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BGE

February 5, 1997

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Response to Request for Information Pursuant to 10 CFR 50.54(f) Regarding Adequacy and Availability of Design Bases Information

REFERENCE: (a) Letter to Mr. C. H. Poindexter (BGE) from Mr. J. H. Taylor (NRC), dated October 9, 1996, Request for Information Pursuant to 10 CFR 50.54(f) Regarding Adequacy and Availability of Design Bases Information

This letter responds to the Nuclear Regulatory Commission's (NRC's) request for information (Reference a) by describing the processes applied at Calvert Cliffs to maintain and operate the plant within its design bases. This response focuses on processes used to maintain the design bases as defined in 10 CFR 50.2, and as explained in footnote 4 of Reference (a). Reference (a) states that recently performed NRC inspections have identified weaknesses resulting in design and configuration deficiencies at selected sites. We recognize that such weaknesses could impact the operability of required equipment, involve unreviewed safety questions, or result in discrepancies between the Updated Final Safety Analysis Report (UFSAR) and the plant configuration and operation. Maintaining current and accessible design documentation is important to ensure that: the plant physical and functional characteristics are maintained and are consistent with the design bases; systems, structures, and components (SSCs) can perform their intended functions; and the plant is operated in a manner consistent with the design bases. Therefore, we welcome the opportunity to describe our processes and to explain the basis for our confidence that the Calvert Cliffs design bases is accurate and up to date.

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DESIGN BASIS INFORMATION

Baltimore Gas and Electric Company has undertaken a design bases review program beginning in 1989. Both programmatic issues (such as seismic qualification and environmental qualification) and systems (such as cooling water and electrical distribution) were reviewed. Calculational records were obtained from our architect-engineer and the Nuclear Steam Supply System vendor. A number of individual

initiatives were undertaken to develop design bases information and enhance understanding and retrieval of design bases information. Major projects continue to enhance our understanding of the design bases. For instance, conversion to the Improved Technical Specifications has required that we review the Technical Specifications for conformance with the UFSAR. A project to study the feasibility of a license renewal effort has reviewed the design bases for passive systems, as required by 10 CFR 54. A recently initiated UFSAR review of selected systems continues the process of enhancing our design bases information. Electronic information systems, including full text search and retrieval for docketed NRC/Baltimore Gas and Electric Company (BGE) correspondence, Technical Specifications and the UFSAR, improve and enhance our access to design bases information. The extensive work that has been accomplished in the area of design bases review and compilation is described in Attachment (2). Taken together, these efforts provide reasonable assurance that the design bases are understood, accessible, and current.

INFORMATION REQUESTED

Provided below are summaries of the responses to the information requested in the referenced letter. Additional information supporting these answers is contained in Attachments (1) and (2). Based upon the information contained in this letter and attachments, BGE has reasonable assurance that the current processes and programs in place are effective in controlling changes to the design bases, thus yielding an up-to-date and accurate design bases.

Request (a)

Description of engineering design and configuration control processes, including those that implement 10 CFR 50.59, 10 CFR 50.71(e), and 10 CFR Part 50, Appendix B.

RESPONSE

The engineering design and configuration control processes are established in the following Nuclear Program Directives:

- Design Authority
- Configuration Management
- Independent Spent Fuel Storage Installation
- Modification Program

The Design Authority program describes requirements and responsibilities for establishing and maintaining the design bases, and for controlling design output documents to accurately reflect the design bases. The Configuration Management program describes administrative controls, responsibilities, and boundaries for a Configuration Management program to maintain plant SSCs and computer software consistent with approved design requirements, to accurately reflect the physical configuration and functional characteristics of the plant in design bases documents, and to operate the plant within its design bases. The Independent Spent Fuel Storage Installation program defines the responsibilities and quality assurance requirements for the construction and operation phases of the Independent Spent Fuel Storage Installation at Calvert Cliffs. This program works with the Design Authority program to maintain the Independent Spent Fuel Storage Installation design bases and is under the requirements of 10 CFR Part 50, Appendix B and 10 CFR 72.48. The Modifications program includes methods for evaluating, approving, prioritizing, engineering, implementing, and

closing out modifications to plant SSCs. The Modifications program is closely aligned with the Design Authority program such that engineering support for modifications provides proper configuration controls.

Additional details of the engineering design and configuration control processes, including descriptions of the processes that control 10 CFR 50.59 and 72.48 reviews and UFSAR updates, are contained in Attachment (1).

Request (b)

Rationale for concluding that design bases requirements are translated into operating, maintenance, and testing procedures.

RESPONSE

Our rationale consists of the following parts:

1. An engineering and configuration control process has been established that requires in part notifying operating, maintenance, and test procedure sponsors, as applicable, of design bases changes. In addition, the process requires the assessment of design bases changes for impact on procedures. This results in the appropriate procedure changes being identified prior to turning over plant modifications to the Nuclear Operations organization.

2. Procedural controls have been established that require procedures or changes to procedures to be adequately reviewed and approved prior to use. Should discrepancies between the procedure and the as-built configuration be identified, the appropriate plant or procedure changes are made. A Procedure Upgrade Project was undertaken in 1990 to upgrade technical procedures to enhance their technical accuracy and functional adequacy. The procedure upgrade process included reviewing design bases information and capturing bases information in procedures so they would not be inadvertently revised or deleted. This provides BGE with a high level of confidence that design bases requirements were adequately captured and reflecting in Calvert Cliffs' technical procedures.

3. Audits and self-assessments support the conclusion that design bases requirements are translated into operating, maintenance, and testing procedures. Routine audits and assessments are done of the engineering and configuration control process and procedural controls for operations and maintenance procedures. These assessments focus on formal observations of program effectiveness and individual findings or concerns associated with control of design bases information. NRC inspections and internal "vertical slice" type inspections have also examined the transfer of design bases information to procedures. These inspections and self-assessments have found that design bases information has been adequately translated into procedures.

Additional detail concerning the rationale outlined above is contained in Attachment (1).

Request (c)

Rationale for concluding that SSC configuration and performance are consistent with the design bases.

RESPONSE

Our rationale consists of the following:

1. The SSC configuration has been reviewed using self-assessments of several systems (vertical slice type inspections). These self-assessments have found that the programs and processes are effective in maintaining the configuration of the plant consistent with the design bases. Nuclear Regulatory Commission Safety System Functional Inspections performed during this same period have reached the same conclusion.

2. Several major testing programs exist to provide information on the performance of SSCs at Calvert Cliffs. These testing programs are developed using the design bases information controlled by the engineering department. The purpose of the testing is to determine if the SSCs performance is consistent with the design requirements reflected in the test procedure. For example, one aspect of the design bases upgrade previously mentioned was a detailed review of the accuracy of the surveillance testing program to determine how well they met the requirements of the Technical Specifications. The work control process provides constraints which require that the necessary testing be satisfactorily completed as part of the process of restoring operability.

Descriptions of the self-assessments and testing programs are contained in Attachment (1).

Request (d)

Processes for identification of problems and implementation of corrective actions, including actions to determine the extent of problems, actions to prevent recurrence, and reporting to NRC.

RESPONSE

The Corrective Actions program provides for prompt identification, documentation, evaluation, and correction of conditions adverse to quality, including those conditions determined to have a significant impact on quality or nuclear safety. Corrective actions are based on an appropriate level of causal analysis and provide reasonable confidence that the condition will not recur. The Corrective Actions program consists of six essential elements:

1. Issue Identification and Documentation (involving all site personnel);
2. Issue Screening, Assessment, and Assignment;
3. Acceptance of Ownership;
4. Causal Analysis;
5. Implementation/Issue Resolution; and
6. Verification of Corrective Action Effectiveness

The process for reporting issues to the NRC is part of the plant's corrective action process.

The Corrective Action program applies to activities within the Nuclear Program that potentially affect plant operation, including the Independent Spent Fuel Storage Installation. This includes activities designated as safety-related or Technical Specification-related (controlled by a Technical Specification-related procedure), designated non-safety-related or augmented quality activities, and also to conditions adverse to quality occurring in non-safety-related activities. The Corrective Action program applies to those conditions that represent failure to meet requirements, such as malfunctions, deficiencies, deviations, or non-conformances. A separate program (Gold Card program) has also been established to address challenges which fall below the threshold of the Corrective Action program.

Additional details about the corrective action process and reporting process are contained in Attachment (1).

Request (e)

The overall effectiveness of your current processes and programs in concluding that the configuration of your plant(s) is consistent with the design bases.

RESPONSE

A combination of functional control by lead organizations to implement management expectations, several vertical slice-type inspections, and ongoing self-assessments of implementing programs supports the conclusion that the programs and processes are effective in maintaining the configuration of the plant in a manner providing reasonable assurance of consistency with the design bases.

Management expectations regarding engineering design and configuration control, operations and maintenance testing, and the Corrective Action program have been established by executive management in the appropriate Nuclear Program Policies. These expectations include:

- establishing and maintaining effective methods that ensure the licensed design bases accurately reflects the as-built plant characteristics;
- ensuring modifications are made in a safe and reliable manner and rigorously adhere to the licensed design bases so that nuclear safety standards are maintained;
- maintaining an effective post-maintenance testing program to verify proper functioning of plant equipment;
- establishing and maintaining a testing program that provides for control of testing activities under specific conditions, and surveillance tests to verify compliance with Technical Specification requirements; and
- maintaining a program to promptly identify, prioritize, document, evaluate, and correct quality deficiencies, and to determine corrective actions to prevent their recurrence.

The programs described previously in this response are derived from these expectations. These expectations and their resultant programs provide reasonable assurance that the configuration of the facility is consistent with the design bases. Both our self-assessment process and NRC inspections indicate that our engineering design and configuration control programs have generally improved

over time as expectations have changed. Past self-assessments have identified deficiencies which were addressed by program improvement initiatives, and led to the upgrade of these programs. Details of these assessments are given in the response to Requests (b) and (c). Based upon the information presented in the responses to Requests (a) through (d) above and in Attachments (1) and (2), we conclude that the control processes provide reasonable assurance that the plant is being operated and maintained in a manner consistent with the design bases.

RESPONSE DEVELOPMENT PROCESS

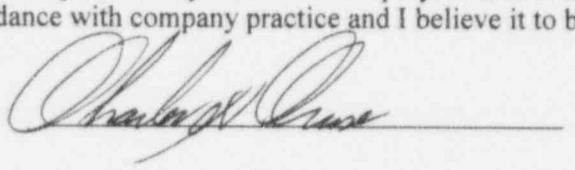
Our response has focused on our programs and processes, and on conclusions drawn from previously completed engineering and configuration control review activities, as discussed in the responses to Requests (b) and (c). The information provided in this letter and attachments are intended to describe processes and procedures as they exist as of the date of this letter. It is not intended to preclude subsequent changes following normal practices, or to require NRC notifications or consents for such changes other than those currently required. Similarly, the information is not intended to create new regulatory commitments.

In responding to the information request, we followed an information gathering process which included verification measures. In accordance with approved processes, this response was developed and independently reviewed by experienced and cognizant personnel. In addition, Plant Operating and Safety Review Committee and Offsite Safety Review Committee members, and other appropriate plant management personnel, have reviewed this response. The information collection process and verification measures were implemented with the objective of assuring the accuracy of the information which supports our conclusion that the plant is operated and maintained within its design bases, and that deviations are reconciled in a timely manner.

Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

I, Charles H. Cruse, being duly sworn, state that I am Vice President, Nuclear Energy Division, of Baltimore Gas and Electric Company (BGE), and that I am duly authorized to execute and file this response on behalf of BGE. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other BGE employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.



Subscribed and sworn before me, a Notary Public in and for the State of Maryland and the County of Calvert, this 5th day of February, 1997.

Witness my hand and official seal.

