INDEPENDENT DESIGN VERIFICATION

CHANGE NOTICE A

Date Effective - 10/8/92

This notice constitutes a change to the subject EOP. The changes described may be incorporated into a subsequent EOP revision without further coordination if no adverse comments are received by the EOP Procedure Coordinator (M/C 360) within 60 days after the effectivity date specified above.

1. Change paragraph 4.1.3a to read as follows:

   a. *When additional verification is required after document issue or application, advise Configuration Management to revise the verification status of the document to "unverified" by processing a DVSCN that identifies the document(s), scheduled completion date, Section Manager's or Business Segment Managers (NSPD) endorsement, and distribution identical to the issuing Design Document/ECN. Section Manager's or Business Segment Manager's authority may be delegated per EOP 15-2.00.*

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SUBJECT: INDEPENDENT DESIGN VERIFICATION

1.0 PURPOSE

1.1 This EOP defines responsibility and procedural requirements for the performance of independent design verification.

2.0 GENERAL AND APPLICATION

2.1 Independent Design Verification is a design/product assurance action which is required to assure adequate safety, reliability, and performance of a design. It is the process of reviewing and substantiating a design, whether hardware or software, to provide controlled, independent, documented confirmation that the design meets its requirements. Design verification is confirmation of design adequacy which is performed by a knowledgeable individual other than the person responsible for the design.

2.1.1 Design/product assurance actions such as qualification testing, design reviews, alternate calculations, and checking, are examples of independent design verification when applied in accordance with the requirements of this EOP.

2.2 In general, all product designs by engineering and suppliers and each application of or change to them are verified.

2.3 Total product verification consists of: a) independent design verification performed in accordance with this EOP; and b) equipment qualification performed in accordance with the applicable work authorization. The design verification and equipment qualification processes are controlled by the following issuance and release systems:

2.3.1 Document Issuance - At the time a document is issued, every Engineering Review Memorandum (ERM), Engineering Change Notice (ECN), Deviation Disposition Request (DDR), Field Deviation Disposition Request (FDDR), and Field Disposition Instruction (FDI) per EOP 55-5.00 only, must be design verified, as indicated by a design verification statement that conforms to Paragraph 4.2.3; otherwise, a verification must be deferred by processing a Design Verification Status Change Notice (DVSCN) in accordance with Paragraph 4.1.2 of this EOP.

+ Indicates change

2.3.2 Document Release - At the time a document is released for manufacture or procurement for direct-to-site shipments, both design verification and any required equipment qualification must be completed. If not completed, a "Conditional Release" must be processed in accordance with EOP 42-5.00 to assure completion of design verification and equipment qualification prior to plant startup or installation in an operating plant and to assure that the customer is appropriately informed of any incomplete conditions applicable to delivered documents or equipment.

2.4 Guidelines for design verification are contained in Appendix A. Examples of documents that may be verified by checking are described in Appendix B.

3.0 DEFINITION OF RESPONSIBLE INDIVIDUAL OR ORGANIZATION

+ 3.1 The following defines the responsible individual or organization for activities established in Section 4.0 of this EOP. Cases with potential for conflict e.g. Manager/Technical Supervisor as verifier, or subordinate as verifier, must be approved prior to performing verification and filed in the verification package.

Configuration Management - Component responsible for issue and control of assigned releases; providing inputs to schedule engineering tasks; and distribution of engineering documents and for retention and control of document masters.

Project/Program Manager - Person(s) responsible for interfacing and transmitting design data to external users.

Responsible Engineer - Person responsible for the design, design document, or design application requiring verification.

+ Responsible Manager - Immediate Manager responsible for the work assigned to the Responsible Engineer. This authority may be delegated per EOP 15-2.00 so long as the delegation does not conflict with Paragraph 3.2.

Verifier - Person or review team chairperson responsible for the independent assessment of adequacy of design.

+ 3.2 The Responsible Engineer, Verifier, and Responsible Manager must be mutually exclusive, i.e., three different people.

4.0 PROCEDURE AND RESPONSIBILITIES

4.1 Responsible Engineer

4.1.1 Performing Verification

a. Assure that all new designs and changes to verified designs, including all applications of design and design changes, are verified before issue or application as numeric revision documents. Data transmitted in noncontrolled documents to others for use in design, shall also be verified (see 4.1.8). Assure that Engineering Services performed per EOP 25-6.00 are verified before transmittal. When verification is deferred until after document issue or application, additional requirements of Paragraph 4.1.2 shall be applied.

b. Determine when the design is ready to be verified.

c. Determine and document the scope and method of verification to be used to confirm that the design meets its specified requirements (if unapplied) or the requirements of its application (if applied). Refer to Appendix A for applicable design verification guidelines. For an application of a design in which the design requirements are identical to or less stringent than those of a previously verified application of the design, it is necessary to verify only that the previous requirements apply. For drawings, identify any independent checking required to detect drawing discrepancies which could affect design adequacy.

