DESIGN BASELINE AND VERIFICATION PROGRAM (DBVP)

CORRECTIVE ACTION PROGRAM PLAN

WATTS BAR NUCLEAR PLANT

REVISION 5

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TITLE:	PROGRAM DESCRIPTION FOR WATTS BAR DESIGN BASELINE AND VERIFICATION PROGRAM (DBVP)	REVISION LOG
Revision No.	Description of Revision	Date Approved
0	Initial issue.	07/21/86
1	This is a general revision to reflect revised scopes of work to be more consistent with the content of the BFN and SQN DBVPs. Changes include addition of calculation activity, addition of testing requirements activity, addition of system evaluations, performance of vertical slice review by an independent contractor outside the DBVP in lieu of previously scoped DBVP verifications, and normal quality assurance/engineering assurance oversight role.	10/06/88
2	This revision addresses comments made by NRC in the presentation of this plan on February 7, 1989. Changes include the addition of logic diagrams to the DBVP scope, clarification that the portion of the fire protection system necessary to mitigate a design basis event is within scope, and clarification with regard to primary and secondary safety-related features to be included in the calculation effort.	03/29/89
3	Deleted reference to the no longer existing Engineering Assurance organization. Added Fuel Handling and Storage System (System 79) to the DBVP Systems List in Attachment 2. Deleted System 86, "Diesel Starting Air System," from the Attachment 2 list and added a parenthetical note to System 82 that it includes "Diesel Starting Air System."	07/27/90
4	Revised the description of the Licensing Verification Program to define the requirement for denoting programmatic commitments in site controlling documents in lieu of the development of the Licensing Document Commitment Matrix. Minor changes to bring CAP up-to-date. Reference: Problem Evaluation Report WBP910097PPER	11/08/91

TITLE:	PROGRAM DESCRIPTION FOR WATTS BAR DESIGN BASELINE AND VERIFICATION PROGRAM (DBVP)	REVISION LOG
Revision No.	Description of Revision	Date Approved
5	Revised the Configuration Control (CC) description to delete system evaluations. System evaluations are no longer required due to the broad scope of the Calculations Program with respect to regenerated calculations and review of existing calculations for technical adequacy and consistency. Clarified that the scope of verification in the CC area is the portion of the systems required to mitigate design basis events. Revised the Testing Requirements area deleting statements regarding the review of previous test results. Revised the Calculation Activity description to clarify the scope of the Mechanical/Nuclear and Civil Calculations programs. Clarified the scope of Calculations Activity to exclude equipment vendor calculations and to include only certain secondary safety-related calculations. Also expanded the discussion on consistency evaluations. Other minor changes.	

WATTS BAR NUCLEAR PLANT

DESIGN BASELINE AND VERIFICATION PROGRAM (DBVP)

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DESIGN BASELINE AND VERIFICATION PROGRAM

1.0 INTRODUCTION

The Watts Bar Nuclear Plant (WBN) Design Baseline and Verification Program (DBVP) assures that the WBN licensing basis, design basis, calculations, and safety-related plant functional configuration for Unit 1 and Common features are in agreement, and establishes the necessary procedures to maintain this baseline. The DBVP also establishes engineering test requirements for the WBN Startup and Test Program.

TVA became aware of inconsistencies and omissions in the WBN licensing and design basis documentation as the result of several activities, including:

- Adverse Conditions and Conditions Adverse to Quality (CAQs).
- Employee Concerns.
- TVA self-evaluations, including lessons learned from Sequoyah (SQN) and Browns Ferry Nuclear Plants (BFN).
- Industry experience and reviews.
- Regulatory reviews.

Upon investigation, TVA determined that there were instances of the following conditions:

- Inconsistencies between the WBN Final Safety Analysis Report (FSAR) and WBN design documentation.
- Incomplete and some inconsistent design input information.
- Missing, incomplete, and out-of-date design calculations.
- Disagreements between the actual plant configuration and the as-constructed drawings.

Attachment 1 lists the Adverse Conditions, CAQs, and Employee Concerns which form the basis for the DBVP and are being corrected through DBVP activities.

The following related causes appear to have contributed to the conditions described above:

- Lack of effective licensing and design change control procedures and data bases to ensure that design requirements were maintained consistent with the FSAR and other commitments to NRC.

- Insufficient definition of design criteria and system description information at the level of detail needed to control design changes.

- Lack of a complete calculation listing to establish the full scope of calculations needed for WBN and procedures to ensure the calculations are maintained consistent with the WBN design.

- Lack of an effective definition of drawings to be maintained under configuration control, and an ineffective system for keeping appropriate drawings as-constructed as plant changes are made.

TVA has determined that the underlying root cause of this situation was ineffective design and configuration control measures.

TVA has developed the WBN DBVP to correct the situation that had developed and to prevent the recurrence of such a situation by eliminating the root cause. The DBVP has the following major components:

- Licensing Verification

- Design Basis

- Calculations

- Configuration Control

- Testing Requirements

The DBVP establishes a baseline of information for each of these areas. Improved design change control procedures will be generated to address the development and maintenance of a single set of plant drawings that are to replace the existing sets of "as-designed" and "as-constructed" drawings.

