

The Light company

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ST-HL-AE-1188
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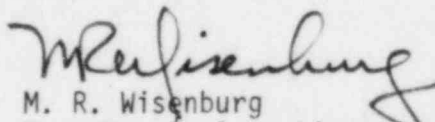
Mr. George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Knighton:

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
NRC Question Responses

Please find attached our responses to NRC question 620.02N. Note that items h, i and k are not included. Houston Lighting and Power will provide responses to these items by April 15, 1985. Because such a broad area is covered by these responses we request that you provide a copy of the responses to the Performance and Test Review Branch and any others you deem necessary.

Very truly yours,


M. R. Wisenburg
Manager, Nuclear Licensing

AND/yd
Attachment:

(1) Response to Q620.02N

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Houston Lighting & Power Company
cc:

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Page 2

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620.0 HUMAN FACTORS ENGINEERING BRANCH

620.2 Provide the following information and clarification regarding your summary report for the Detailed Control Room Design Review (DCRDR) submitted April 12, 1984:

- a. Your systems function and task analysis (SFTA) was performed through document reviews, briefings, and walk-throughs on the mock-up and updated using the revised mock-up as reported in the SFTA Validation Report. Because the SFTA was not based on upgraded emergency operating procedures (EOPs) required by Supplement 1 to NUREG-0737, and because EOP's are not typically available at early stages of design and construction, but should be available prior to licensing, please confirm, after EOPs are finalized, that information and control function needs have been adequately identified and are satisfied by available instrumentation and controls.
- b. Verify that an objective comparison of independently determined display and control requirements, as determined by function and task analyses has been made with the control room inventory to identify missing controls and displays as required in Supplement 1 to NUREG-0737, and summarize the results of this comparison.
- c. Substantiate that an objective, independent determination of the operator information and control needs for each operator task has been made before instrument and control specifications are developed.
- d. Describe the specific process for using generic guidelines and background documentation to identify the characteristics of needed instrumentation and controls. For the information of this type that is not available from the Emergency Response Guidelines and background documentation, describe the process used to generate this information to derive required instrumentation and control characteristics and control characteristics.
- e. Verify an auditable record is maintained regarding how the needed characteristics of required instruments and controls were determined for each instrument and control used to implement the emergency operating procedures.
- f. Discuss the present status of the design of the sit-down control stations.

- g. Provide a summary discussion and conclusions regarding the supplementary assessment to accommodate smaller (i.e. 5th-20th percentile) female operators and to use extended functional reach criteria for lower percentile subjects.
- h. Discuss the resolution of the three category "A" human engineering deficiencies regarding:
 - (1) The green Rotobellite indicator lights which cannot be distinguished when illuminated;
 - (2) The bypass and inoperable status light legend which are unreadable due to narrow stroke width and inadequate character separation and line spacing; and
 - (3) The legend messages containing more than three lines of text.
- i. Discuss the results of the resolution of all unresolved human engineering deficiencies in categories "B", "C", "D" and "E".
- j. Provide justification and rationale for using random checks rather than 100 percent checks of items which cannot be completed until the control room and/or simulator is operational.
- k. Your present schedule is stated in general terms for completion of all planned DCRDR work. Provide a more specific schedule for implementation of corrective actions for human engineering deficiencies.

Response

STP performed the Control Room Design Review (CRDR) as part of an overall integrated effort to address the requirements and guidance of Supplement 1 to NUREG-0737. CRDR activities were and continue to be integrated with the following STP activities:

- ° Development of the Safety Parameter Display System (SPDS) which is implemented via the Emergency Response Facilities Data Acquisition and Display System (ERF DADS).
- ° Determination of instrumentation requirements for post accident monitoring to address Regulatory Guide 1.97.
- ° Development of STP Emergency Operating Procedures (EOPs) that are human factored, function oriented and well integrated with the plant design.