Denise D. Snukis

My Commission Expires 2/2/98

CHC/PSF/dlm

Attachments: (1) Requested Information
(2) Design Bases Review Program

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
Director, Project Directorate I-1, NRC
A. W. Dromerick, NRC
H. J. Miller, NRC
Resident Inspector, NRC
R. I. McLean, DNR
J. H. Walter, PSC

ATTACHMENT (1)

REQUESTED INFORMATION

Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
February 5, 1997

ATTACHMENT (1)

REQUESTED INFORMATION

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ATTACHMENT (1)

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ATTACHMENT (1)

REQUESTED INFORMATION

INTRODUCTION

We place great importance on configuring, operating, and maintaining Calvert Cliffs in accordance with its design bases. Compliance with the design bases is one of the key elements in reasonably assuring public health and safety. To this end, we have made a continuing commitment to maintain compliance with the design bases.

REQUESTED INFORMATION

The following information was requested for each licensed unit:

(a) Description of engineering design and configuration control processes, including those that implement 10 CFR 50.59, 10 CFR 50.71(e), and 10 CFR Part 50, Appendix B;

(b) Rationale for concluding that design bases requirements are translated into operating, maintenance, and testing procedures;

(c) Rationale for concluding that systems, structures, and component (SSC) configuration and performance are consistent with the design bases;

(d) Processes for identification of problems and implementation of corrective actions, including actions to determine the extent of problems, actions to prevent recurrence, and reporting to Nuclear Regulatory Commission (NRC); and

(e) The overall effectiveness of your current processes and programs in concluding that the configuration of your plant(s) is consistent with the design bases.

Additional information was requested for each licensed unit regarding a design basis review program. We were requested to indicate whether we have undertaken any design review or reconstitution programs, and if not, provide a rationale for not implementing such a program. Further, if such a program is completed or is being conducted, provide a description of the review programs, including identification of the SSCs and the plant-level design attributes. The description should include how the program ensures correctness and accessibility of the design bases information for the plant, and that the design bases remain current.

Request (a)

Description of engineering design and configuration control processes, including those that implement 10 CFR 50.59, 10 CFR 50.71(e), and 10 CFR Part 50, Appendix B.

RESPONSE

INTRODUCTION

The Nuclear Program establishes a procedure hierarchy consisting of Nuclear Program Policies, Directives, administrative procedures, and technical procedures. Management has established their expectations regarding engineering design and configuration control in the appropriate Nuclear Program Policies. These expectations include:

- establishing and maintaining effective methods that ensure the licensed design basis accurately reflects the as-built plant characteristics; and

- ensuring modifications are made in a safe and reliable manner, rigorously adhering to the licensed design basis so that nuclear safety standards are maintained.

These expectations are incorporated in programs established and governed by Nuclear Program Directives. Nuclear Program Directives assign responsibilities and state management requirements and regulatory commitments for each program area supporting the Nuclear Program Policies, in order to meet regulatory requirements and management expectations. Administrative procedures specify the processes used for compliance with directive requirements. The three levels of administrative procedures that exist within the hierarchy are interdepartmental, departmental and section/unit. Technical procedures are written to operate, maintain, test, or protect systems and related equipment, and are controlled by administrative procedures.

The following engineering design and configuration control processes are described in the following Nuclear Program Directives:

- Design Authority
- Configuration Management
- Independent Spent Fuel Storage Installation
- Modifications Program

The Design Authority program describes requirements and responsibilities for establishing and maintaining the design bases, and controlling design output documents to accurately reflect the design bases. This program further details the methods used to require applicable design activities to comply with regulatory commitments, industry standards, and management expectations. The Design Authority program provides for the technical accuracy and maintenance of the plant design; establishes specified limits and controls for delegation of design activities to internal and external organizations; and establishes technical standards and criteria for the performance of the design and engineering activities according to applicable regulatory and management requirements. These Engineering Standards cover the generation of drawings, calculations, specifications, and other items.

Administrative procedures provide the controls and processes for initiating and performing engineering services, the process for implementing design modifications in coordination with the Modifications program, and the controls and processes for performing safety evaluation screenings and safety evaluations as required by 10 CFR 50.59 and 10 CFR 72.48.

Engineering Standards provide a standard method for performing complicated or specialized activities supporting the engineering process. In addition, Engineering Standards are a convenient vehicle to provide commentary and to present engineering information that is contained in various engineering documents which may be less retrievable or convenient to use. The issuance of Engineering Standards is controlled by administrative procedures.

The Configuration Management program describes administrative controls, responsibilities, and boundaries for a Configuration Management program to maintain plant SSCs and computer software consistent with approved design requirements, to accurately reflect the physical and functional characteristics of the plant in design bases documents, and to operate the plant within the design bases. There are no administrative procedures within the Configuration Management program;

however, numerous procedures outside of the program implement these expectations and requirements.

The Independent Spent Fuel Storage Installation (ISFSI) program defines the responsibilities and quality assurance (QA) requirements for the construction and operation phases of the ISFSI at Calvert Cliffs. This program works with the Design Authority program to maintain the ISFSI design bases and is under the requirements of the 10 CFR Part 50, Appendix B, and 10 CFR 72.48. There are no administrative procedures specific to the ISFSI program.

The Modifications program includes methods for evaluating, approving, prioritizing, engineering, implementing, returning to service, and closing out modifications to SSCs. The Modifications program requires that design activities associated with modifications be accomplished in coordination with the Design Authority program. Additionally, modifications are subject to the same review and approval process as the original design.

Personnel at Calvert Cliffs use NUCLEIS to support the plant's design and configuration control processes. NUCLEIS is an onsite computerized database which consists of equipment, maintenance, materials, records management, and activity tracking subsystems. The equipment subsystem is used to store component-specific data, such as make/model, safety classification, and engineering characteristics. The records management subsystem provides a means of associating various documents and records with components. The activity tracking subsystem is used to track and identify the status of actions required to be completed as a result of issued engineering packages. This data is controlled by appropriate administrative procedures and is available to engineering personnel and is routinely used in activities associated with configuration management.

DESCRIPTION OF THE ENGINEERING DESIGN CONTROL PROCESS

The design control process applies to personnel involved in plant changes which affect design, function, or method of performing the function of an SSC described in the Updated Final Safety Analysis Report (UFSAR) and/or controlled by QA program documents. This process is used for the review, approval, release, distribution, and revision of documents involving design interfaces. It requires use of an Engineering Service Package (ESP) to implement requests for engineering services for those SSCs. The type of service dictates the content of and controls placed upon each service. The preparation and issuance and control of various documents, referred to as "engineering products," is controlled by this process. The processing of changes to design-controlled fields in the NUCLEIS equipment technical databases is also covered.

Engineering Services

The design control process classifies the different types of engineering services and defines the evaluation method for each. There are five types of engineering services that can be requested; configuration document change evaluations (CDCEs), like-for-like evaluations, equivalency evaluations, modification evaluations, and engineering evaluations.

Configuration document change evaluations are changes to engineering products for which field implementation is not applicable (e.g., as-found field discrepancies in drawings, addition of vendor information to technical manuals). Prior to changing plant design output (configuration)

documentation to resolve discrepancies between as-built configuration of the plant and configuration documents, a CDCE is performed to determine whether the change is according to approved engineering. The CDCE determines if the change is or is not design-related. The CDCE may also be used to update or change design output documents, e.g., drawings, equipment technical databases, vendor technical manuals, calibration data documents for reasons other than resolving plant configuration discrepancies (i.e., administrative change).

Like-for-like evaluations are used when the replacement item is not or cannot be readily determined to be a like-for-like replacement.

Equivalency evaluations determine whether a proposed alternate replacement item is capable of meeting the same design requirements and performing the same function as the original item. The equivalency evaluation determines that interface, interchangeability, safety, fit, and function are not adversely affected or contrary to regulatory requirements.

Modifications are planned changes to the design, function, or method of performing the function of an SSC. Changes to SSCs must be accomplished according to requirements and limitations of applicable codes, standards, specifications, licenses, and predetermined safety restrictions. A modification evaluation is used to approve and document a modification to an SSC. This evaluation determines that an SSC is modified according to appropriate design and licensing bases requirements.

Engineering evaluations are used when the above evaluation methods are not applicable to the requested engineering service. Examples of engineering evaluations are:

- Documentation of system operational configurations as compared to plant design bases to support Operations requests;
- Documentation of engineering studies and reviews conducted in support of Issue Report and Program Deficiency Report resolutions; NRC Bulletins, Information Notices, and Circulars; and Industry Operating Experience Reviews;
- Documentation of plant configurations which are at a level of detail below that found in design bases documents; and
- Documentation of calculation reviews for specific or situational applications.

Inputs, Analysis, Outputs

Design inputs are identified, documented, reviewed, and approved as specified for each design activity. Changes to design inputs, including the reasons for the changes, must also be identified, approved, documented, and controlled. Engineering Standards are used to provide a standard method for completing evaluations of design inputs for any activity requiring application of the design considerations specified by ANSI N45.2.11, Draft, 1973.

Design analyses are to be performed in a planned, controlled, and correct manner. Methods are established for the selection and review for suitability of application of items and processes that are essential to the functions of the SSCs. Likewise, methods to identify and control internal and external design interfaces are established. As an example, an owner acceptance review is required for

products developed and approved under an external design organization program and procedures (such as a design calculation prepared and approved by a vendor using the vendor's calculation procedures). It is a check for the reasonableness of inputs, assumptions, and results, and to verify that the product requested is the one received.

Design changes must be justified and subjected to design control measures commensurate with those applied to the original design. Methods are established to incorporate regulatory requirements and the design bases into specifications, drawings, procedures, and instructions. Engineering products that define technical requirements of SSCs are categorized as "design output." Examples of design outputs are drawings, specifications, calculations, and vendor technical manuals.

Design control methods identify the individuals responsible for design reviews and other design verification activities, their authority, and responsibilities. Design outputs are independently reviewed by competent individuals, and the independent review includes confirming that the design inputs were correctly selected and incorporated into the design. Completion of these design verification activities is required prior to the issuance of engineering. Training is provided for personnel to become qualified to perform the activities described here.

DESCRIPTION OF THE CONFIGURATION CONTROL PROCESS

The Configuration Management program at Calvert Cliffs is described as, "a mechanism for ensuring the plant is maintained and operated according to the design bases, and that design documentation accurately reflects the current design bases." The objectives of the Configuration Management program are that:

- The design bases are clearly defined and readily retrievable.
- All plant changes are consistently incorporated into the design bases.
- Necessary documentation accurately reflects the as-built plant conditions.
- The plant is operated within the limits of the design bases.
- The plant is consistently maintained within the design bases.

The Configuration Management program acts in conjunction with implementi g programs to maintain the plant design bases from construction through modification, maintenance, and operations.

Methods have been established to communicate needed design information across internal and external design interfaces, including changes to the design information as work progresses. Design information transmitted from one organization to another is documented in specifications, drawings, or other controlled documents that are uniquely identified and issued by authorized persons.

Design Bases are Defined and Retrievable

The 10 CFR 50.2 defined design bases are contained in the UFSAR. This information, along with other important design information, is contained primarily on the NUCLEIS database and on other databases or calculational records maintained as part of the engineering process. Design bases information is used during the engineering processes described earlier.

Engineering Standards maintain configuration control for applicable programs and documents. These

standards refer to the appropriate design bases information for the programs or documents covered by the standard. The engineering process uses a checklist to determine if one of these specialty (Engineering Standard) areas is affected by the proposed engineering activity. If so, then the specialty area will be considered and documented in the ESP.

Other programs also work to provide design bases information in a retrievable form. The Document Control program requires that the latest revision of controlled documents, such as, procedures, Technical Specifications, UFSAR, Vendor Technical Manuals, and drawings are available to site personnel. Any discrepancies between these documents and the as-built configuration that are identified are corrected under the corrective action process.

Additionally, the Licensing and Regulatory Matters program is responsible for requiring that regulatory commitments are fulfilled, that changes to the operating licenses are technically justified and appropriately implemented, and that the required regulatory reports are submitted on time. Requiring that the licensing bases be clearly defined and retrievable is another important aspect of the program.