The program will be performed in accordance with the TVA Quality Assurance Program. This will include inspections and audits by the Quality Assurance organization.

This revision to the DBVP supersedes Revision 4 to the WBN DBVP Plan previously submitted to the Nuclear Regulatory Commission (NRC) on November 8, 1991.

2.0 OBJECTIVES

The objectives of the WBN DBVP for each program activity are:

2.1 Licensing Verification

- Assure that commitments to NRC are captured in the appropriate highest level controlling document.

- Establish procedures to maintain compatibility between commitments and controlling documents.

2.2 Design Basis

- Establish a plant design basis document (DBD) that contains or references appropriate engineering requirements including design basis commitments.

- Establish procedures to maintain the design basis consistent with changes to the plant, technical requirements, and licensing commitments.

2.3 Calculations

- Assure the existence and retrievability of calculations that are technically adequate and consistent with the "safety-related" plant design.

- Establish a process for statusing calculations that will maintain calculations current with plant design changes.

2.4 Configuration Control

- Develop and implement an improved design change control system.

- Establish a single set of configuration control drawings (CCDs) and verify that the functional configuration of the portions of plant systems that mitigate plant design basis events is consistent between the CCDs and the constructed plant.

2.5 Testing Requirements

- Assure that preoperational test scoping documents (which define system and component preoperational test requirements) are current and consistent with the DBD.

3.0 SCOPE

The WBN DBVP applies to Unit 1, Unit 2 required for Unit 1 operation, and common features. The scope of specific program areas is as follows:

3.1 Licensing Verification

The Licensing Verification activity includes verification of docketed WBN commitments associated with design, construction, operations, maintenance, and inspection identified in the following types of documents initiated prior to December 1988:

- Final Safety Analysis Report (FSAR)

- NRC Safety Evaluation Report (SER) and Supplements

- Draft WBN Fuel Load License and Appendices (includes Final Draft Technical Specifications)

- 10 CFR 50.55(e) Final Reports

- Responses to NRC regarding:
  - Violations/Deviations
  - Bulletins and Circulars
  - Generic Letters
  - Confirmation of Action Letters
  - Show Cause Letters

- Correspondence referenced in the SER and Supplements

- Correspondence since SER Supplement 4

3.2 Design Basis

The Design Basis activity includes the development and consolidation of design basis engineering requirements and licensing commitments for the plant features that perform a primary or secondary safety function.

3.3 Calculations

The Calculations Activity includes the identification, statusing, evaluation for technical adequacy, and revision or regeneration, as required, of those essential calculations that are necessary to establish or support, as a minimum, the safety-related plant systems or design features required to meet 10 CFR 50 Appendix A General Design Criteria. The calculations activity does not include the equipment vendor calculations prepared under vendor quality assurance programs.

3.4 Configuration Control

The Configuration Control activity includes the development and implementation of an improved design change control process which will be utilized for subsequent plant changes. CCDs will be developed for the following categories of safety-related control room drawings:

- Flow Diagrams

- Electrical Single Lines

- Control Diagrams

- Schematics

- Logic Diagrams

These drawings will be verified to agree with plant functional configuration for the portions of plant systems required to mitigate design basis events.

3.5 Testing Requirements

The Testing Requirements activity includes a review of preoperational test scoping documents for the tests identified in Table 14.2-1 of the WBN FSAR.

4.0 DESCRIPTION OF PROGRAM ACTIVITIES

The DBVP will be performed through baselining efforts in five program areas as described in Sections 4.1 through 4.5 below. The flowchart for the DBVP, including program interfaces, is provided in diagram format in Attachment 3. Quality Assurance oversight of DBVP activities is described in Section 4.6.

4.1 Licensing Verification

The scope of the verification process encompassed docketed correspondence initiated before December 15, 1988. Commitments contained in these documents were verified to be incorporated in the highest tier controlling TVA or vendor document that implements the commitment. Where inconsistencies between licensing commitments and implementing documents were identified, an Open Item Report (OIR) was generated, tracked, and controlled in an open item management system. OIRs which are determined to be an adverse condition will be documented and controlled under the TVA Corrective Action Program. Currently, 425 of the OIRs are still open.

Implementation of the Licensing Verification activities was defined to include the development of a Licensing Document Commitment Matrix (LDCM) data base and the establishment of site procedures for proper control of commitments. The intended function of the LDCM data base was to cross-reference the commitments identified through execution of the verification process to the appropriate upper-tier site implementing document. It was intended that, once developed, the LDCM would be maintained and used as a tool to ensure continuing awareness of commitments when changes to established site processes, design, or operational criteria were initiated.

A prototype LDCM was developed and was used to catalog the commitments identified by the Licensing Verification activities. However, a planned upgrade of the system to facilitate the commitment control functions defined for the system was never implemented. This, along with the development of marginal procedures for control, utilization, and maintenance of the LDCM rendered the system ineffective for maintaining control of commitments.