The CRDR System Function and Task Analysis (SFTA) was independently performed by Torrey Pines Technology (TPT) to comply with NUREG 0700 as defined in the STP CRDR Program Plan submitted to the NRC by letter ST-HL-AE-899,

Mr. J. H. Goldberg of Houston Lighting and Power to Mr. Thomas M. Novak, U.S. Nuclear Regulatory Commission dated October 20, 1982, and resubmitted with the CRDR Executive Summary Report by letter ST-HL-AE-1080, Mr. J. H. Goldberg of Houston Lighting and Power to Mr. Darrell G. Eisenhut, U.S. Nuclear Regulatory Commission, dated April 12, 1984. A flow chart of the STP CRDR SFTA process is shown in Figure 620.2-1. This SFTA was based on the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs) as well as the STP plant design. The STP design was integrated with the WOG ERG's utilizing STP design documentation and input from STP plant operators to develop functional flow diagrams specific to STP. These diagrams formed the basis for the SFTA tabulation of the operator tasks and required equipment (i.e. instrumentation or controls) associated with each task. This process for performing the STP CRDR SFTA and the SFTA results are documented in the STP CRDR System Function and Task Analysis Report submitted to the NRC with the CRDR Executive Summary. Following the revision to the STP main control panel layout, the SFTA tabulations of operator tasks and required equipment were revised to reflect the new panel equipment and locations. This update formed the basis of the SFTA validation of the panel design. A procedure walk-through/talk-through was also conducted using draft plant specific procedures in the control room mock-up. These draft plant specific procedures were based on the WOG ERGs, STP process design, and the STP SFTA functional flow diagrams. This SFTA validation process and the results are documented in the STP CRDR System Function and Task Analysis Validation Report submitted to the NRC with the CRDR Executive Summary.

In parallel with the STP CRDR SFTA efforts, STP performed an analysis to address post accident monitoring requirements to respond to Regulatory Guide 1.97. A flow chart of the STP Regulatory Guide 1.97 implementation process is shown in Figure 620.2-2. This was accomplished by performing a task analysis based on the WOG ERGs to identify variables necessary for implementation of the guidelines. This analysis was applied to the STP specific design through a plant survey of the STP design documents. The STP specific analysis is summarized in STP FSAR Appendix 7B. The analysis itself identified, in addition to the variables necessary for implementation of the ERGs, variable display requirements including range, accuracy, qualification, redundancy, recording needs, and operator task utilization. These requirements were compared to existing STP instrumentation to determine required design changes. These changes were incorporated in the revised main control panel mock-up and were utilized in the CRDR SFTA validation. This instrumentation is summarized in FSAR Table 7.5-1.

Also in parallel with the STP CRDR SFTA and with the STP Regulatory Guide 1.97 implementation, STP began development of the EOPs based on the WOG ERGs, the identified Regulatory Guide 1.97 variables, and the revised panel layouts.

The Regulatory Guide 1.97 variable list developed during the Regulatory Guide

1.97 implementation process was then utilized to determine the ERF DADS/SPDS data base. This system is described in FSAR Section 7.5.7. A subset of this data base, those Category 1 Type A and Type B variables determined from the Optimal Recovery Guidelines (ORGs) and the Critical Safety Function (CSF) Status Trees/Functional Recovery Guidelines (FRGs) respectively, is the data base for the Qualified Display Processing System (QDPS) described in FSAR Section 7.5.6. The ERF DADS/SPDS display development process is shown in Figure 620.2-3.

- a. The development of the South Texas Project Electric Generating Station (STPEGS) EOPS are based on Revision 1 of the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs). During the conversion process the instrumentation and control requirements of the ERGs are compared with the Regulatory Guide 1.97 equipment to develop both the normal and alternate indications available to the operators. Prior to final approval of the STPEGS EOPs, they will be placed through a verification and validation program as specified by Supplement 1 to NUREG-0737. This program will be described in detail in the Procedure Generation Package scheduled for submission in June of 1985. This program will confirm that the instrumentation and control function needs have been adequately identified and are satisfied.
- b. The CRDR SFTA process included a comparison of the display or control requirement, as defined by a task objective, to the main control panel equipment. The task objectives are stated in specific terms relating to plant equipment, for status or control requirements. This comparison was performed by TPT personnel during the SFTA. The task objectives defining a display or control requirement were developed from functional flow diagrams. These functional flow diagrams were developed by TPT utilizing the WOG ERGs, plant process design documentation, and input from plant design and operations personnel relative to plant system function.

The Regulatory Guide 1.97 implementation process included a comparison of the display or monitoring requirements, as defined by the STP design basis to respond to Regulatory Guide 1.97, to the main control panel equipment. The monitoring requirements are stated in terms of range, accuracy, and Regulatory Guide 1.97 category which in turn defines instrumentation qualification, redundancy, and display and/or recording requirements. This comparison was performed and documented in an STP Regulatory Guide 1.97 plant survey.

