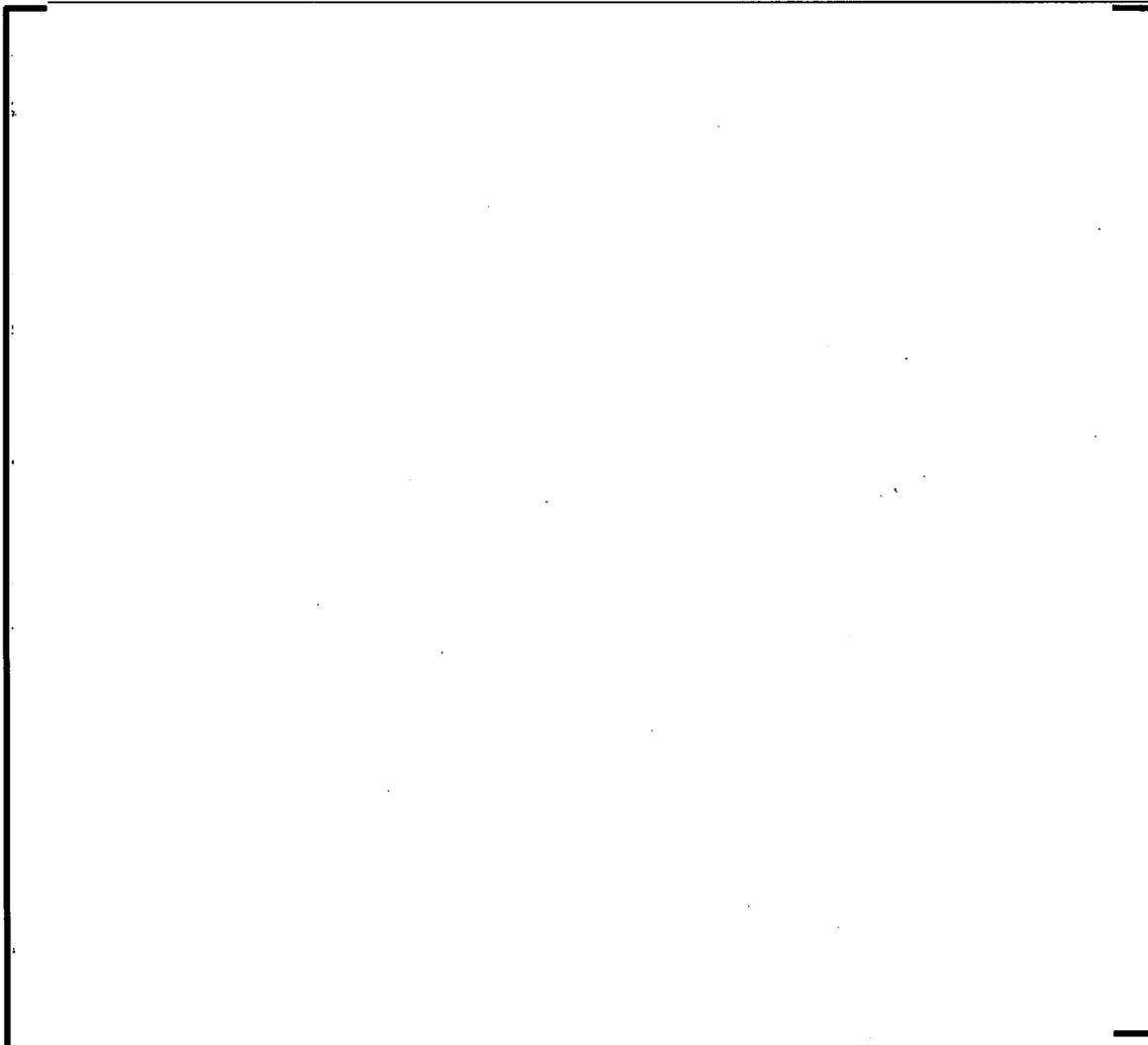
Describe how the transition from electronic to paper procedures will be conducted.