To ensure the objectives of the Licensing Verification area are fulfilled the following measures are now being implemented:

1. The documents reviewed under the scope of the Licensing Verification activities included docketed correspondence to the NRC initiated prior to December 15, 1988, the Final Safety Analysis Report (FSAR), the draft fuel load license, and the Technical Specifications. As an element of Phase I and II of the Program for Assurance of Completion and Assurance of Quality (PAC/AQ), commitments will be cataloged and the source of implementation verified. The scope of Phase I and II of the PAC/AQ verification will encompass the original scope of the Licensing Verification activities with the exception of the draft fuel load license and Technical Specifications. In addition, PAC/AQ will verify commitments defined in docketed correspondence initiated between December 16, 1988 and November 18, 1991.

2. The LDCM will be updated to reflect closure of the 425 outstanding OIRs. Once this is completed, the LDCM will document final closure status of the Licensing Verification activities and then it will be archived.

3. Revision 2 of Site Standard Practice (SSP) 4.03, "Managing and Tracking NRC Commitments," has been issued. This procedure defines the site process for commitment control administered by the Site Licensing organization and establishes requirements for source noting of programmatic activities in site controlling documents (i.e., procedures, design criteria, construction specifications, etc.).

4. The Tracking and Reporting of Open Items (TROI) system is the principal commitment tracking system. Software will be provided to better facilitate user access and data retrieval to ensure that ties between commitments and the documents which implement the commitments can be made.

5. Programmatic commitments verified to the source of implementation by PAC/AQ or the closure process for the outstanding 425 OIRs will be source noted in the appropriate site controlling document and transitioned to Site Licensing for future control.

6. Commitments verified to be inappropriately captured in an implementing document by either PAC/AQ or the OIR closure process will be submitted to Site Licensing for tracking and resolution as an outstanding commitment in accordance with SSP 4.03.

4.2 Design Basis

The Design Basis activity involves the review of existing criteria contained in either design criteria documents or system descriptions. The review will assure that these documents contain the licensing

commitments and engineering requirements that make up the design basis of WBN. In order to accomplish this review, licensing commitments and design requirements have been reviewed by senior TVA engineers familiar with plant design and categorized as to whether they contain design input associated with plant structures, systems, components, or general design topics.

The categorized commitments and requirements (C/R) have been entered into a relational C/R data base with sorting capability for a specific structure, system, component, or design topic. Selected sorts appropriate for each design criteria or system description have been generated, and the commitments or requirements appropriate for each document have been identified. Existing documents will be revised or new documents issued as required to ensure that the design basis for WBN is correct, complete, and in accordance with licensing commitments and engineering requirements.

The Design Basis activity includes the preparation of a new design criteria document that addresses WBN design basis events. These criteria will provide safety limits and safety functions for each event's mitigation scheme and will identify the required systems for each event.

As inconsistencies are identified between the licensing commitments/design requirements and the existing criteria, OIRs will be generated, tracked, and controlled in an open item management system (unless they are otherwise administratively controlled). If an open item is determined to be an adverse condition, it will be tracked and controlled by the TVA Corrective Action Program.

4.3 Calculations

The Calculation Activity includes the review for technical adequacy of those safety-related calculations associated with problem areas and selected calculations for areas where problems have not been identified, and the development of any missing calculations necessary to support safety-related plant design. A list of calculations which are necessary to establish or support the safety-related plant systems and features will be generated for each of the engineering disciplines.

As inconsistencies are identified between calculations and other design documents, OIRs will be generated, tracked, and controlled in an open item management system (unless they are otherwise administratively controlled). If an open item is determined to be an adverse condition, it will be tracked and controlled by the TVA Corrective Action Program.

Details of the Calculation Activity are provided in Attachment 4.

4.4 Configuration Control

The Configuration Control activity ensures that the functional configuration of portions of systems which are required to mitigate design basis events are accurately depicted on plant control room drawings. The Configuration Control activity also includes the implementation of an improved means of design change control. These are described below.

An improved means of design change control for WBN will be developed consistent with the corporate TVA approach identified in TVA Nuclear Performance Plan Volume I. This change control process is based on the design change "package" process as described by the INPO Good Practice TS-402, "Plant Modification Control Program."

A single series of baseline drawings called CCDs will be developed for the control room drawings. These CCDs become the new drawings of record, replacing the former as-designed and as-constructed versions of the drawings. In-process plant modifications will be posted against the CCDs. Portions of CCDs which are required to mitigate design basis events will be identified in a system baseline boundary calculation. These design basis events are defined in WBN design criteria WB-DC-40-64, and include the design basis events defined in Chapter 15 of the WBN FSAR. These portions of the CCDs will be verified to match plant functional configuration by walkdown or testing. Walkdown verification will be used where practical on flow, control, and single line drawings. Systems and components which cannot be confirmed through walkdowns (for example electrical circuits represented on schematics) will be tested or evaluated in order to ensure functional performance consistent with the drawings. Utilizing baselined schematics, the logic diagrams will then be confirmed.

Outstanding design changes will be reviewed to identify those planned for implementation before or after fuel loading. Design changes that are planned for implementation after fuel loading will receive an Unimplemented Design Item Evaluation (UDIE). The UDIE is a safety evaluation to ensure that the effect of not implementing the change until after fuel loading does not compromise plant safety or WBN licensing commitments.

As inconsistencies are identified between the design basis, the system CCDs, or the constructed plant, OIRs will be generated, tracked, and controlled in an open item management system (unless they are otherwise administratively controlled). If an open item is determined to be an adverse condition it will be tracked and controlled by the TVA Corrective Action Program.