+ d. Select a Verifier who: 1) qualifies by knowledge and experience to perform the verification, and 2) did not perform the design or design change being verified (see 3.2).

e. When the design or design change is complete, provide a verification package to the Verifier. The package shall consist of the information the Verifier needs to perform the verification, and includes:

(1) The design results (including assumptions, calculations, design related notes and reports, etc.) to be verified;

(2) The documented scope and method of verification including specification of any necessary additional checking of documents;

(3) Identification of the design requirements, including a list of input documents;

(4) Selection and identification of the detailed information on drawings to be checked by the independent Verifier.

+ (5) Identification of participating design organization with design interface when applicable.

f. Provide clarification, additional information, or necessary corrections to the design documentation as requested by the Verifier. When changes are made as a result of technical or verification reviews, consider what verification these changes require, and have the verifications performed.

g. Assure that the statement made by the Verifier is either on the ERM, ECN, DDR, FDI (per EOP 55-5.00 only), or FDDR, or is filed in a DRF. If the verification statement is in a DRF and not on an ERM/ECN/DDR/FDI/FDDR, reference the DRF on the ERM/ECN/DDR/FDI/FDDR

h. Assure that all pertinent verification data generated for inclusion in a DRF are recorded per the requirements of EOP 42-10.00.

4.1.2 Deferring Verification

a. When verification is deferred on an ERM, ECN, DDR, FDI (per EOP 55-5.00 only), or FDDR, the following shall be included on that document:

(1) Statement that verification is deferred;

(2) Statement "See DVSCN No. DV _____."

b. For every situation resulting in either the deferral of verification or the removal of a previous deferral, a Design Verification Status Change Notice (DVSCN) shall be prepared and processed as follows:

(1) When the deferral, or the removal of a previous deferral, is being accomplished by an ERM, ECN, DDR, FDI (per EOP 55-5.00 only), or FDDR, the DVSCN shall accompany that document to Configuration Management.

(2) When the deferral does not require an ERM, ECN, DDR, or FDDR, only the DVSCN shall be delivered to Configuration Management.

(3) When the removal of a previous deferral does not require an ERM, ECN, DDR, or FDDR, only the DVSCN shall be delivered to Configuration Management. The reason for removing the

deferral and identification of the DRF containing the verification data shall be stated on the DVSCN.

(4) Every DVSCN shall specify a distribution equivalent to the distribution of the Design Document, ECN, DDR, FDI (per EOP 5-5.00), or FDDR that originally deferred the verification and the distribution of the documents listed on the DVSCN.

c. When verification is deferred for designs to be released, initiate releases per EOP 42-5.00, 45-2.00 or 70-3.00.

d. Assure that technical issues that result from the verification are resolved and that verification is completed in accordance with the schedule committed and the requirements of Paragraph 4.1.1. Inform Responsible Manager for resolutions, as required.

4.1.3 Performing Additional Verification

a. When additional verification is required after document issue or application, advise Configuration Management to revise the verification status of the document to "unverified" by processing a DVSCN that identifies the document(s), scheduled completion date, Section Manager's endorsement, and distribution identical to the issuing Design Document/ECN.

b. When additional verification is required for designs that have been released or are to be released, initiate releases per EOP 42-5.00 or 45-2.00.

c. Arrange for the additional verification to be performed by applying the requirements of Paragraph 4.1.1.

d. When additional verification is complete, notify Configuration Management by processing a DVSCN form that identifies the verified documents, DRF containing verification, completion date, and distribution identical to the DVSCN processed in Paragraph 4.1.3a.

4.1.4 Verification by Testing

a. Follow the requirements of EOP 35-3.00 or EOP 35-3.10.

b. Assure that the test program includes requirements for testing under specified design conditions (including environmental conditions). When the test program is intended to confirm the adequacy of the overall design, all pertinent operating modes shall be considered in determining these specified design conditions.

When the test is only intended to verify a specific design feature, the other features of the design shall be verified by other means.

c. The documented evidence of successful performance of a previous production unit under the specified conditions may be used as evidence of verification by test.

d. The startup testing program for a proje[illegible] not be used as verification by testing for that project unless the testing is made under the specified design conditions, and any design inadequacies can be corrected before plant operation.

e. Apply the test results to verify the adequacy of the design by applying the requirements of Paragraph 4.1.1.

f. Where testing indicates that modifications to the design are necessary to obtain acceptable performance, document the modifications and retest the design or otherwise verify satisfactory performance.