As a result of the CRDR SFTA, it was determined that the existing panel layout contained the required instrumentation and control equipment with the exception of ECW flow indication. This was documented as HED S-875. The adequacy of the existing equipment was not specifically addressed as part of the SFTA. This was addressed as part of the control room survey and as part of the Regulatory Guide 1.97 review. The CRDR SFTA identified significant concerns relative to panel layout and functional grouping of panel equipment. These results were a primary input to the decision to perform extensive panel redesign.

The Regulatory Guide 1.97 task analysis identified numerous changes required to panel display instrumentation (including ECW flow monitoring). The changes were in the form of additional or revised ranges, instrument qualification, or new display or recording devices. Approximately 100 changes were identified and were summarized in the STP CRDR Implementation Plan Report initially submitted to the NRC by letter ST-HL-AE-946, from Mr. J. H. Goldberg to Mr. Thomas M. Novak, April 7, 1983.

The Regulatory Guide 1.97 results are also documented in FSAR Table 7.5-1.

- c. The CRDR SFTA functional flow diagrams and task objectives were developed by TPT utilizing the WOG ERGs, plant process design documentation, and input from plant design and operations personnel relative to plant system function. The task objectives defining a display or control requirement are stated in specific terms relating to plant equipment for status information or control needs, or plant process variable, for monitoring information or control needs. These task objectives determining operator information and control needs were developed prior to the comparison to the main control panel equipment as documented on the SFTA operator task identification and analysis forms.

The Regulatory Guide 1.97 variable requirements were defined based on the Westinghouse generic design basis to respond to Regulatory Guide 1.97. These generic design bases were applied to the STP specific process designs through reviews utilizing plant process flow diagrams and single lines, and the plant accident analyses. These variable requirements were developed prior to the comparison to the existing plant instrumentation.

Numerous control and instrumentation specifications existed prior to the inception of the STP CRDR or the STP Regulatory Guide 1.97 implementation. As a result of both of the efforts, the majority of these specifications were revised to replace, upgrade or enhance the existing controls and instrumentation. In addition many new specifications were developed after the needs were determined through either the CRDR or the Regulatory Guide 1.97 review.

- d. The CRDR SFTA and the Regulatory Guide 1.97 review utilized the WOG ERGs and numerous plant specific documents. From these TPT, as part of the CRDR SFTA, developed an extensive STP "systems" background employing where necessary interviews with plant design and operations personnel. This "systems" knowledge is documented in the CRDR SFTA report and formed the basis for the SFTA.

The Regulatory Guide 1.97 reviews also employed the WOG ERGs and plant specific documents including the plant accident analysis for plant specific design data required to derive operator informational needs. As the STP EOPs are developed, a continuing dialogue exists between the HL&P Operations staff and the system designers to ensure that operational information needs are identified and addressed by the control room instrumentation. The design basis for the operational information needs is documented in FSAR Appendix 7B and the instrument requirements are documented in Table 7.5.1.

- e. An auditable record is maintained documenting the design basis for determining the instrumentation requirements (operator informational needs) based on the WOG ERGs and STP plant specific documentation. This design basis, provided in FSAR Appendix 7B, and the detailed instrumentation listing provided in FSAR Table 7.5-1, will be maintained through the development and validation of the EOPs.
- f. There are two consoles within the control room: ZCC-020, Operators Console and ZCC-021, Auxiliary Console. The design has been completed on the consoles and the design has been reviewed for compliance to the STP CRDR Criteria. The consoles will be fabricated and are scheduled for delivery in mid-1985.
- g. Houston Lighting and Power (HL&P) has developed a functional reach test to be administered to all Reactor Operator candidates. The development of the test included the identification of all controls that are critical in emergency situations. Two types of critical controls that are located at the greatest height on the vertical panels were identified. A mock-up test panel will be constructed to simulate the locations of the critical controls. Simultaneous with the functional reach test, a job-relevant preliminary visual acuity screen will be conducted using control and annunciator labels identified to those used on the main control board. Procedures for the administration of the tests are detailed and provide clear pass/fail criteria. Personnel not passing the tests will not be allowed to perform in the Reactor Operator position.
- h. Response will be provided by April 15, 1985.
- i. Response will be provided by April 15, 1985.
- j. Random or sample checks are identified in the CRDR Executive Summary Report to be performed in the completed control room and/or simulator for the following:

- ° labels
- ° annunciator tiles
- ° demarcation painting
- ° meter scales
- ° legend light engravings and "closed corner" markings
- ° recorder charts
- ° vertical meter pointer color

All of the items have been or are in the process of being implemented through engineering drawings, data sheets, and specifications. Each of these documents is reviewed for compliance to the STP CRDR Criteria prior to issue for purchase, fabrication, and/or installation. This is a controlled design process and the purchase, fabrication, and/or installation of these items are also governed by a quality assurance program. Sample checks will be performed as an additional assurance measure.