4.5 Testing Requirements

The Testing Requirements activity will begin with a review of preoperational test scoping documents (i.e., documents which define system and component functional test requirements) against the DBD.

Based on the review, the test scoping documents will be revised as appropriate. The reviewed/revised preoperational test scoping documents will serve as input to the WBN Startup and Test Program, to be used for the development of test instructions.

Discrepancies between the DBD and the scoping documents will be identified as open items, tracked, and controlled in an open item management system (unless they are otherwise administratively controlled). If it is determined that an open item is an adverse condition, it will be tracked and controlled by the TVA Corrective Action Program.

4.6 Quality Assurance (QA) Oversight

Activities affecting the quality of plant design or configuration will be conducted in accordance with documented procedures and receive a Quality Assurance review. Activities will be monitored through scheduled audits and/or surveillances.

In addition to the WBN Quality Assurance monitoring activities, findings identified by Quality Assurance against the DBVPs at SQN and BFN will be reviewed for applicability to similar WBN DBVP activities. Any such findings determined to be applicable to WBN DBVP activities will be identified as OIRs and tracked to resolution.

5.0 PROGRAM INTERFACES

The Program Interfaces include both those between major DBVP activities as well as those with other WBN special programs. Internal program interfaces are depicted in Attachment 3, and include:

- Licensing commitments that are design input are verified against the DBD.
- The DBD is supported by calculations.
- The DBD provides system functional requirements to the testing requirements activity for the review of preoperational test scoping documents.
- The DBD provides system functional requirements to be used in the Calculation Program in the preparation of new calculations and in the technical adequacy review of existing calculations.
- The DBD provides system functional requirements against which the outstanding design changes will be compared in the UDIE.

External program interfaces with other WBN special programs are characterized as follows:

- The DBD interfaces with other WBN special programs that involve the preparation or revision of design criteria or system descriptions. Examples include the Hanger and Analysis Update Program (HAAUP) and the Conduit Support Program. The DBD activity provides procedural controls for the preparation or revision of these design criteria or system description documents to ensure proper incorporation of applicable commitments and requirements in accordance with the DBVP open items management system.

- Revised preoperational test scoping documents will provide the system functional testing requirements to the WBN Startup and Test Program.

- The calculation program interfaces with other special programs that involve the preparation or review of calculations. An example of such an interface includes the HAAUP effort to regenerate or review pipe stress and pipe support calculations.

- The configuration control activity will utilize DBVP accepted inputs from other programs for the verification of CCDs and for the system evaluations. An example of such inputs includes HAAUP walkdown data.

6.0 PROGRAM IMPLEMENTATION

The DBVP will be conducted by a program management team which is responsible for procedure development and management of program activities and interfaces. Program activities are performed by the normal line organizations or by contractors where appropriate.

Procedures that control DBVP activities only are contained within the DBVP Program Manual, which was part of the now superseded Watts Bar Engineering Project (WBEP) Manual. Procedures which are intended for project use beyond the conclusion of the DBVP have been issued as engineering administrative instructions or site standard practices, as appropriate. DBVP activities requiring procedural control are identified in Attachment 5.

7.0 PROGRAM DOCUMENTATION

Deliverables from the DBVP include the following documents:

- New Design Change Control Procedures

- Licensing Document Commitment Matrix data base (archived for historical purposes)

- Commitment/Requirement data base

- Watts Bar Design Basis Document

- Complete Calculation Cross-Reference Index System (CCRIS)
- New or revised calculations or Technical Adequacy Reviews (TARs) as appropriate
- Configuration Control Drawings
- UDIEs
- Revised Preoperational Test Scoping Documents

Any discrepancies identified during the DBVP will be documented, tracked, and controlled in an open item management system (unless they are otherwise administratively controlled). If an open item is determined to be an adverse condition it will be tracked and controlled by the TVA Corrective Action Program.

A final report, describing the results of each area of the DBVP, will be produced at program completion.

8.0 CONCLUSION

The DBVP is an integrated effort to ensure that the plant licensing basis is properly embodied within plant design; that the plant design basis is supported by analysis; and that functional plant configuration is properly supported by the design basis. DBVP will also ensure that an effective design change control process will be implemented to maintain configuration control. Performance in each program area will be summarized in a report with significant observations identified.

ATTACHMENT 1

BASIS FOR DESIGN BASELINE AND VERIFICATION PROGRAM

I. SIGNIFICANT CORRECTIVE ACTION REPORT	SUBJECT
Design Basis Area	
SCAR WBP870443SCA	Insufficient Design Input
Licensing Verification Area	
SCAR WBT870165SCA	FSAR not current with respect to plant design
Calculations Area	
See Attachment 4	

II. EMPLOYEE CONCERNS	SUBJECT
Design Basis Area	
EC 20103-WBN-01 EC 30711-WBN-01	Lack of Adequate Design Criteria
Configuration Control Area	
EC 20406-WBN-02 EC 20601-WBN-02 EC 20601-WBN-03 EC 20601-WBN-01 EC 30713-WBN-02	Lack of adequate Design Change Control Process As-Constructed Drawings do not match plant configuration
Calculations Area	
See Attachment 4	