4.1.5 Verifying Spare and Renewal Parts

a. Apply the following criteria to determine what minimum verification is required (additional guidelines are presented in EOP 70-3.00):

(1) For an existing application, no additional verification is required for spare or renewal parts identical in design to those originally supplied.

(2) If spare or renewal parts for an existing application are of a modified or different design from the original design, the differences in design between the new part and the original part must be verified for the application.

(3) If spare or renewal parts are used in a new application (e.g. a different system, or a different power plant), or there are new or modified requirements for application (e.g. environmental requirements) which were not included in the design previously, the design of the parts must be verified for the differences between the old and new applications.

b. Perform verification by applying the requirements of Paragraph 4.1.1.

4...6 Verifying Supplier Designed BWR Equipment and Supplier Designs

a. Determine whether the equipment or design is Safety Related per EOP 65-2.10.

b. For Safety-Related equipment or designs:

(1) Decide which parts of the verification shall be performed by the supplier and which by engineering.

(2) For supplier verification, assure that the verification requirements are specified to the supplier per EOP 42-5.00 or 45-2.00.

(3) For engineering verification, specify supplier document submittal requirements and follow the requirements of Paragraph 4.1.1.

c. Engineered equipment, catalog items, and supplier designs, which are not Safety-Related, require engineering independent design verification of the purchase part drawing or purchase part specification, per the requirements of Paragraph 4.1.1.

4.1.7 Verifying Dispositions of Deviations

a. Where dispositions of nonconformances and deviations from specification requirements (e.g. Material Review Boards, Deviation Disposition Requests, Field Deviation Disposition Requests, etc.) require additional design or analysis or affect the original verification, verify the changes by applying the requirements of Paragraph 4.1.1.

b. Assure the document authorizing the disposition contains the verification statement or references the DRF that contains the verification statement.

4.1.8 Verifying Noncontrolled Transmittal of Design Data to Others

a. When design data is sent to others in a noncontrolled transmittal, assure that the verification status (verified or not verified) of the transmitted data is indicated.

4.1.9 Verifying by Design Review Team

a. Where design verification is to be performed by a design review team, apply the requirements of EOP 40-7.00.

b. Contributors to the design, design inputs, or design change, serving as review team members, will not function as the review team chairperson nor verify personal design contributions.

4.2 Verifier

4.2.1 Upon receipt of the verification package from the Responsible Engineer, perform the verification within the scope and method established by the Responsible Engineer to assure that the design satisfies its requirements, including appropriate interfaces and/or the proposed application of the design is correct. Utilize applicable design verification guidelines contained in Appendix A. If the Verifier judges that the established scope, method, and/or design interfaces are not sufficient to verify design adequacy, the Verifier shall discuss and resolve them with the Responsible Engineer.

4.2.2 Obtain additional information or necessary corrections from the Responsible Engineer, as required.

4.2.3 When the design is verified, the Verifier shall prepare and sign a verification statement that includes:

a. Identification of the design or design application verified or both.

b. Description of the verification performed, including scope, method, inputs, and outputs.

c. Any open items resulting from the design verification process have been resolved and closed.

d. Statement of design adequacy made by the Verifier from results of the verification.

e. The name of the Verifier and the date of verification.

4.2.4 Return the verification package and the verification statement to the Responsible Engineer.

4.2.5 If the design cannot be verified, document the reason and return the verification package to the Responsible Engineer.

4.3 Responsible Manager

4.3.1 Approving Verification

a. Review completed verification package for the design or design change to assure that verification is sufficient to issue or apply the design or design change and denote this by approving the ERM, ECN, DDR, FDI (per EOP 55-5.00 only), FDDR, or complete

verification package. It is not necessary for the Responsible Manager to approve the detailed elements of the verification as long as the total verification is approved.

b. Assure design requirements are identified and technical issues that result from the verification are resolved.

4.3.2 Approving a Technical Supervisor as Verifier

a. Approve prior to verification the designation and justification of a Technical Supervisor as Verifier.

4.4 Project/Program Manager

4.4.1 Based on DVSCN input, notify the external user about the deferred verification status of applicable design data, together with schedule for verification and any limitations on the application of data or product hold requirements.

4.4.2 Based on the DVSCN completion input, notify the user that the design verification has been completed.

4.5 Configuration Management

4.5.1 Issue or apply design documents only when at least one of the following conditions has been met:

a. The ERM/ECN references the verification statement location.

b. The verification statement is on the ERM/ECN.

c. A deferral of the verification has been approved by the Responsible Engineer's section-level management.