Changes are Incorporated into the Design Bases

The engineering process for both modifications and non-modifications contains requirements for updating design bases information in design output documents. These requirements differ somewhat for modifications and non-modifications.

When modifications are issued, the applicable design output documents are updated when the engineering is approved. Exceptions are when design output documents are updated as a result of post-installation activities, or when the activities are identified on the ESP's design instructions. These activities are also tracked through the use of the activity tracking subsystem.

Non-modification engineering packages are issued as approved and are closed when the applicable activities are completed. These activities consist typically of updating configuration control documents. The activity tracking subsystem of NUCLEIS is used to check that these activities are completed prior to the engineering package being closed. This tracking with NUCLEIS is important because the engineering service (non-modification changes included) may be permitted before all of the configuration documents are updated. For example, the engineering process states, "Once the Equivalency Evaluation is approved, the alternate replacement item may be installed . . . even though additional configuration documents such as procedures, drawings, vendor technical manuals, or technical databases may need to be updated." The activity tracking subsystem is used to track the completion of these activities. Tracking milestones are issued to identified organizations requesting they evaluate the ESP for impact on their procedures, training, and other activities.

During the implementation phase of a modification, other configuration and control documentation is used. Configuration control documentation is issued as "approved for installation." Examples are:

- Drawing Change Notices;
- Cable/Raceway Cards;
- Setpoint Change Transmittal Sheets ;
- Calibration Change Transmittal Sheets;
- Master Calibration Data Sheets ;
- Turn-Around-Documents for updating engineering technical data bases;
- Electrical Device Setting Sheets; and
- Vendor Technical Manual Review Packages.

Instructions are provided for the implementation of a modification using work packages. These instructions are applicable to permanent changes and changes to non-safety-related SSCs. Requirements include:

- Appropriate vendor technical manuals have been reviewed, and equipment location and orientation are correctly reflected in installation instructions and drawings.
- The proper environmental qualification classification for electrical equipment and instrumentation has been determined.
- Qualification Maintenance Requirement Sheets are provided for 10 CFR 50.49 equipment.
- Master Calibration Data Sheets and Setpoint Changes are included.
- Label requests are processed. This includes notification of new equipment being installed that needs identification tags installed. (This includes labels for the simulator.)
- If separate portions of a modification are planned for implementation at different times, then drawing change notices are issued such that the completed portions can be as-built for drawing control.
- A list of approved drawing change notices and construction drawings is sent to plant records.
- Minimum test requirements and acceptance criteria are specified. These requirements and criteria shall include testing required to validate assumptions on which the design was based.
- The work package is reviewed for modifications that have been designated as potential high risk to determine that safety evaluations and design instruction requirements have been correctly incorporated into the work package.

These instructions help to maintain the plant and the documentation in conformance.

The configuration control documents permit work to be performed in the field. When completed, each modification is turned over to Operations. A turnover checklist is required to determine that procedures, configuration documents, labels, training, testing, and parts necessary to support continued operation of the modified equipment are completed prior to the equipment being declared operable.

Documents Reflect As-Built Conditions

The design control and configuration control processes incorporate design bases information in maintenance, operations, and testing procedures. Specifically, for modifications:

- Maintenance and operating procedures and training, which need to be developed or changed prior to declaring the modification operable, be identified.
- A list of other procedures is provided which must be developed, or changed and training which must be conducted, prior to declaring the system operable.
- Activity tracking milestones are assigned to change or to develop the appropriate procedures and to conduct training prior to system operability, if not already previously assigned.

During the modification close-out process, notifications are made of any new equipment scheduled to be installed, but which was not installed. This notification includes any newly assigned component numbers so they are not included in procedures. The close-out process has a requirement to include a copy of the notification in the modification package. Once the modification work is completed, configuration control documents are used to update the applicable drawings, cable/raceway cards, engineering technical databases, instrument maintenance controlled files, etc.

Other related programs require changes to documents so they reflect as built conditions. For example, the Training program establishes requirements for coordination between personnel involved in the modification process and training process so that the Control Room simulator reflects the current configuration of the Control Room. The program also requires that lesson plans be based on current information, and that plant changes that impact craft training be identified. The Procedures program is another area that requires that changes to the plant's design bases or current configuration be reflected in appropriate procedures. Additional discussion of this program can be found under Request (b).

Plant Operations are Within the Design Bases

The Nuclear Operations program has, as one of its main goals, to operate Calvert Cliffs within the requirements established by the NRC. These requirements are contained in the plant Operating License and Technical Specifications, and are based on design bases information contained in the UFSAR. The program establishes requirements that dictate that SSCs required to perform a specific function will be operable as specified in the Technical Specifications.

Plant is Maintained Within the Design Bases

Several programs have as a main goal to maintain the plant within the design bases. The Maintenance program establishes requirements and responsibilities that require systems and equipment be maintained for optimal reliability and availability, and within their design requirements. Numerous program provisions require that the conduct of maintenance returns equipment to a like-for-like/identical configuration as that depicted in approved test or configuration documents. Any deviation from the approved configuration for "accept-as-is" or "repair" dispositions must be approved.

In general, corrective maintenance utilizes the corrective action process as the initiator for action. When equipment is degraded, failed, or results of testing identify deficiencies, the corrective action process is entered. This requires that conditions adverse to quality are identified and actions necessary to return equipment to its proper configuration are undertaken. Upon discovery, these items are screened for operability. The work is planned utilizing approved configuration control documents. In instances where incomplete information is identified, then engineering assistance is requested to develop the applicable information. Work is scheduled considering the risk of work balanced against the aggregate increase in availability and reliability. Post-maintenance testing is then performed to ensure the equipment operates as designed.

The Procurement program requires that procurement activities conform to regulatory requirements and reflect commitments made under 10 CFR Part 50, Appendix B. The Procurement program also requires that procurement/design specification packages be developed and independently reviewed for safety-related and designated non-safety-related items and services. Procurement specification packages include:

- Technical Requirements;
- QA Requirements;
- Documentation Requirements;
- Non-conformance Reporting Requirements;
- Change Control;
- Packaging, Shipping, and Storage Requirements; and
- Vendor Surveillance Requirements.

The design organization is also involved in the acceptance and dedication process for accepting commercial grade items for safety-related applications. The current revision level of the design engineering specifications is required for safety-related requisitions and orders. Further approval may be required for certain types of conditional release requests.

The Modifications program directly interfaces with the Design Authority program because plant modifications require engineering products to be produced by the Design Authority program. Procedural requirements for temporary modifications are established under the Modifications program. This procedure provides for the performance of temporary modifications within the plant's design bases.

The Information Technology Management program requires that information technology be classified as either business or plant information technology. Plant information technology scope includes hardware and software associated with plant SSCs. Configuration changes for plant information technology hardware and software are governed by the engineering design process, and therefore must be controlled in the same fashion as any other design element.

These programs collectively accomplish the objectives of the Configuration Management program. They operate together to maintain the plant design bases from construction through modification, maintenance, and operations.

10 CFR 50.59 PROCEDURE

10 CFR 50.59 and 10 CFR 72.48 regulations allow Baltimore Gas and Electric Company (BGE) to make changes to Calvert Cliffs or the ISFSI without prior NRC approval if the proposed change, test, or experiment does not involve:

- A change in the Technical Specifications/licensing conditions for Calvert Cliffs or ISFSI;
- An unreviewed safety question for Calvert Cliffs or the ISFSI;
- A significant increase in occupational exposure for the ISFSI; or
- A significant unreviewed environmental impact for the ISFSI.

To make these determinations, Calvert Cliffs performs Safety Evaluation Screenings and Safety Evaluations. Safety Evaluation Screenings and Safety Evaluations evaluate the implications of a proposed change to the facilities and procedures, or proposed tests or experiments on the UFSAR, Technical Specifications or License Conditions to determine if prior NRC approval is needed. It is not the purpose of the screening and evaluation process to evaluate the safety, technical adequacy or acceptability of the proposed change, test, or experiment beyond the 10 CFR 50.59 or 72.48 questions. Safety Evaluation Screenings and Safety Evaluations provide the basis for maintaining the Calvert Cliffs UFSAR, ISFSI Updated Safety Analysis Report (USAR), and Technical Specifications.

A procedure controls Safety Evaluation Screenings and Safety Evaluations performed to comply with 10 CFR 50.59 and 10 CFR 72.48. There is also an Engineering Standard that serves as a "how to" guidance document for this procedure. Controlling procedures for various processes requiring Safety Evaluation Screenings and Safety Evaluations direct procedure users to these documents. Use of this standard process provides consistency in the screening of changes to determine conformance with the Calvert Cliffs UFSAR, and the ISFSI USAR and Calvert Cliffs and ISFSI Technical Specifications. The qualification and training requirements for those personnel performing Safety Evaluation Screens and Safety Evaluations are established procedurally, and the step-by-step development, review, and approval process for performing these activities is stated.

Safety Evaluation Screening

Proposed changes, tests, and experiments are screened to determine if a Safety Evaluation is needed. Changes are defined as any alteration to a SSC or procedure, including additions, deletions, design changes, modifications, setpoint changes, altered replacements, revisions to procedures, and changes to the UFSAR. Other activities that may require a Safety Evaluation Screen are listed later. Changes to SSCs that are not explicitly described in the UFSAR can have the potential for affecting the design, function, or method of performing the function of SSCs which are explicitly described in the UFSAR. Therefore, both implicit and explicit descriptions of the facility are included in the Safety Evaluation Screening process. Tests and experiments are defined to include tests or experiments affecting systems described in the UFSAR if such tests and experiments have not been discussed in the UFSAR. These tests or experiments could degrade the margin of safety during normal operation or anticipated transients.

The Safety Evaluation Screening process requires consideration of several factors, including whether the activity would affect the Technical Specifications or the Operating License. The proposed activity is also reviewed to determine its effect on SSCs described in the UFSAR. Additions and

deletions to the UFSAR are also considered. Operation with the proposed modification is reviewed to see if SSCs continue to be operated in a manner consistent with the design. If the responses on the Safety Evaluation Screening indicate that the change requires a UFSAR change, a Safety Evaluation is initiated.

Safety Evaluations

The Safety Evaluation is written to determine whether a proposed change, test, or experiment involves an unreviewed safety question (Calvert Cliffs or ISFSI), or a significant unreviewed environmental impact or occupational exposure (ISFSI). If one of these conditions is determined to exist and BGE wishes to proceed with the change, a license amendment must first be obtained. Safety Evaluations are required to be performed by appropriately trained personnel using the guidance described earlier. Safety Evaluations are presented to and reviewed by the Plant Operations and Safety Review Committee, then reviewed and approved by the Plant General Manager. Approved safety evaluations are subsequently reviewed by the Offsite Safety Review Committee through the Offsite Safety Review Committee Safety Evaluation Subcommittee. If required, NRC approval is obtained prior to implementing the proposed activity.

Processes That Require Safety Evaluation Screening

Safety Evaluation Screenings (and/or Safety Evaluations) are required for a variety of activities, including:

- Configuration Document Changes, Equivalency Evaluations, Modification Evaluations, and Engineering Evaluations;
- Administrative and Technical Procedure Revisions, Changes, and Cancellations;
- Temporary Alterations;
- At-Risk Deviations;
- Temporary Shielding;
- Procurement Identified Deficiencies;
- Reload Core Design.

Configuration Document Changes

A Safety Evaluation Screening is performed in connection with certain engineering services, such as configuration document change evaluations, equivalency evaluations, and modification evaluations. These evaluations are described above under the design control process. A Safety Evaluation Screening is also performed for engineering evaluations if the activity results in a proposed change, test, or experiment.

Administrative and Technical Procedure Revisions

A Safety Evaluation Screening is prepared for procedure changes, as described in the response to Request (b).