III. AUDIT FINDINGS	SUBJECT
Test Requirements Area	
QWB-A-86-0017-D601	Inadequate preoperational test scope definition

ATTACHMENT 2

WBN SYSTEMS WITHIN THE SCOPE OF THE DBVP
CONFIGURATION CONTROL ACTIVITY

Designation	System
1/15	Main Steam System (and Steam Generator Blowdown System)
3	Main and Auxiliary Feedwater System
13	Fire Detection System
18	Fuel Oil System
26	High Pressure Fire Protection
30	Ventilating System
31	Air-Conditioning (Cooling-Heating) System
32	Control Air System
33*	Service Air System
39	CO_2 Storage, Fire Protection, and Purging System
41*	Layup Water Treatment
42*	Chemical Cleaning
43*	Sample and Water Quality System
46	Feedwater Control System
52*	System Test Facility
57	Associated Electrical Systems
59*	Demineralized Water and Cask Decontamination System
61	Ice Condenser System
62	Chemical and Volume Control System
63	Safety Injection System
65	Emergency Gas Treatment System
67	Essential Raw Cooling Water System
68	Reactor Coolant System
70	Component Cooling System
72	Containment Spray System
74	Residual Heat Removal System
77	Waste Disposal System
78	Spent Fuel Pit Cooling System
79	Fuel Handling and Storage System
81*	Primary Makeup Water System
82	Standby Diesel Generator System (including Diesel Starting Air System)
83	Hydrogen Recombination System
84	Flood Mode Boration System
85	Control Rod Drive System
88	Containment Isolation System
90	Radiation Monitoring System
92	Neutron Monitoring System
94	In-Core Flux Detectors
99	Reactor Protection System
211	6.9-kV Shutdown Power