- k. Repsonse will be provided by April 15, 1985.

**SOUTH TEXAS PROJECT
EMERGENCY RESPONSE FACILITIES DATA ACQUISITION
AND DISPLAY SYSTEM/SAFETY PARAMETER DISPLAY SYSTEM
DISPLAY DEVELOPMENT PROCESS**

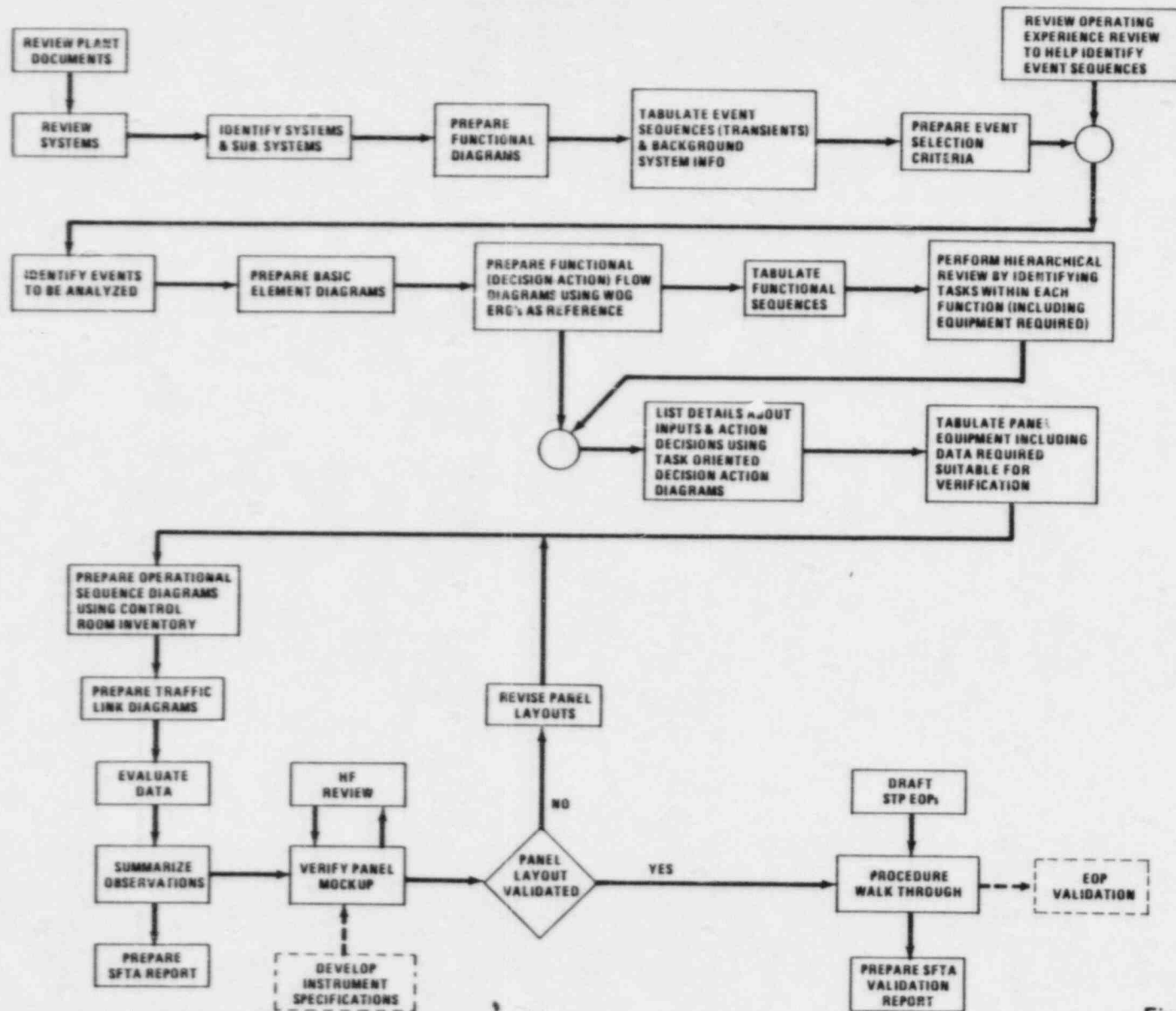


Figure 620.2-1