Temporary Alterations

There is a control procedure for performing temporary alterations at Calvert Cliffs. This procedure applies to temporary plant configuration changes not controlled by other approved plant procedures. A temporary alteration is defined as a temporary plant configuration change that modifies the design/function of equipment and has not been evaluated for operational acceptability by another approved process. A temporary plant configuration change includes the installation, removal, or modification of equipment or components that result in a departure from plant configured design. Such changes are intended to be minor in nature and of short duration to allow operation or maintenance of systems at Calvert Cliffs.

After a temporary alteration is initiated and approved for continued processing, a Safety Evaluation Screening is performed. Specific unusual conditions are identified which have been pre-screened for 10 CFR 50.59 applicability, including installation of temporary sump pumps and fans and heaters. Use of this equipment is controlled at the direction of, and with close monitoring by, the Shift Supervisor.

At Risk Deviations

An at-risk deviation is a process which allows for completion of maintenance activities in which a modification must be performed to restore the equipment to a fully operable condition. This applies to both safety-related and non-safety-related modifications. The responsible maintenance group, responsible System Engineer, and a Senior Reactor Operator determine if a modification can continue without prior approval of a revision to the modification. When maintenance personnel are performing an at-risk deviation on a Maintenance Order for a modification, a Safety Evaluation Screening must be performed before returning the equipment to service.

Temporary Shielding

Temporary shielding involves shielding or shielding equipment that is installed for a specific time period, e.g., for duration of job, to reduce personnel exposure by reducing area radiation levels. It is expected that the need for temporary shielding will be considered at the earliest possible stage in work planning to allow sufficient time to review, screen, evaluate, and approve required temporary shielding. As part of planning for the temporary shielding, a Safety Evaluation Screening and/or Safety Evaluation is performed.

Procurement Identified Deficiencies

A control procedure exists for identifying, controlling, screening, tracking, and resolving procurement-related deficiencies. Procurement-related deficiencies include materials, parts, components, or services that do not meet the requirements as specified in the purchase order. A Safety Evaluation Screening is performed for conditional release which allows items identified as non-conforming during receipt inspection or items in the dedication process to be installed, tested, energized, pressurized, or operated.

Reload Core Design

The reload core design is the fuel and reactor core design required for the next cycle. Reload core design is considered a modification and is initiated using an ESP. Design documents, attachments, and other information that is pertinent to the reload core design is assembled into a reload core design package for review and approval. A Safety Evaluation Screening is performed for the reload core design package.

UFSAR UPDATE PROCESS

The UFSAR updating process is defined in and controlled by a procedure. The revision process addresses two categories: those revisions that are initiated through the design change process, and those changes initiated by other processes.

Revisions resulting from a design change are captured as part of the design change since a review of the impact on the UFSAR is required. Updated Final Safety Analysis Report changes are forwarded to the UFSAR Coordinator at the issuance of the design change. The change is logged and a hard copy file is maintained in a central location. Once the design has been implemented and turned over, the final change package is sent out for post-implementation review.

Revisions to the UFSAR may also result from Safety Evaluations. changes to procedures, changes to design calculations or analyses, analyses of new safety issues, operating license changes, changes to administrative information, and as-found conditions. Under these situations, a UFSAR change package, including a safety evaluation, is also required. The package is logged and a hard copy file is maintained. Review and approval is required from various departments for these packages.

Between updates, identified changes for the UFSAR are maintained by the UFSAR Coordinator. In preparation for transmittal to the NRC, all the approved change packages are assembled into a submittal. This package is submitted to the NRC. Personnel required to perform the functions described above are trained.

IMPLEMENTATION OF APPENDIX B CRITERIA

A QA program to implement the requirements of 10 CFR Part 50, Appendix B, was established at the initial design phase of Calvert Cliffs, and has been continuously implemented by BGE and its contractors and suppliers through the construction, startup, and operation phases. The QA program is referenced in UFSAR Section 1B, and it has been approved by the NRC. The QA program addresses the 18 criteria of 10 CFR Part 50, Appendix B. Revisions are made to reflect changes in organizational responsibilities and methods of program implementation, and are provided to the NRC. Reductions in commitments require prior NRC review and approval. These requirements are implemented through a series of approved procedures and instructions.

Implementing procedures and instructions are organized by responsible department (e.g., Operations, Maintenance, Engineering, etc.) or, in certain cases, by program (e.g., Corrective Action). Procedures and instructions (including changes thereto) are processed in accordance with approved administrative procedures that control their format, preparation, review, approval, and issuance. Compliance with, and the effectiveness of, these documents is assessed on a planned and periodic basis.

Request (b)

Rationale for concluding that design bases requirements are translated into operating, maintenance, and testing procedures.

RESPONSE

There are three key elements which provide our rationale for concluding that design bases requirements are translated into operating, maintenance, and testing procedures. These elements consist of an engineering and configuration control process, procedural controls, and audits and self-assessments of these controlled processes.

ENGINEERING AND CONFIGURATION CONTROL PROCESS

The engineering and configuration control process was described above. This process is administratively controlled so that activities and organizations affected by engineering activities are addressed. These controls include the following:

- Engineering notifies organizations that may be affected by an ESP. A formal matrix is used to determine who may be affected.
- The activity tracking subsystem of NUCLEIS is used to track the activity to be performed and any resulting change activities, including procedure change activities.
- Prior to closing out an ESP, Engineering reviews activity tracking milestones to determine if they have been completed and closed.

PROCEDURAL CONTROLS

Procedures Upgrade Project

The Procedures Upgrade Project (PUP) scope included the upgrade of all technical procedures and was completed on November 16, 1994. During this effort, technical procedures were upgraded against the objectives set forth in the PUP Project Plan. These objectives included:

- Continuing and completing the ongoing upgrade of [technical] procedures to enhance technical accuracy and functional adequacy;
- Capturing the bases and commitment information from this point on to ensure that regulatory requirements, technical requirements, and NRC/internal commitments are not deleted without due consideration;
- Developing an upgraded review system which trains and qualifies individuals to review procedures;
- Establishing a formal 10 CFR 50.59 and 72.48 safety evaluation screening process for proposed procedure changes;
- Enhancing the procedure validation and verification program to ensure technical accuracy and functional adequacy of procedures; and

- Establishing a permanent organization to maintain the integrity of upgraded procedures, and to manage the procedure development/revision process.

The procedure upgrade process included review of design bases information and capturing bases information in procedures so they would not be inadvertently revised or deleted. Technical reviews were performed to validate the technical adequacy of the procedure. Safety Evaluation Screenings (10 CFR 50.59 and 72.48) were performed to evaluate procedure requirements against requirements stated in the plant's Technical Specifications and UFSAR. Any discrepancies required the preparation of a Safety Evaluation. The conclusion of PUP in 1994 provided BGE a high level of confidence that design and licensing bases requirements were adequately captured and reflected in Calvert Cliffs' technical procedures.

Plant management wanted to ensure that post-PUP efforts continue to result in high quality procedures. To this end, the procedural controls established require that our procedures be maintained current and reflect the plant's design and licensing basis.

Administrative and Technical Procedural Controls

The controls established for performing procedure revisions and immediate changes help maintain procedures consistent with the plant's design and licensing basis. These controls also provide direction on how to proceed if a proposed procedure change is not consistent with the plant's design and licensing basis.

Since the beginning of PUP, procedure controls have been in place to adequately develop, review, and approve procedures. Controls for revising procedures include the following:

- Technical review, when required, by someone independent from the procedure writer;
- Safety Evaluation Screening/Safety Evaluation;
- Nuclear Safety Significance Screening for non-safety-related procedures;
- Designated review by the Plant Operations and Safety Review Committee, Procedure Review Committee or a Qualified Reviewer (designated by the Plant General Manager) to determine that no unreviewed safety question is involved for safety-related procedures;
- Approval by the approval authority who has been designated by the Plant General Manager and is someone independent from the Qualified Reviewer; and
- Compliance with the Technical Procedures Writer's Manual.

Procedure use and adherence requirements are established which reflect management's expectations that plant procedures reflect the as-designed configuration. Procedure users are instructed to stop the job and perform a change to the procedure when the procedure cannot be performed as written.

Controls for making immediate changes (often referred to as on-the-spot changes, field changes, or temporary changes) include the following :

- A determination that the change is not a change of intent;
- Review by two members of the plant management staff knowledgeable in the areas affected by the procedures, at least one of whom holds a Senior Reactor Operator's License on the unit affected;
- Safety Evaluation Screening/Safety Evaluation by qualified individuals;
- Nuclear Safety Significance Screening for non-safety-related procedures; and
- Approval by the approval authority who has been designated by the Plant General Manager and is someone independent from the Qualified Reviewer. Approval must be obtained within 14 days of implementation.

Administrative Procedures - 50.59

Administrative procedure revisions (including cancellations) and temporary changes receive a Safety Evaluation Screening. Editorial corrections do not need a Safety Evaluation Screening since the editorial correction process limits the types of changes made to those which have been determined not to affect a Safety Evaluation Screening.

After completing a draft procedure, it is processed through review, which includes a Safety Evaluation Screening. If the Safety Evaluation Screening identifies that the procedure revision or temporary change constitutes a change to the facility as described in the UFSAR or changes the Technical Specification, a Safety Evaluation is prepared.

Technical Procedures - 50.59

Calvert Cliffs defines technical procedures as, "procedures that describe actions to operate, maintain, test, or protect systems and related equipment." Technical procedure revisions (including cancellations) and temporary changes receive a Safety Evaluation screen. A few technical procedures are allowed to be pre-screened; and, thus, case-by-case Safety Evaluation screening is not required because these procedures have an initial Safety Evaluation Screening which demonstrates that changes are acceptable under 10 CFR 50.59. Meeting the conditions specified in the Safety Evaluation Screening allows changes to be made without an additional Safety Evaluation Screen. Safety Evaluation Screening are performed for immediate changes to technical procedures, as well as for new, revised, and canceled procedure changes.

AUDITING AND ASSESSMENTS

Engineering and Configuration Control Process

A review of audits, surveillances and other QA records (1990-1996) was conducted to assess whether data from these documents indicate that configuration management is being maintained, and that the design bases is being reflected in procedures. The review indicated that configuration management is being adequately maintained and the design bases is adequately reflected in procedures.

The assessment was conducted by a team consisting of members from the site's Nuclear Performance Assessment Department. Members were chosen based on their experience and background in the assessment area assigned. Nuclear Performance Assessment Department products generated since 1990 formed the raw data input for this evaluation. How each of these products assesses performance varies, but each contains elements of performance-based assessment. These documents were collected and reviewed by the team members. A database was generated to track the results of the review. Team members looked for specific conclusions or information on design basis or configuration control within these reports. The individual reviews were combined into the database, sorted by assessment element, and prepared for analysis. After collecting the data, a team of assessors met to develop the overall conclusions generated from reviews of the collected data. The methods described in the configuration management control model in NUMARC 90-12 (Design Basis Guidelines) provided the review framework. The team used the information from the database, and their own knowledge and experience, to develop a conclusion on the health of the program elements. These individual conclusions are presented below.

Design Inputs

In the area of design control, documentation related to design inputs, design process, and design output were reviewed. For design inputs, the review encompassed such areas as: Design Basis; Vendor Technical Manuals; Station Blackout; Human Factors Engineering; Environmental Qualification; and Appendix R/Fire Protection. It was concluded that design inputs are generally appropriate and technically correct. Some instances of incorrect design inputs were noted and documented in our Corrective Action program (such as an instance of a lack of design details for a fire wall expansion joint), but they have become less frequent and less severe in recent audits, with the exception of the fire wall expansion joint. Noted deficiencies have been corrected. There is an improving trend in the findings associated with design inputs.