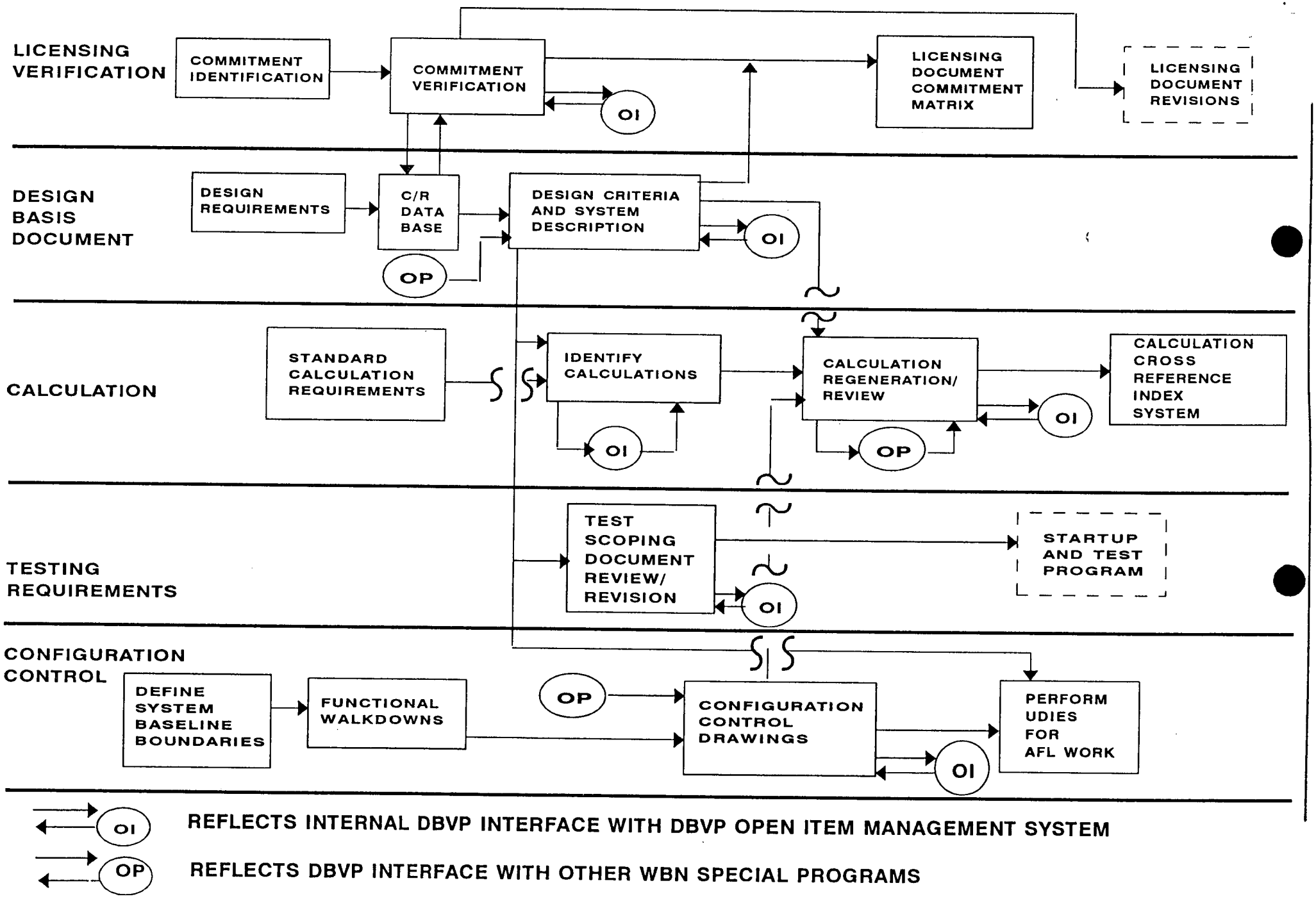
*Containment Isolation Function Only

ATTACHMENT 2

WBN SYSTEMS WITHIN THE SCOPE OF THE DBVP
CONFIGURATION CONTROL ACTIVITY

Designation	System
212	480-V Shutdown Power
213	Reactor Motor Operated Valve Power
214	Control and Auxiliary Vent Power
215	Diesel Auxiliary Power
228	Plant Lighting
232	Reactor Vent Power
235	120-VAC Vital Power
236	125-VDC Vital Power
251	Sound-Powered Telephones
268	Permanent Hydrogen Mitigation System
271	Containment and Auxiliary Buildings (Reactor Components Handling Systems Only)

ATTACHMENT 3
FLOWCHART FOR WBN DESIGN BASELINE & VERIFICATION PROGRAM



Attachment 4

DESIGN BASELINE AND VERIFICATION PROGRAM CALCULATION ACTIVITY DESCRIPTION

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WATTS BAR CALCULATION ACTIVITY DESCRIPTION

1.0 INTRODUCTION

Over the past several years, the TVA design control program has been the focus of a number of internal and external reviews. These reviews include audits by TVA's Quality Assurance organizations, inspections conducted by the Nuclear Regulatory Commission (NRC), and evaluations performed by the Institute of Nuclear Power Operations (INPO). Review findings have shown that TVA's nuclear power plant design basis and calculations were not adequately documented. Calculations have been identified as missing, incomplete, or not updated as the plant configuration has been altered through approved design and construction modifications. Further, a composite calculation listing had not been established that specifically defines the full scope of safety-related calculations needed for WBN.

Calculation deficiencies were initially identified in the electrical discipline area. Subsequent assessments by TVA management have concluded that similar conditions could exist in the other engineering disciplines. The root cause of this situation can be attributed to ineffective procedural controls, inadequate training, failure to follow procedures, and incomplete design reviews.

In order to prevent recurrence, the design control aspects of this condition have been addressed by TVA through an improved design change control process under the Configuration Control Activity of the DBVP. To ensure that safety-related calculations are adequate and in place prior to receipt of an operating license, the plan described herein has been formulated. Conditions Adverse to Quality (CAQs), and Employee Concerns being addressed by the calculation activity are identified in Appendix A.

2.0 OBJECTIVES

The fundamental goal of the Watts Bar Calculation activity is to assure the existence and retrievability of design calculations that are both technically adequate and consistent with the current plant design. In order to achieve this goal, the following specific objectives have been established:

1. Identify calculations.

2. Verify the existence and retrievability of the calculations and generate any calculations determined to be missing.

3. Assure that the calculations are technically adequate.

4. Assure that calculations are consistent with the plant design.

5. Establish a process that will maintain calculations current with the plant design.

3.0 SCOPE

The scope of calculations encompassed by this plan consists of those which are necessary to establish or support the Unit 1, Unit 2 required for Unit 1 operation, and common safety-related plant systems or design features necessary to ensure:

1. The integrity of the reactor coolant pressure boundary;

2. The capability to shut down the reactor and maintain it in a safe shutdown condition; or

3. The capability to prevent or mitigate the consequences of an incident which could result in potential offsite exposures comparable to those specified in 10 CFR 100.

The criteria stated above will be used in the review of the WBN design calculations to determine which calculations are within the scope of the calculation program.

The scope of this program also encompasses certain calculations necessary to establish or support plant features which must either:

1. Retain adequate structural integrity because its failure could jeopardize to an unacceptable extent the achievement of a primary safety function or because it forms an interface between Seismic Category I and non-Seismic Category I plant features; or

2. Perform a function that is not a primary safety function but whose failure or unwanted action could jeopardize to an unacceptable extent the achievement of a primary safety function.

The Calculations Activity does not include equipment vendor calculations prepared under the vendor Quality Assurance programs.

4.0 DESCRIPTION OF CALCULATION ACTIVITY

The Calculation Activity has been structured to accomplish the five objectives identified in Section 2.0. The plan to achieve each of these is described below.

4.1 Identification of Calculations

Calculations will be identified by reviewing the following:

1. Standard calculation types required by each TVA engineering discipline.

2. System Descriptions (SD) and Design Criteria (DC) which constitute the WBN Design Basis Document (DBD).

Each TVA engineering discipline has defined the standard calculation types which are to be used in identifying WBN safety-related calculations. These standard calculation types are defined in References 1 through 3. The extent of applicability of each standard calculation type to WBN will be determined. This will be accomplished primarily by means of reviewing applicable design output documents to identify specific safety-related plant features which require supporting calculations within each calculation type. This review will be oriented towards physical design features. Additionally, the DBD development effort includes provisions to identify the design basis requirements for WBN which should be supported by calculations. The resulting list of WBN calculations will be compared to the Sequoyah Nuclear Plant (SQN) calculations list in order to finalize the WBN list.