**SOUTH TEXAS PROJECT
REGULATORY GUIDE 1.97
IMPLEMENTATION PROCESS**

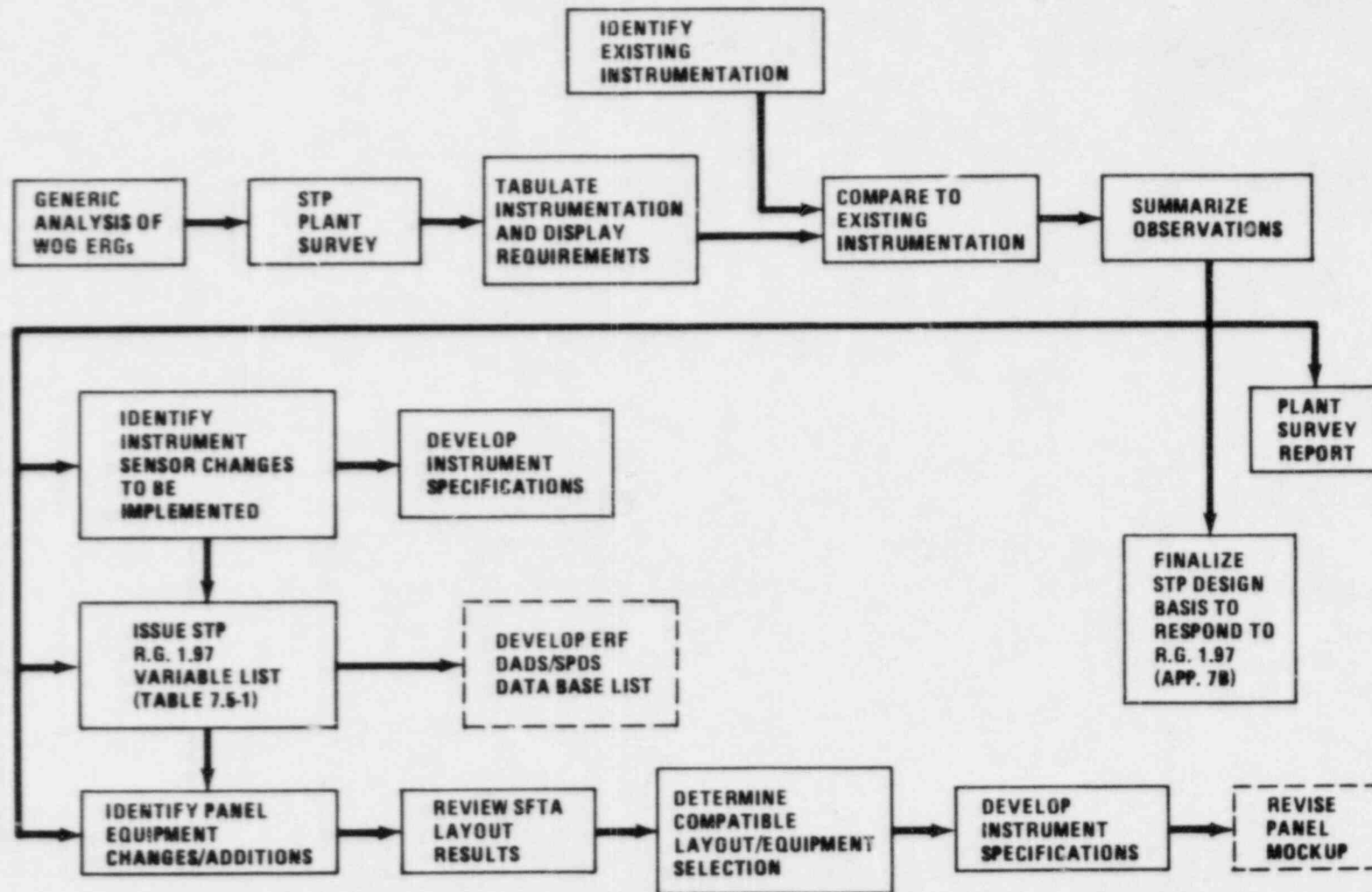


Figure 620.2-2

SOUTH TEXAS PROJECT
EMERGENCY RESPONSE FACILITIES DATA ACQUISITION
AND DISPLAY SYSTEM/SAFETY PARAMETER DISPLAY SYSTEM
DISPLAY DEVELOPMENT PROCESS