Design Process

Design processes were reviewed. This review encompassed such areas as: Calculations; Electrical Analysis; Cooling Water Studies; Heating, Ventilation, and Air Conditioning; Flooding, Piping & Support Analysis; ALARA [as low as reasonably achievable] Design Review; Radio Frequency Interference; Load Handling; and Erosion/Corrosion Process. The design process is considered adequate, however, instances of calculational assumptions that were not properly verified were noted. Engineering management has also noted this area during self-assessments. These instances are being corrected under the site Corrective Action program. In most cases, these assumptions adequately supported the calculations. In one case, however, calculational assumptions used to support switchgear room ventilation analyses were incorrect, leading to inadequate Appendix R compensatory actions. A recent assessment (January 1997) concurs with these findings. Management attention is focused on this assessment to be sure the corrective actions are tracked and completed.

Design Output

The design output review encompassed such areas as: Drawing Control; Seismic Qualifications; Setpoint Control; and Procurement Specification. Setpoint control is a complex program with parallel paths producing many similar outputs. However, the paths appear to complement each other and the process appears to be working satisfactorily. Also, the design outputs generally appear conservative and include appropriate design margin. The design outputs also appear currently adequate.

Configuration Management

Configuration management control for procedures was reviewed. This review was conducted by reviewing QA audits, surveillances, quarterly safety performance evaluations, Industry Safety Evaluation Group (ISEG) observations, ISEG evaluations, ISEG trends and investigations, Root Cause Analysis Reports, and other QA records since 1990.

In the area of configuration management, documents related to 10 CFR 50.59 and 72.48 Safety Evaluations, UFSAR updates, license amendment requests, core reload process, operability assessments, repair and replacement processes, temporary alterations, and the modification process were reviewed. While the Safety Evaluation process had some weaknesses prior to 1993 (such as poor justifications or not always properly screened), significant procedural changes and training have occurred since then, such that the process has demonstrated significant improvement. The UFSAR updates, license amendment requests, and core reload process also were determined to be adequate. Some minor process weaknesses were noted in the past, but the quality is improving. Operability assessments and the repair and replacement process are considered adequate. The temporary modification program is considered generally adequate, with some recent instances showing the need for stronger action, such as insufficient ownership of the process and work conducted outside of approved processes. As a result of management attention, these issues are being corrected. The modification program was reviewed and is considered adequate, with exceptions related to engineering package closeout. Some modifications were treated as closed before all associated paperwork was complete, while in other cases closeout was inappropriately delayed. A program for correcting instances of incomplete closeout is in place. Management has taken to steps to address this weakness and the engineering process is currently being revised to correct the weakness.

Licensee Event Reports

A review of Licensee Event Reports since 1990 has found seven occasions where we found the plant operation outside of the design bases. The nature of these Licensee Event Reports has changed from issues where the design bases was not properly consulted or maintained, to issues where plant conditions developed that placed the plant outside the design bases (pressurizer heater sleeve cracking, heat exchanger microfouling). Corrective actions taken since 1990 have changed the engineering design process to reduce instances of a mismatch with the design bases.

NRC Inspections

In addition to internal reviews, a review of routine NRC inspections since 1992 was conducted to identify findings related to engineering design control or configuration control. Examples of inspection areas include: spent fuel pool design, new emergency diesel generators, and safety evaluations. In general, the inspection findings show improvements in attention to maintaining the design bases. The general good and improving health of the engineering design and configuration control programs is reflected in our last three Systematic Assessment of Licensee Performance [SALP] 1 scores in the Engineering area. Additionally, special inspections were done of our Service Water System, Electrical Distribution System, and motor-operated valves. The NRC inspection results were consistent with the findings of the assessments discussed above.

Procedural Controls

Assessments are conducted to review the performance of the operations and maintenance organizations related to design instructions and maintaining configuration of SSCs complete. Audits and assessments of operations and maintenance from 1990 to the present were reviewed. The review focused on formal observations of program effectiveness and individual findings or concerns associated with control of design bases information. For operations, the reviewed data indicate that design bases requirements are adequately implemented by plant operating procedures. Some weaknesses have been identified (such as a few cases where UFSAR requireme were not explicitly proceduralized, or where procedures did not meet some documentation requirements) and these have been evaluated and corrected through the corrective action process. In the maintenance area, the data indicate that good modifications packages and post-modification/maintenance packages are provided. However, they must be complemented by maintenance personnel recognizing when a configuration change occurs and rigorously applying good work practices.

Request (c)

Rationale for concluding that SSC configuration and performance are consistent with the design bases.

RESPONSE

Our rationale consists of two major parts. component configuration and component performance.

1. The SSC configuration has been reviewed using self-assessments of several systems (vertical slice type inspections). These self-assessments have found that the programs and processes are effective in maintaining the configuration of the plant consistent with the design bases. Nuclear Regulatory Commission Safety System Functional Inspections performed during this same period have reached the same conclusion.

2. Several major testing programs exist to provide information on the performance of SSCs at Calvert Cliffs. These testing programs are developed using the design bases information controlled by the engineering department. The purpose of the testing is to determine if the SSC performance is consistent with the design requirements reflected in the test procedure. The work control process provides constraints which require that the necessary testing be satisfactorily completed as part of the process of restoring operability. These major testing programs are described below.

SSC CONFIGURATION

Audits were performed in 1991, 1993, and 1995 to assess the operational performance capability of selected systems. These audits used a vertical-slice sampling philosophy (similar to IP 93801) to assess:

- Capability of systems to perform safety functions per design bases;
- Consistency of as-built data with current design/licensing bases;
- Adequacy of systems testing to demonstrate all required functions;

- Adequacy of human factor considerations/procedures to maintain proper system operation (normal, abnormal, and emergency conditions); and
- Adequacy of management controls for ensuring systems fulfill the safety functions required by their design bases.
- Completeness and accuracy of operations, maintenance, surveillance, and test documentation;
- Adequacy of training for tions and maintenance personnel on these systems;

The 1995 audit did not assess the last two items on the previous list because the system had not become operational at the time of the audit. The results of these audits have found that the reviewed systems are generally consistent with the design bases described in the UFSAR. The more current audits reflect an improving awareness for maintaining SSC configuration in agreement with the design bases.

In 1991, a vertical slice inspection was performed on Electrical Distribution Systems. The AC and DC electrical distribution systems, including their supporting systems, were found to be functional (capable of performing as designed on demand).

Several audit strengths were identified including the good overall level and completeness of recent calculation efforts. Functional test procedures for Class 1E 480 and 4 kV circuit breaker and cubicle inspections were very detailed and included the use of good diagrams/schematics. The daily maintenance meetings provide effective interaction between engineering and plant personnel. The engineering department is utilizing the most current industry standards in performing instrument setpoint calculations.

Several process weaknesses were noted during the inspection. Examples are:

- The UFSAR did not contain all of the most current operating data/information concerning the electrical distribution system. ANSI N45.2.11 guidelines were not followed for electrical analyses calculations. Operability assessments were completed for equipment affected by the deficient calculations. The analyses were redone and the UFSAR corrected. Training on the updated design process was held for the design engineers. The process for updating the UFSAR was strengthened.
- The lack of preventive maintenance activities could have led to an undetected degraded condition of the equipment. New preventative maintenance procedures for AC/DC panels were developed and implemented.
- The prioritization processes onsite needed to be assessed to determine if planned work is accomplished in a timely manner. When the assessment was conducted, deficiencies in the prioritization process were found. Corrective actions for prioritization for timely accomplishments of work were completed.

The NRC performed an inspection of the Electrical Distribution System in 1992. The weaknesses noted above had been resolved at the time of the inspection; however, a number of other issues concerning calculational adequacy, inadequate tests and procedures and inadequate design control were identified. These items have since been resolved and the engineering control process has been

strengthened. The inspection found that the electrical distribution system was capable of performing its safety function (taking into consideration a required modification). The inspection also found a number of weaknesses that our internal inspection did not. Lessons learned from the example were used to develop the inspection plan for the Service Water System described below.

In 1993, a vertical-slice inspection was performed on the Service Water System. The Saltwater, Service Water and Component Cooling Water Systems were found to be capable of fulfilling their thermal and hydraulic performance requirements. These systems were found to be operated within their design parameters and design bases. An assessment of their operational controls, maintenance activities, surveillance, and testing activities and associated training concluded they are operated and maintained to effectively meet their safety-related function. The assessment found that requirements of Generic Letter 89-13 were being satisfied.

Several audit strengths were identified. The technical staff was considered dedicated and knowledgeable of the system requirements. The analytical efforts and documentation related to confirmation of the licensed design bases were strong. The material condition of Saltwater, Service Water, and Component Cooling Water Systems' components, and piping was good. The availability of information aided the inspection effort and improved document retrievability.

Process weaknesses were noted in implementing and maintaining an ongoing program of inspection activities required by Generic Letter 89-13. These weaknesses include:

- A failure to follow procedures for trending results from preventive maintenance activities. A review addressed the root causes, generic implications, and corrective and preventive actions. These actions have been accomplished and system managers trend preventive maintenance results in monthly system performance report cards.
- A lack of attention to detail was the precursor to several issues identified in the maintenance of these systems. The root cause was tied to human performance for failing to recognize the significance of the Service Water System. Two generic implications were identified. First, equipment deficiency corrective actions were not being reviewed as an input to develop future preventive actions. Second, certain preventive maintenance activities needed to have their periodicity reviewed to ensure critical safety functions were maintained. New maintenance tasks were created, and statements added to the tasks concerning human performance issues. These tasks have been implemented.

The NRC also performed an Operational Functional Inspection of the Service Water System in 1994. The inspection concluded that the Service Water System is satisfactorily designed and capable of performing its safety functio . It judged our overall performance to be superior with respect to Service Water System activities. While the inspection identified several design-control process issues, no new safety significant design issues were identified. The inspection findings generally agreed with those identified in our self-assessment.

In 1995, a vertical-slice inspection was performed on the 1A and 0C Emergency Diesel Generators. The objectives of the inspection were to ensure that the design of these diesel generators satisfies regulatory requirements, and the as-built installation of both the 1A and 0C diesel generators is consistent with design requirements.

Audit strengths noted that the design analysis and documentation were comprehensive and detailed. In addition, testing, particularly Engineering Test Procedures, were good.

A few process weaknesses were found. They include calculational weaknesses in the area of undocumented assumptions and some calculational inconsistencies. All individual findings were corrected; however, a follow-up assessment was conducted to determine if the weakness in the area of unverified assumptions is programmatic. This assessment is discussed under the response to Item (b). There is no corresponding NRC Safety System Functional Inspection for this system.

SSC PERFORMANCE

Satisfactory SSC performance and conditions, when tested and inspected using design requirements, provide confidence that SSCs are maintained within their design bases. Calvert Cliffs has several major testing and inspection programs which are based upon and use underlying design bases information. As described below, each of these programs measures selected SSC configuration and performance against criteria developed, in part, from design bases information. Performance of these tests is controlled by the computerized Quarterly System Schedule. This scheduling program allows for system interactions (Technical Specifications, probabilistic risk assessments) to be taken into consideration when scheduling systems to be out-of-service for maintenance.

Modification Testing Procedures

Modifications often require the development of one-time, post-modification testing to verify that a modification is properly installed, that it achieves the objective of the modification, that it restores system operability or functionality, and does not adversely affect plant safety. Post-modification testing may also be used to validate analytical models used to design the modification, verify correctness or conservatism of the assumptions used for predicting plant and system responses to anticipated transients or postulated accidents, familiarize operating and technical staff with the operation of the modified system, and provide baseline data for future evaluation. This also includes development of new procedures if warranted by the scope of the modification and existing procedures.

The modification process is controlled by the engineering design process described above (response to Item a). Post-modification test requirements are specified in the work package for the modification. The testing requirements range from relatively simple functional checks to detailed testing necessary to establish system operability or performance. The work package typically references approved procedures that must be followed in performing the testing, such as a maintenance procedure. If no approved procedure exists and testing is relatively simple, detailed instructions may be included in the work package. If testing is complex, and is not covered by an existing procedure, an Engineering Test Procedure is typically developed to perform testing. Following implementation of the modification, post-construction walkdowns are conducted to verify

proper installation of the modification. These walkdowns typically include a review of post-modification testing.