Will an analysis for the loss of the electronic procedures be conducted? If so, describe the strategy/process.

Response to Question 18-84:

A description of the transition from computer-based procedures (CBPs) to electronic procedures and the analysis of this event will be added to the U.S. EPR Procedure Implementation Plan (IP). The subject matter addressed in the following paragraphs contains representative information from the revised U.S. EPR Procedure IP:





FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-85:

Clarify the process used (prior to the ISV) to verify all procedures.

Response to Question 18-85:

Procedures are evaluated for accuracy during the initial procedure evaluation phase of the U.S. EPR Human Factors Procedure Implementation Plan (IP). Once the procedures complete this phase, they are sent to AREVA NP human factors engineering (HFE) verification and validation (V&V) engineers. These engineers verify that the procedures incorporate the output from the task analysis (TA), incorporate relevant risk-significant human actions (HAs), and comply with the requirements of the Procedure Writer's Guide prior to performing integrated system validation (ISV) using those procedures.

The subject matter addressed in the following section contains representative information from the revised U.S. EPR Procedure IP that will clarify this process::

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The schedule for providing the revised U.S. EPR Human Factors Procedure IP is provided below:

Document Number	Commitment Date
U.S. EPR Human Factors Procedure Implementation Plan	3/18/2010

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-86:

In Figure 4-1 of the IP, it appears that changes that are identified in the initial procedure evaluation are input back into the TA (denoted by a solid black line). A dashed line above that line is drawn but has no designation. Clarify what the dashed lines are communicating in this Figure.

Response to Question 18-86:

The dashed lines in U.S. EPR Human Factors Procedure Implementation Plan (IP), Figure 4-1 communicate that the initial procedure development and initial procedure evaluation steps of the procedure development process can separately provide input to and receive input from the human system interface (HSI design) and training elements of the human factors engineering (HFE) program. Figure 18-82-1 shows the layout of the lines and their line types, which have been revised in the U.S. EPR Human Factors Procedure IP.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-87:

Procedures should be maintained throughout the development and V&V processes. Provide clarifying information in the IP describing the plan for procedure maintenance during the HFE process.

Response to Question 18-87:

Procedures will be maintained throughout the development and verification and validation (V&V) processes. The subject matter addressed in the following paragraphs contains representative information from the revised U.S. EPR Human Factors Procedure Implementation Plan (IP):

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The schedule for providing the revised U.S. EPR Human Factors Procedure IP is provided below:

Document Number	Commitment Date
U.S. EPR Human Factors Procedure Implementation Plan	3/18/2010

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-88:

In Section 18.8.2.3, the FSAR summarizes the NUREG-0711, section 9.4, criterion 9. The FSAR states that "Adequate space is provided at appropriate workstations in the MCR and RSS for operators..."; it does not address adequate space for lay down of procedures at the local control stations. Describe procedure use at local control stations.

Also, this aspect of procedure use is not addressed in the IP. Add this information to the IP.

Response to Question 18-88:

Local control stations (LCS) development is included in the LCS design plan. There is not an expectation that a laydown area is necessary at any LCS. Because LCS can consist of a single valve handwheel, there is no expectation of placing a laydown area next to each. Laydown areas for actual control stations that contain a safety information and control system (SICS) or a process information and control system (PICS) work station are considered.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 18-89:

The IP does not describe how the operators can easily access the necessary procedure through the US EPR electronic procedure system. Are there multiple VDU stations in the MCR that the operators can use to access electronic procedures, all of the stations, only one or two? At the individual stations what is the functionality of the electronic procedure system that ensures the operators will be able to navigate to, and through, the procedures?

In general, provide detailed information describing how the operators will interface with the electronic procedure system within MCR, RSS, and LCSs.

Response to Question 18-89:

The following description of the computer-based procedure system contains representative information from the revised U.S. EPR Procedure Implementation Plan (IP):

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FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.