4.5.2 Assure that the verification status of all documents, including those requiring additional verification or having approved deferred verification, is entered into the Engineering Information System (EIS) in accordance with the requirements of EOP 30-3.40.

4.5.3 Revise the verification status of documents entered in EIS in accordance with DVSCN's authorized by the Responsible Engineer.

5.4 Provide inputs to schedule engineering tasks per EOP 25-5.00, and track the completion of deferred verifications and additional verification requirements.

4.5.5 At least 30 days before the scheduled fuel loading of any requisition plant, report the status of any remaining deferred verifications to the Responsible Engineer and to each Responsible Manager, Responsible Section Manager, and Project Manager. If there are no outstanding deferred verifications on a project, that condition shall also be reported to the Project Manager.

4.5.6 Close out completed verification tasks upon receipt of authorizing DVSCN from performing component.

4.5.7 Provide periodic reports on overdue additional verifications and overdue approved deferred verifications to the Responsible Engineer's Section Manager.

4.5.8 Copy DVSCN for record retention and perform distribution to include the responsible Project/Program Manager.

5.0 RESPONSIBILITY FOR COUNSELING

For counsel on matters pertaining to this EOP, refer to the EOP Counsel Matrix in EOP 15-1.00.

6.0 REFERENCES

EOP 15-1.00	EOP Counsels
EOP 25-4.00	Work Authorizations
EOP 25-5.00	Planning and Scheduling
EOP 25-6.00	Engineering Services
EOP 30-3.40	Engineering Information System
EOP 35-3.00	Engineering Tests
EOP 35-3.10	Special Engineering Tests at Operating Plants
EOP 40-7.00	Design Reviews
EOP 42-5.00	Engineering Requirements Document Release
EOP 42-10.00	Design Record Files
EOP 45-2.00	Engineering Services Quality Assurance
EOP 55-5.00	Document Control Transfer to Customer
EOP 65-2.10	Safety Classification
EOP 70-3.00	Spare and Renewal Parts

APPENDIX A
DESIGN VERIFICATION GUIDELINES

(Based on ANSI N45.2.11 - 1974, where appropriate.)

+ Consider the following questions:

A1 Were the design's performance and application requirements inputs correctly selected and incorporated?

A2 If assumptions had to be made in order to perform the design effort, were the assumptions reasonable?

A3 Are the appropriate quality assurance requirements specified?

A4 Were the applicable standards, regulatory requirements, Codes, Code Cases and BWR Materials Handbook requirements correctly selected and incorporated?

A5 Have applicable construction and operating experience been considered?

A6.1 Have technical interfaces been identified and addressed?

A6.2 Have participating design organizations reviewed and concurred with documents involving technical interfaces?

A7 Was an appropriate design method used?

A8 Are the outputs reasonable compared to the inputs? If possible, compare the outputs with outputs from a previous design to check if the changed output is consistent with the changed input.

A9 Are the specified parts, equipment, and processes suitable for the required application?

A10.1 Are the specified materials compatible with each other.

A10.2 Are the specified materials compatible with the environmental conditions to which they will be exposed?

A11 Have adequate maintenance features and requirements been specified?

A12 Are accessibility and other design provisions adequate for performing needed maintenance and repair?

A13 Has adequate accessibility been provided to perform in-service inspection expected to be required during plant life?

A14 Has the design properly considered radiaticn exposure to the public and plant personnel?

A15 Have acceptance criteria been sufficiently delineated on the design document to measure whether specified standards are being maintained, and whether specified performance requirements are being met?

A16 Has it been tested as close as practicable to its actual interface with the customer equipment? If not, has it been measured against the dimensions provided in the Customer Technical Requirements?

A17 Are adequate handling, storage, cleaning and shipping requirements specified?

APPENDIX B

DOCUMENTS THAT MAY BE VERIFIED BY CHECKING

The following engineering controlled design documents are examples of those documents that may be adequately design verified by checking the correct transfer of controlling data from the design input document to the listed document without verification of the design concept or intended function:

B1 Changes to Parts List and Master Parts Lists (MPL), provided the application of the change has been verified.

B2 Arrangement drawing which is not used as a source or controlling document.

B3 MPL A50 Section Documents - Customer/Architect Engineer supplied input data.

B4 Electrical Device List computer printout, if the source is verified.

B5 Shipping Groups Parts List

B6 Company Purchase Part Drawings that contain only a supplier catalog item; however, application of the Purchase Part must be verified when it is applied.

B7 Process and material specifications taken from industry codes and standards or from verified handbooks or similar documents. (The Verifier should assure that the correct revision was used.)