Surveillance Testing Procedures

Surveillance requirements in Appendix A of the Operating License specify certain tests, calibrations, and inspections to evaluate the performance of SSCs. The surveillance testing administrative procedure establishes the requirements for writing, approving, scheduling, performing, completing, and reviewing surveillance test procedures.

To maintain the Surveillance Testing program consistent with the Technical Specifications and Calvert Cliffs design basis, two databases have been created. One database is a matrix which cross-references the surveillance requirements to the implementing procedures. Whenever the plant design changes, or UFSAR or Technical Specifications are changed, the database is reviewed to check the implementing procedures affected by the change are revised accordingly. Changes to technical procedures are also screened to determine the impact on the first database, and updates are made as necessary. The second database cross-references the installed plant instrumentation used to satisfy surveillance requirements to the implementing procedures and the instrument calibration procedure. This database is used to determine which surveillance test procedure is affected by particular instrument changes or failures. An annual review of the Technical Specification Surveillance Cross-Reference List in the first database is required with a complete validation every five years. Periodic self-assessments are performed. For example, in 1991, the Technical Adequacy Review Process evaluated all surveillance testing to determine whether the surveillance tests meet the intent of the Surveillance Requirements in Technical Specifications (see Attachment 2). Most recently, a basis document was completed for the Pump and Valve Inservice Test program.

Additionally, the administrative procedures for the Surveillance Test program assign responsibility to applicable personnel for program maintenance. These personnel review changes which potentially impact the programs and complete the necessary changes to the program utilizing NUCLEIS, the Electronic Docket, and the surveillance information system. These same controls apply to the Pump and Valve Inservice Test program.

Reactor Core Performance

Calvert Cliffs has a startup test program and a core follow program to verify that the operating characteristics of the reactor are consistent with the design bases. These programs reasonably assure that the core operates as designed.

The startup test program is performed after each core refueling, as required by the UFSAR. Proposed changes to the startup program must be evaluated under the 10 CFR 50.59 process. Prior to returning to normal operations after core alterations, the startup test program evaluates operating characteristics of the core to see if they are consistent with design predictions. The engineering staff directs the evolution of the testing program through approved procedures. Sufficient measurements are obtained to verify that the plant is being operated in a safe condition, and is within the bounds of the applicable acceptance criteria and within the design bases. Experience gained from this program has improved the ability to model the reactor core.

The core follow program is periodically performed during normal operation based on internal requirements. This program also identifies any deficiency in the predictive capability of the core models, and provides data which can be used to determine process biases and uncertainties. Verification of the core physics models and calculational methods is a continuing part of the core reload process. The core follow program provides the ability to check predicted characteristics of the reactor core with measured operating data to determine that the core remains within the design bases. The program can serve to identify potential problems at an early date, and to provide up-to-date analytical models which can be used to promptly diagnose trends. Experience gained from past core follow efforts has been applied to subsequent reload designs. It has also enhanced the core monitoring system.

Inservice Inspection Program

The surveillance requirements in the Technical Specifications specify that inservice inspection (ISI) of ASME Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code. An administrative procedure establishes the requirements for the planning, scheduling, inspection, documentation, evaluation, disposition, and submittal of records of components and systems subject to ISI in accordance with ASME Section XI.

Components subject to the ISI rules of ASME Section XI include Class 1, 2, and 3 nuclear power plant items such as vessels, containments, piping systems, pumps, valves, core support structures, and storage tanks, including their respective supports. Based on the specific code classification of an item, Section XI provides rules for the ISI of that component. Section XI utilizes three methods of examination; visual, surface, and volumetric, for evaluating the items subject to inspection. Section XI provides standards for evaluation of examination results. When Section XI does not provide acceptance standards for a particular component, the original construction code standards are specified by Section XI. Issue Reports are initiated for any item not conforming to the specified acceptance criteria.

The purpose of the inservice examinations of the Class 1, 2, and 3 components is to verify the absence of flaws which may affect the operation of the component. If flaws are detected, they must meet the acceptance criteria of ASME Section XI or the original construction code. Flaws which exceed the acceptance criteria of ASME Section XI or the original construction code must be repaired, replaced, or accepted by evaluation. Evaluations done to accept components which exceed the acceptance criteria must be submitted to the regulatory authority having jurisdiction at the plant (NRC, American Nuclear Insurers). The repairs or replacements required to correct conditions must be done in accordance with ASME Section XI. An administrative procedure prescribes the requirements for repairs, replacements, and modifications within the scope of ASME Section XI at Calvert Cliffs.

Calvert Cliffs' maintenance process/procedures include requirements to determine the applicability of ASME Section XI and the Repair/Replacement program in the process of planning the work. Maintenance activities (i.e., installation of replacement items or modifications) involving ASME Section XI components must be identified, and if required, a Repair/Replacement plan is generated. The Repair/Replacement plan captures the essential requirements for the completion of the repair/replacement. The essential requirements include items such as the repair procedure,

Construction Code, Installation Code, Original Design Specification, welding requirements, non-destructive examination requirements, and pressure testing requirements.

The current program requires that modifications and design changes to Code Class 1, 2, and 3 items be reflected in the ISI program. Modifications and design changes to these items must be implemented via the Repair/Replacement program. Personnel responsible for maintaining the ISI program are involved in the approval process for Repair/Replacement Plans, which allows them to keep current with any plant modifications to the Class 1, 2, and 3 components.

Request (d)

Processes for identification of problems and implementation of corrective actions, including actions to determine the extent of problems, actions to prevent recurrence, and reporting to NRC.

RESPONSE

CORRECTIVE ACTION PROCESS

The Corrective Action program applies to activities within the Nuclear Program that potentially affect plant operation including the ISFSI. This includes activities designated as safety-related or Technical Specification-related (controlled by a Technical Specification-related procedure), designated non-safety-related or augmented quality activities, and also to conditions adverse to quality. The Corrective Action program applies to those conditions that represent failure to meet requirements, such as malfunctions, deficiencies, deviations, or non-conformances. A separate program (Gold Card program) has also been established to address challenges which fall below the threshold of the Corrective Action program.

General Description

The Corrective Action program provides for prompt identification, documentation, evaluation, and correction of conditions adverse to quality, including those conditions determined to have a significant impact on quality or nuclear safety. Corrective actions must be based on an appropriate level of causal analysis and provide confidence that the condition will not recur. The Corrective Action program consists of six essential elements:

1. Issue Identification and Documentation;
2. Issue Screening, Assessment, and Assignment;
3. Acceptance of Ownership;
4. Causal Analysis;
5. Implementation/Issue Resolution; and
6. Verifying Corrective Action Effectiveness.

Issue Identification and Documentation

Individuals performing work at, or in support of, Calvert Cliffs are responsible for the quality of their own work. Any individual may, and in fact has a responsibility to, identify and document conditions adverse to quality, and to initiate corrective action through the Issue Report system. The threshold for initiation of an Issue Report is kept low enough to identify and report programmatic issues requiring documentation of corrective actions.

As a general matter, conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances, are promptly identified and documented on Issue Reports. Prompt identification means at the time of discovery or as close to that time as prudent and practical. Line supervision is responsible for promptly reviewing Issue Reports and ensuring legibility, completeness and validity.

Issue Screening, Assessment, and Assignment

Issue Reports are reviewed, evaluated and assigned to responsible organizations by an independent, interdisciplinary review group. Issue Reports must be reviewed for safety significance, operability, reportability, and programmatic deficiencies. Issue Reports determined to be significant conditions adverse to quality are processed by Calvert Cliffs as Program Deficiency Reports. Issue Reports involving potential operability issues are reviewed to determine if the issue involves a Technical Specification violation, requires immediate notification, or is otherwise reportable to the NRC. Issues are maintained in the activity tracking subsystem of NUCLEIS until the corrective actions have been completed.

A control procedure provides the process for addressing operability issues which exist in instances where the full qualification status of non-conforming or degraded installed SSCs cannot be demonstrated. Prompt determination of operability is made from a detailed examination of the deficiency whenever the ability of an SSC to perform its specified function is an issue. The determination may be based on analysis, test, operating event experience, engineering judgment, or a combination of these factors, taking into consideration equipment functional requirements. The time between identifying the operability issue and completing the operability determination is commensurate with the safety significance of the issue. Use of this procedure results in the development of a formal Functional Evaluation. This evaluation involves the examination of the current licensing bases, including the UFSAR, Technical Specifications, and commitments to establish the conditions and performance requirements to be met for determining operability. This procedure was developed considering the guidance contained in Generic Letter 91-18.

Whenever possible, recommendations for corrective and preventive action are assigned to a single individual who acts as the issue resolution sponsor. Issues designated as potentially reportable are evaluated. Potential 10 CFR Part 21-related issues are evaluated to determine if the issue could involve a design-related reportable condition. Mode restraining issues are tracked to determine that the responsible organizations have resolved these issues to the point where the Mode restraint can be removed and the plant be permitted to enter the next higher operating Mode. The activity tracking subsystem of NUCLEIS is used to track progress in resolving an issue.

Acceptance of Ownership

The issue resolution sponsor is responsible for the full resolution of the issue and prevention of recurrence. Responsibilities include coordination of all efforts necessary for the timely resolution consistent with the probability of recurrence and associated risks.

Causal Analysis

For errors or deficiencies, the cause of the condition is determined and corrective action taken to preclude recurrence. The level of causal analysis required is determined based on thresholds established by procedures, and the actual or potential consequences of recurrence. The results of the causal determination/root cause analysis of conditions adverse to quality, and recommendations for corrective actions, are required to be documented and reported to appropriate levels of supervision and management.

Significant conditions adverse to quality are investigated by formal investigation methods dependent on the significance of the issue. Lesser conditions adverse to quality are evaluated using less formal causal analysis.

Root cause analyses require the generic aspects of the issue be considered, and corrective actions implemented, to address the immediate and preventive corrective measures. Informal causal analysis also requires consideration of generic aspects of the issue and actions to correct the issue.

Implementation/Issue Resolution

Action taken to resolve issues, including corrective and preventive actions, are to be timely and appropriate for the significance of the issue. The timeliness of corrective actions is based upon an assessment of the probability of recurrence, and the potential consequences associated with recurrence, before corrective and/or preventive actions are taken. The organizations responsible for implementing corrective actions establish an appropriate due date and/or estimated completion date based on the significance of the issue.

Organizations responsible for taking action to resolve an issue update the activity tracking subsystem to maintain the current status of the issue throughout the corrective action process. Documentation of issue resolution is in accordance with administrative procedures. General and line supervision responsible for resolving issues are accountable to plant management for the overall adequacy and completeness of the corrective actions taken with regard to prevention of recurrence in the future.

Verifying Corrective Action Effectiveness

The resolution of an issue must be supported by objective evidence. The degree of corrective action verification is appropriate to the significance of the issue. For significant issues, corrective action verification is performed and documented by individuals not directly involved with implementing the corrective action, and organizations responsible for corrective and/or preventive action are required to schedule an evaluation of the effectiveness of the corrective actions taken. If determined to be ineffective, a new Issue Report is required to be written and additional corrective actions taken to prevent further recurrence of the issue.

A monthly report provides management with information about the closure of significant Issue Reports. The report specifically addresses inadequate closure quality and contains trend information for issues identified at the wrong level of significance and issues completed past their due date. Management also receives a status of the timeliness of corrective actions every two weeks. This level of awareness maintains management's focus on the closeout of corrective actions.

Reporting Information to the NRC

Non-Routine Reports

The process for reporting problems to the NRC is closely aligned to the plant's corrective action process. The reportability review process contains multiple screens by reviewers with varying degrees of knowledge concerning reportability issues. The process starts with the initiation of an Issue Report. The Issue Report form, itself, and the procedure that governs Issue Report initiation, both contain guidelines to assist in determining if the issue involves a reportability concern. The Issue Report initiator and the reviewing supervisor are both procedurally tasked with reviewing these guidelines and indicating if they have a reportability concern. The reviewing supervisor is required to send the Issue Report to the Issues Assessment Unit for issue screening, assessment, and assignment. Issues Assessment Unit personnel are experienced at identification of reportability concerns and also use the reportability guidelines in the procedure and on the Issue Report form. After the Issue Report has been screened, it is reviewed by a multi-disciplinary group for, among other things, reportability concerns.