4.2 Verification of Existence and Retrievability

Watts Bar calculations have been transferred from diverse filing locations to a central location onsite. Copies of joint SQN/WBN calculations and other applicable calculations that are not specific to WBN will also be identified and filed in this location. A consolidated WBN calculation list will be created reflecting calculations in this central file.

Existing safety-related calculations will be entered into a computerized data base using the Calculation Cross-Reference Information System (CCRIS) software program. This data base will replace and consolidate various calculation indexes that currently exist and will also contain additional calculation information including cross-reference documents, category type, and Record Information Management System (RIMS) accession number. Existing calculations that are of a type no longer requiring updating for WBN (e.g., support variance calculations) will not be entered into CCRIS. These calculations are no longer considered to be essential, but will be maintained in the Records Information Management System for historical purposes.

Upon completion of CCRIS data entry, the resulting calculation list, sorted by category type, will be compared to the list of required calculations to determine those that are missing. Missing calculations will be generated in accordance with current calculation procedures. Completion of these efforts will achieve a complete set of engineering calculations, which will be filed in a central location onsite and verified as retrievable.

4.3 Assurance of Technical Adequacy

The technical adequacy of existing WBN calculations will be established through the generation of new calculations, the technical review of affected calculations in identified deficient areas, or a review of selected calculations in those areas where problems have not been previously identified. The combination of these methods will provide adequate confidence in the technical adequacy of WBN calculations.

The determination of the methodology to be applied to each calculation type has been or will be made based upon an evaluation of identified problem areas. This evaluation will consider both WBN deficiencies and those calculation-related deficiencies identified at SQN. Calculation inadequacies identified by other WBN special programs, the TVA Corrective Action Program, and the WBN Vertical Slice Review will be reviewed for specific and generic impact to WBN calculations.

TVA has determined that the generation of new calculations is appropriate in the following major areas. Electrical calculations will be regenerated prior to Unit 1 fuel loading based on Significant Corrective Action Report (SCAR) SCRWBNEEB8571SCA, which documents lack of adequate control for electrical calculations, and the results of internal calculation reviews and SQN experience. Additionally, pipe stress analysis calculations will also be regenerated prior to Unit 1 fuel loading as described in the HAAUP.

Calculations associated with other deficient areas, as identified in the evaluation described above, will be reviewed for technical adequacy or new calculations generated in accordance with current calculation procedures. The Mechanical/Nuclear Calculations Program is retrieving and technically reviewing the mechanical/nuclear calculations issued prior to January 15, 1992, that are within the scope of the Calculations Activity. Calculations found to be technically inadequate or nonretrievable will be revised or regenerated.

The Civil Calculations Program is evaluating a substantial part of the Civil calculations in areas covered by the following ongoing CAPs:

- Instrument Project
- Seismic Analysis
- Cable Tray and Cable Tray Supports
- Conduit and Conduit Supports
- Hanger Analysis and Update Program (HAAUP)
- Equipment Seismic Qualification
- HVAC Ducts and Supports

Civil engineering calculations not covered by these CAPs will be retrieved and technically reviewed. Calculations found to be technically inadequate or nonretrievable will be revised or regenerated. Where the population of features/calculations is considered small, a 100 percent review will be completed, although grouping and bounding may be utilized to verify calculations for similar designs. However, where the population is relatively large, an engineering-guided sample will be used. The methodology and implementation of Civil Calculations (WCG-1-1419) and Civil CAPs were reviewed by the NRC during the Civil Independent Design Inspection (IDI) audit of July 13 through August 7, 1992.

In summary, documentation of the technical reviews of existing calculations will be maintained for examination and future reference. Unacceptable calculations will normally be revised in conjunction with the review process unless circumstances justify deferral based on other planned work or work in progress. Calculations which are technically acceptable but contain discrepancies will be tracked to ensure their correction when the calculation is next revised.

Discrepancies encountered in the review process will be identified as Open Item Reports, tracked, and controlled in an open items management system (unless they are otherwise administratively controlled). If an open item is determined to be an adverse condition, it will be tracked and controlled by the TVA Corrective Action Program, including an evaluation for reportability as appropriate.

4.4 Assurance of Consistency With Plant Design

Regenerated calculations will be produced consistent with the plant design (i.e., the design basis requirements and the design configuration required to support plant operation). Where the calculations support the design of a constructed feature, the regenerated calculations are consistent with the constructed feature. The regenerated calculations will also be consistent with the FSAR; as FSAR change requests are prepared when required as the calculations are completed. For existing calculations, assurance of consistency with plant design will be established concurrent with the assurance of technical adequacy. The consistency review will be performed for the same calculations reviewed for technical adequacy. Consistency of calculations with current plant design will be assured by one or more of the following methods, as applicable:

1. Reconciliation with as-built conditions as determined by field walkdowns.

2. Reconciliation with current revisions of applicable design output (drawings, specifications, etc.). This method is applicable to revised calculations only.