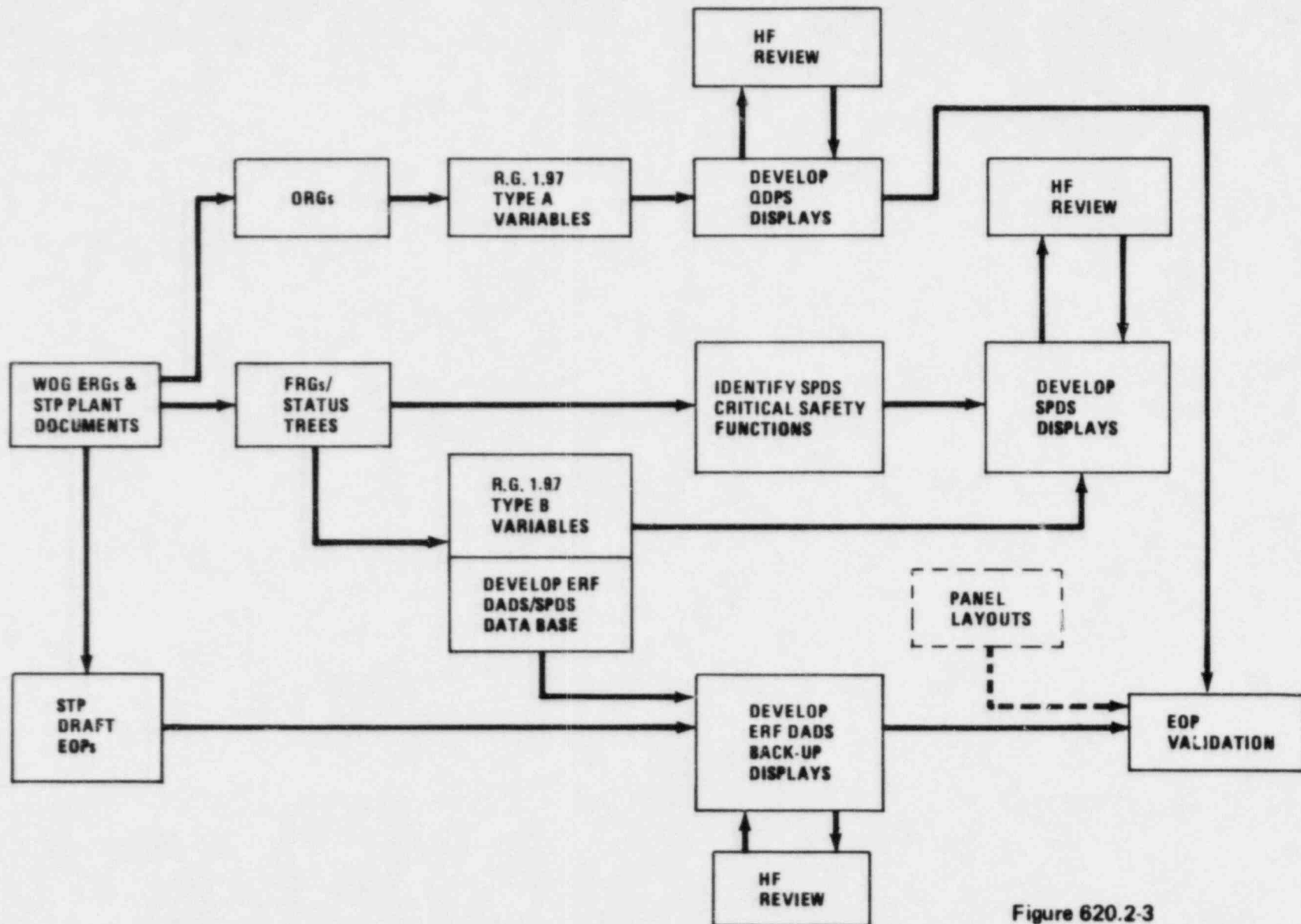


Figure 620.2-3