If a reportability concern is identified by the Issue Report initiator, they are required to immediately discuss the concern with the reviewing supervisor. If the reviewing supervisor agrees that a reportability concern exists, the Shift Supervisor is required to be notified immediately. If at any point later in the Issue Report process a reportability concern is identified, the Shift Supervisor is required to be immediately notified. The Shift Supervisor has detailed knowledge, training, and experience, and additional resources to assist in making an accurate reportability determination. Upon being notified of a reportability concern, the Shift Supervisor is responsible for reviewing the Issue Report and confirming or refuting the concern. If confirmed as a reportability issue, the Shift Supervisor is responsible for fulfilling any required immediate notification requirements to NRC or other offsite agencies within the required time limits. Any required follow-up written reports are submitted to NRC.

Routine Reports

Many routine reports to NRC are required by regulation or the facility license to be submitted. These reports are identified in a report manual and tracked on the activity tracking subsystem of NUCLEIS. Each routine report is assigned to a responsible individual using the report manual so it is submitted by its required date. As each report is submitted, a new action item on the activity tracking subsystem is assigned to the responsible individual to track the next report.

Gold Card Program

In April 1994, the Gold Card program was initiated, first in the plant Operations department, later in the other departments at Calvert Cliffs. The Gold Card program provides a self-assessment tool that involves all levels of personnel within an organization. The gold cards provide a pocket reference of the performance traits personnel are expected to use. Observations of the use or misuse of those traits is recorded on the card. The intent of the program is that individuals and groups learn to use these traits in their everyday activities. The items identified by use of the gold cards are trended. This trending has allowed for removing challenges before they escalate to the consequential level. The traits identified in the Gold Card program generally are below the threshold of an Issue Report. This

provides a mechanism to eliminate traits that are precursors to events which would otherwise be resolved in the Corrective Action program described above.

Request (e)

The overall effectiveness of your current processes and programs in concluding that the configuration of your plant(s) is consistent with the design bases.

RESPONSE

A combination of the implementation of management expectations, several vertical slice-type inspections and ongoing self-assessments of program implementation leads to the conclusion that the programs and processes are effective in maintaining the configuration of the plant in a manner providing reasonable assurance of consistency with the design bases.

Executive management expectations regarding engineering design and configuration control, operations and maintenance testing, and the Corrective Action program have been established in the appropriate Nuclear Program Policies. These expectations include:

- establishing and maintaining effective methods that ensure the licensed design bases accurately reflects the as-built plant characteristics;
- ensuring modifications are made in a safe and reliable manner and rigorously adhere to the licensed design bases so that nuclear safety standards are maintained;
- maintaining an effective post-maintenance testing program to verify proper function of plant equipment;
- establishing and maintaining a testing program that provides for control of testing activities under specific conditions, and surveillance tests to verify compliance with Technical Specification requirements; and
- maintaining a program to promptly identify, document, evaluate, and correct quality deficiencies, and to determine corrective actions to prevent their recurrence.

The programs described previously in this response are derived from these expectations. These expectations and their resultant programs provide reasonable assurance that the configuration of the facility is consistent with the design bases. Past self-assessments led to the desire to upgrade these programs, although the results of the self-assessments suggested that no significant safety issues existed. The identified deficiencies were addressed by the program improvement initiatives. Details of these assessments are given in the response to Requests (b) and (c). Based upon the information presented in the responses to Requests (a) through (d) in this Attachment and information presented in Attachment (2), we conclude that the control processes provide reasonable assurance that the plant is being operated and maintained in a manner consistent with the design bases.

ATTACHMENT (2)

DESIGN BASES REVIEW PROGRAM

Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
February 5, 1997

ATTACHMENT (2)

DESIGN BASES REVIEW PROGRAM

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ATTACHMENT (2)

DESIGN BASES REVIEW PROGRAM

Baltimore Gas and Electric Company (BGE) has undertaken a design basis review program. The program consists of several parts: preparing formal design basis documents and matrices; upgrading, updating and consolidating design information in calculations, reports and studies; reviewing existing Technical Specifications and converting them to the Improved Standard Technical Specifications; licensing improvements covering various topics; capturing NRC commitments; and upgrading site procedures. These program areas are described below.

DESIGN BASIS DOCUMENTS

To address issues concerning accessibility of design bases information, BGE determined that a systematic effort was needed to accumulate and consolidate design bases information. Therefore, in 1988, a design bases review plan was incorporated into the Nuclear Division Plan, leading to a strategic goal to systematically upgrade the design basis documents and controls.

Description

The process for researching the design bases and capturing the appropriate information is governed by an Engineering Standard. This Standard was developed based on the guidance given in NUMARC 90-12, Design Basis Program Guidelines.

Numerous design inputs and source documents were reviewed in order to prepare both Design Basis Documents and Design Basis Matrices. Design Basis Matrices are similar to Design Basis Documents, but focus on selected key parameters instead of the full range of design bases information. These design basis documents show a logical design flow process which encompasses the design input, design analysis, design output and [illegible] bases, validation. Information gathering for the development of design basis documents included the following types of documents:

- Applicable industry codes and standards
- Licensing documents (regulations, current licensing basis, other correspondence)
- Engineering department files
- Architect Engineer files
- Nuclear Steam Supply System vendor
- Equipment specifications/drawings/calculations
- Other

During the process of developing these design documents, discrepancies were identified and entered into the corrective action system for assessment and resolution. Compiling design bases information served as a useful tool in preparing for "vertical slice" evaluations of systems.

Systems Reviewed

The following systems had either design basis documents or design basis matrices created for them. The documents were created during the period from 1990 to 1994.

- Switchgear Room Heating, Ventilation, and Air Conditioning
- Fuel Handling Heating and Ventilation
- Spent Fuel Exhaust Ventilation
- Compressed Air System

- Emergency Diesel Generator Fuel Oil Capacity and Chemistry
- Emergency Diesel Generator Starting, Acceleration, Loading, Voltage, Frequency
- Control Room Heating, Ventilation, and Air Conditioning
- Containment Isolation Valves and Penetration Types
- Integrated and Local Leak Rate Testing
- Post-Accident Monitoring (as it relates to containment isolation)
- Fire Protection
- Containment Isolation Topics
- Radiation Monitoring System
- Saltwater System
- Service Water System
- Component Cooling Water System
- Emergency Diesel Generators
- SACM Emergency Diesel Generators
- Independent Spent Fuel Storage Installation

Conclusion

The design basis documents facilitated an understanding of specific design basis information at a time when information was not easily accessible and research was time consuming. In 1991, the NUCLEIS program (an information retrieval database) became available at Calvert Cliffs. NUCLEIS/NORMS (with imaging capability) became available at every engineer's workstation throughout the site in 1993. NORMS is a text retrieval database system with word and phrase search capabilities. These programs significantly improved design information accessibility. In addition to these new information storage and retrieval processes, improvements were also made to site processes to capture design bases information. This information can now be linked via NUCLEIS/NORMS to various data fields including the system, unique equipment identifiers, and controlled documents. Because of the transition of the information into the NUCLEIS system, the design basis document effort was discontinued as a separate item. The information is now updated as part of the engineering control process.

DESIGN INFORMATION

A number of additional initiatives have been undertaken in the design area to develop design bases information, and enhance understanding and retrieval of design bases information. These initiatives are described below and are divided into programs, systems, and calculations.

Programs

License Renewal Project

The License Renewal project is being conducted in order to evaluate the feasibility of renewing the operating licenses for Calvert Cliffs Units 1 and 2 for an additional 20 years beyond their current licenses. The portions of this project which include a review of design basis information are the Integrated Plant Assessment for Aging and the Time-Limited Aging Analysis review required by 10 CFR Part 54.21. Design basis information is reviewed for systems, structures, and components (SSCs) having passive functions and includes the intended functions of the SSCs as well as their materials of construction and environmental service conditions. The aging management review step of the Integrated Plant Assessment evaluates these attributes to arrive at a conclusion that existing

programs, modified existing programs or new programs will manage the plausible aging effects as required. The Time-Limited Aging Analysis review addresses the time-dependent characteristics of certain plant analyses related to aging of SSCs.

Throughout these reviews, the License Renewal Rule (paragraph 54.30), as well as the site corrective action program, requires the identification of aging issues which are applicable to the current license term. Once identified, such issues are addressed under current site processes for resolving issues. Therefore, even though the results of the Integrated Plant Assessment and Time-Limited Aging Analysis review would not be applicable until a renewed license is granted, License Renewal project work has also addressed aging issues for the plant during the current license term.

Seismic Qualification Program

In response to Unresolved Safety Issue A-46, a program to verify the seismic adequacy of essential equipment was undertaken. Baltimore Gas and Electric Company participated in the industry program to resolve this safety issue. Appropriate seismic response spectra were used in a review of essential equipment. Essential equipment was determined based on the equipment's contribution to four safe shutdown functions (reactivity control, inventory control, pressure control, decay heat removal). Emergency and Abnormal Operating Procedures were reviewed to determine if the essential equipment was a legitimate way to shut down the plant consistent with the plant procedures and operator training. The essential equipment was walked down to determine the seismic adequacy of the equipment. During the walkdowns, the teams looked at equipment anchorage, seismic capacity versus demand, and seismic interactions. The results of the walkdown identified equipment acceptability, information on seismic outliers, and our plan for correcting those outliers. The seismic verification methods used by this project can be used for design and procurement activities. If they are used, they are subject to the engineering design control process. This information is currently maintained in engineering files.

Environmental Qualification Program

Reviews of the 10 CFR 50.49 Environmental Qualification (EQ) program at Calvert Cliffs started in 1980 with the issuance of Bulletin 79-01. Both internal and external audits have indicated that the program has evolved from having weaknesses (in 1984) to satisfactorily meeting the requirements of 10 CFR 50.49 and Bulletin 79-01B (in 1989). To provide additional confidence, an outside consultant performed an independent review of the EQ program in 1991. The purpose of this review was to assess the EQ program implementation to assure continued qualification of electrical equipment. The results of the review provided confidence that the EQ program would establish and maintain the environmental qualification of electrical equipment under 10 CFR 50.49. Environmental qualification design criteria have been integrated into the engineering design control process. This promotes consistent use of the information throughout the design process. Environmental service conditions were reevaluated to determine that the documented basis for these conditions was available and accurate. The engineering design control process contains provisions for considering environmental qualification as part of engineering design changes and temporary plant changes. Preparation of EQ documentation is also controlled by the engineering design control process. Environmental qualification information is linked to each component through the NUCLEIS computerized records management system. This provides information necessary for the corrective and preventative maintenance programs to provide continued compliance with program provisions.

Q-List

A project was undertaken in 1987 to update the Q-List by establishing a functional basis for safety-related items, activities, and services. This effort resulted in a Q-List which clearly identifies why an item, activity, or service is safety-related. Categories were created which established an item's safety-related function (i.e., pressure boundary, post-accident monitoring, electrical, etc.). Shutdown flow sheets were developed to identify items required for the capability to shut down the reactor and maintain it in a safe shutdown condition. These flow sheets covered design basis events, vital auxiliaries, and systems. In addition, both piping and electrical diagrams were developed which clearly indicated the portion of each system which was considered safety-related. Structures, support services, non-system specific items, and other special cases were also evaluated and included in the Q-List, if appropriate. Changes and additions to the Q-List are controlled under the engineering design control process and maintained on the NUCLEIS system.