3. Reconciliation based on resolution of test deficiencies.

4. Reconciliation with the FSAR, processing FSAR change requests when required.

Walkdown or testing information being developed for other WBN programs will be used as available and applicable. An example of such a program includes walkdowns associated with HAAUP.

Completion of these reconciliation activities and any corrective actions that may evolve from the technical adequacy reviews (TARs) will provide assurance that calculations reflect the current plant design.

4.5 Establishment of a Calculation Maintenance Process

Maintenance of calculations to reflect ongoing design changes and/or plant modifications will be accomplished by means of procedural controls requiring the use of cross-reference information contained in the CCRIS data base. Procedural requirements will be implemented to require the identification and update of calculations that are either necessary to support the design change or that may be affected by the change. Upon implementation of CCRIS, identification of such existing calculations will be accomplished by searching the data base for calculations that are either predecessors or successors to the design document being changed.

Changes to design documentation which do not entail physical modifications will also be checked against the CCRIS data base for potential impact on calculations. Additionally, when calculations are revised for any reason, the CCRIS data base will be utilized to identify any subsequent successor document that may also require update. Ongoing updates to the CCRIS data base when any new or revised calculations are issued will ensure that cross-reference information, as well as the calculation, is kept current.

5.0 CALCULATION ACTIVITY INTERFACES

An interface exists with the Design Basis area of the DBVP. The Design Basis activity will identify the calculations (existing and missing) which are required to support the plant design basis. In turn, the Calculation activity will assure that those calculations required to support the DBD are current and technically adequate.

Additionally, the Calculation Activity will interface with other WBN programs that either rely on data obtained from existing calculations or that will require the preparation of new or revised calculations. One such program is HAAUP, which will interface with the Calculation activity for both of these reasons. Other programs having similar interfaces include the conduit support, equipment seismic qualification, and electrical issues.

6.0 CALCULATION ACTIVITY DOCUMENTATION

Calculation Activity work products will be prepared in accordance with procedures. These work products will include:

- CCRIS data base inputs
- New or revised calculations, or TARs as appropriate
- An open items tracking system and OIRs
- Task or activity summary reports, if appropriate

These work products, as well as ongoing program activities, will be subject to Quality Assurance audits or surveillance to assure completeness and traceability of program documentation.

Any discrepancies identified during the Calculation Activity will be documented, tracked, and controlled in an open item management system, unless they are otherwise administratively controlled. If an open item is determined to be an adverse condition, it will be tracked and controlled by the TVA Corrective Action Program.

A final report, describing the results of the Calculation Activity will be produced at program completion.

7.0 CONCLUSION

Upon completion of the calculation activities, WBN will have the safety-related engineering calculations in place with assurance that they are technically adequate and up to date. Calculations that have been reviewed will have documentation available to demonstrate technical adequacy. A user-accessible data base of calculations complete with interdependency cross-reference will be available. Finally, a system will be in place to ensure that calculations are maintained up to date to reflect any future design changes over the life of the plant.

8.0 REFERENCES

1. Electrical Engineering Procedure Method PM 86-02, "Electrical Calculations," dated July 17, 1987 (B43 870717 903).

2. Civil Engineering Branch Instruction CI-21.53, "Calculations," dated July 17, 1988 (B41 880715 001).

3. Mechanical/Nuclear Engineering Branch Instruction, "Classification, Categorization, and Maintenance of Design Calculations," M/NE-I-25.3.1, dated June 6, 1991 (B45 910606 263).

APPENDIX A

BASIS FOR DESIGN BASELINE AND VERIFICATION PROGRAM CALCULATION ACTIVITY

CONDITIONS ADVERSE TO QUALITY REPORTS	SUBJECT
WBF 870038	Seismic Reanalysis for Condensate Demineralizer Waste Evaporator Building (Dispositioned under the Seismic CAP)
WBF 870039	Technical Adequacy Review of Seismic Analysis for Additional Diesel Generator Building (Dispositioned under the Seismic CAP)
WBP 870396	Seismic Reanalysis for Diesel Generator Building and Waste Packaging Area (Dispositioned under the Seismic CAP)

EMPLOYEE CONCERNS	SUBJECT
Report 201.6(A)	Incorporation of Requirements and Commitments in Design
Report 205.1(A)	Control of Design Calculations
Report 215.6(A)	Hanger Loads on Structures
Report 21200	Pipe Support Program

SIGNIFICANT CORRECTIVE ACTION REPORTS	SUBJECT
SCRWBP910055SCA	Technical Inadequacies in Calculations
SCRWBP880786SCA	Vertical Slice Discrepancy Reports against Civil Calculations
SCRWBNEEB8571SCA	Lack of Electrical Calculations Control

ATTACHMENT 5

DBVP ACTIVITIES REQUIRING
PROCEDURAL CONTROL

Compilation of Licensing Commitment Units

Commitment Unit Verification

Maintenance of Licensing Commitments Consistent with Plant Design

Preparation of Commitment/Requirement Data Base

Preparation of Design Basis Document

Maintenance of the Design Basis Document and FSAR

Identification of Required Calculations

Selection of Calculations for Technical Review

Preparation of Design Change Notices

Configuration Control Drawing Preparation and Control

Walkdowns

Performance of UDIES