Appendix R

There have been several projects undertaken to review compliance with Appendix R since 1989. Specifically, efforts were initiated in 1989, 1992, and again in 1996. Information from Generic Letters, Information Notices, and NRC inspections at other plants were included in these reviews. As a result of these reviews, a long-term program for Appendix R compliance has been established. Engineering procedures and standards have been developed to address Appendix R considerations and reviews during the engineering design control process. These procedures cover screening design modifications, detailed checklists, updating Appendix R calculations, and operations and maintenance impacts on Appendix R compliance.

In 1996, there was a renewed interest in Appendix R compliance prompted, in part, by issues raised during NRC Inspection 96-05 regarding the Switchgear Room ventilation during an Appendix R fire. A team of outside contractors was established to perform a self-assessment of Appendix R compliance. The team went beyond the Calvert Cliffs licensing basis and considered current NRC expectations for Appendix R compliance. An Appendix R project plan is being developed to address areas of weakness identified by this team. A meeting with NRC Region I personnel has been requested to discuss the results of the self-assessment.

Systems

Cooling Water Project

The design basis of the Saltwater, Service Water, and Component Cooling Water was reconstituted to verify the adequacy of the available heat sink cooling during normal and accident conditions. This project also incorporated the issues raised by Generic Letter 89-13. The thermal-hydraulic design basis of the three cooling water systems was reconstituted by reviewing the licensing basis for each system, performing extensive system and component testing, and developing computerized flow models calibrated with the test results. This effort has resulted in the development of a thermal hydraulic calculational basis for the three systems which describes the performance requirements and capabilities of these systems. Revisions to the calculational basis and modifications were made, as necessary, to make this basis consistent with the licensing basis and plant operating and maintenance procedures. The results of this project have been incorporated into the engineering design control processes to keep the

information developed for the project current. Continuing tasks such as annual thermal performance testing of selected heat exchangers and monitoring of microfouling resulted from this project.

Electrical Distribution System

A review of the electrical distribution was conducted to verify electrical calculations and studies. This review included AC load flow and fault calculations from the 500 kV switchyard to 120 Volt loads, emergency diesel generator loading and fault calculations, and DC battery loading. A complete review of relay coordination for the 13 kV busses, 4 kV busses, and 480V busses down through the 480 Volt motor control centers was performed, as well as the 120 Volt AC and 125 Volt DC systems. The electrical load flow software was upgraded and the relay setting sheets and motor control center setting sheets were improved. The computer model of the electrical system is used to investigate proposed changes to the plant electrical system and is kept current with the existing plant configuration as modifications occur. Load growth of safety-related busses is controlled by the engineering design control process, as are the electrical design calculations and the protective relay studies.

Motor-Operated Valves

After the issuance of Generic Letter 89-10, design basis reviews were performed on each motor-operated valve (MOV) to determine specific operational requirements, and to develop a detailed system profile identifying the maximum system pressure and differential pressure expected during normal and abnormal events. This review included safety-related and balance of plant MOVs. The project also performed analysis of the safety-related MOVs for conditions and attributes which influence MOV performance. The analysis included the effects of seismic events, and ambient post-accident temperatures. The effects of reduced voltage on motor capability were also assessed. Actual voltage values were established as part of the Electrical Distribution System study. Design criteria were established, including load sensitive behavior and lubricant degradation issues. Operating Instructions were changed to reduce unnecessary operational demands on the MOVs. Calculations produced as part of this project are controlled under the engineering design control process.

Reactor Pressure Vessel

License renewal activities have included an extensive review of reactor pressure vessel maintenance and operating history for potential impacts on intended functions. In addition, issues have been evaluated and initiatives undertaken throughout plant history that have focused on the ability of the reactor pressure vessel to perform its intended function. In addition to various design changes, 10 CFR 50.59 reviews, calculations, and analyses, specific programs are in place to monitor and ensure the design basis for specific issues, such as low temperature overpressure protection, primary water stress corrosion cracking, internals vibration, fatigue, boric acid corrosion, and material embrittlement. Calvert Cliffs also has programs in place to monitor, track, and evaluate any changes to these issues.

Code Pressure Boundaries

About 1987, while preparing our update to the 1983 Edition (Summer 1983 Addenda) to the ASME Boiler and Pressure Vessel Code Section XI, BGE decided to review all of the inservice inspection boundaries and compare them to the criteria of 10 CFR 50.55a and Regulatory Guide 1.26. This resulted in a set of Code boundaries for ISI piping. These boundaries are controlled as part of the engineering design control process.

Calculations

Control of Design Basis Event Safety Analyses

Updated Final Safety Analysis Report Chapter 14 contains the Calvert Cliffs Design Basis Event safety analyses. These analyses represent a significant portion of the Calvert Cliffs design basis. Efforts have been undertaken to verify that Updated Final Safety Analysis Report (UFSAR) Chapter 14 is consistent with, or conservative with respect to, plant design and operating procedures. One-time reviews were completed to verify UFSAR Chapter 14 is currently a conservative representation of plant performance. These reviews included: a comparison of the UFSAR with the Emergency and Abnormal Operating Procedures; a verification of UFSAR Chapter 14 inputs by comparison with Technical Specifications, testing and maintenance requirements, operator logs, etc.; reanalysis of several sections of UFSAR Chapter 14; and verification of the ground rules document. Normal processes were used to implement the resulting plant design changes and procedural changes, and to transfer that information to the UFSAR. A process change was made which now requires Nuclear Engineering review of significant changes to the Emergency and Abnormal Operating Procedures to verify that significant safety functions are unaffected by the change.

Control of Instrument Setpoints

Setpoints are controlled under the engineering design control process. Various setpoint basis projects have been undertaken since 1988 to develop design basis information. In addition, activities were performed to improve plant operations and maintenance, to facilitate Technical Specification changes, and to resolve internal commitments. Setpoint bases were developed for many instruments. Instrument uncertainty calculations were done for instrument loops and for the Reactor Protective System and Engineered Safety Features Actuation Signal reactor trip bistables. Most of the action values in the Emergency Operating Procedures have setpoint design basis documents. Setpoint information is available site wide using the site-wide NUCLEIS records database.

Instrument Calibration Data Basis Program

This project created engineering approved calibration criteria for plant instrumentation. Most plant instrumentation is covered under this program. Preparation of the calibration data required the review of vendor technical manuals, specifications, drawings, surveillance procedures, maintenance procedures, instrument calibration procedures, and the equipment tracking system. Field walkdowns were also completed for much of the instrumentation. This project also reviewed existing design bases information and created approved design basis documents that are used to calibrate plant instrumentation. This calibration information is available site wide using the site-wide NUCLEIS records database, and is controlled under the engineering design control process.

Loss of Control and Indication Power Study

A design review was performed to determine system responses to loss of power events. With this understanding of the plant's response, effective Abnormal Operating Procedures were developed to allow proper handling of these events. To conduct this review, a list of components associated with vital and non-vital instrument AC and DC busses and breakers was assembled. Information was gathered for each component's power source, associated drawings, and vendor technical manuals. A Loss of Power Effects Analysis was conducted for each breaker and bus. This analysis included determining loss of power effects, loss of power detection indication, and re-power effects. Licensed operators then

reviewed the analysis to determine the transient effect on the plant for a loss of power to each bus. The Abnormal Operating Procedures were updated with the results of the transient analysis. The simulator has also been updated with the results of this study. The results of this study are also used by the Safety Tagging Unit to determine the expected effect prior to deenergizing breakers for maintenance or modification. This study is controlled under the engineering design control process.

Reload Technology Transfer

This effort was begun to improve Calvert Cliffs' technical capabilities by obtaining the fuel vendor's reload methodology and performing some of the reload calculations in-house. As part of the technology transfer effort, acceptance reviews have been done on a number of vendor calculations which support the accident analyses. A detailed review has also been done on the calculational techniques and underlying methodology found in the UFSAR and supporting Asea Brown Boveri/Combustion Engineering Topical Reports. Some discrepancies in vendor calculations have been found and dispositioned in conformance with the corrective action process. The acceptance reviews done by the project to date provide confidence that plant design parameters are adequately reflected in the reload calculations.

TECHNICAL SPECIFICATIONS

A review of the technical adequacy of the surveillance test program procedures has been performed. This review effort included re-verification of the basis for each of the Technical Specification Surveillance Requirements. In addition, Calvert Cliffs has submitted an amendment request to convert our Standard Technical Specifications to the Improved Standard Technical Specifications. These activities are described below.

Surveillance Test Procedures (Technical Adequacy Review Process)

In the years previous to 1991, a number of Licensee Event Reports were submitted which identified problems in the performance of Surveillance Test Procedures (STPs). Additionally, during 1989 and 1990, reviews by NRC, Institute of Nuclear Power Operations, and BGE identified many issues associated with the STPs. As a result, BGE implemented a review of the STP program procedures. The purpose of the review was to determine the technical adequacy of the STPs, and whether they met the intent of the Surveillance Requirements in the Technical Specifications. The bases for each Surveillance Requirement was researched, identified, and documented. The review included primary and secondary references, and applicable standards. Position statements were developed for each of the Surveillance Requirements. In addition, position statements were also developed for each of the Limiting Condition for Operations to document the relationship between the Surveillance Requirements and the Limiting Condition for Operations. This review checked that the reasons for the Surveillance Requirements were known and documented, and that the intent could be met. Procedures were then compared to these position papers to determine whether the intent of the Surveillance Requirement was being met, and whether the procedure adequately tested the affected equipment. Procedures were also compared to plant drawings to determine whether systems and components were completely tested from the point of continuity. Deficiencies were identified and resolved within the Corrective Action program.

Improved Technical Specifications

Calvert Cliffs is converting to the Improved Technical Specifications to focus on items important to the safe operation of the plant and to reduce regulatory burden. The license amendment request was submitted to the NRC on December 4, 1996. The Calvert Cliffs Improved Technical Specifications and

the Improved Technical Specification Bases were verified against the UFSAR, Quality Assurance Policy, plant procedures, system design and operation, accident analysis calculations, and other sources, such as design calculations, drawings, and operational practices, as appropriate. The Bases for each Technical Specification contain background material on the required system and a discussion of the significant accident analysis that credit the requirements in the Specification. In addition, the Bases for every Limiting Condition for Operation, Applicability, Action, and Surveillance were researched and verified. If discrepancies in the referenced material were discovered, they were reported through the Corrective Action program. Once approved, the Technical Specifications will be controlled under the change process described in 10 CFR 50.90.

LICENSING IMPROVEMENTS

Electronic Docket

The Electronic Docket was created as a task of the Regulatory Commitment Management Project (see below). The Electronic Docket task was designed to make Calvert Cliffs' docketed correspondence readily available by placing the docketed information in an electronic system with full text search and retrieval capability, and the ability to view and print a scanned image of the document. An extensive effort was undertaken to retrieve the entire Calvert Cliffs docketed correspondence. This correspondence was scanned and put into electronic text form on the Electronic Docket. The correspondence in the Electronic Docket is updated on a monthly basis, with a two-month processing time. Other text has also been added, such as the Calvert Cliffs and Independent Spent Fuel Storage Installation Technical Specifications, UFSAR, Updated Safety Analysis Report, Standard Review Plan, and Division 1 Regulatory Guides. This information is also updated on an appropriate frequency. Plant personnel at Calvert Cliffs can now quickly and accurately review the docketed correspondence. Questions, such as commitments to Regulatory Guides and Standards, analyses of record, and references to a subject in the UFSAR or docketed correspondence, can be answered quickly and accurately.

UFSAR Upgrade

In 1990, an effort was begun to improve the process for updating the UFSAR and to improve the quality of the content for the UFSAR. Stronger links were created between the modifications process and the UFSAR update requirements. Specific provisions were made to review Technical Specification changes for impact on the UFSAR. In addition, processes internal to the Nuclear Regulatory Matters Unit were created to allow for consistency and tracking of update requests. A UFSAR Coordinator was assigned full time to the task of updating the UFSAR. These processes have continued to improve through recommendations made during internal audits and self-assessments.

Recognizing the previous bias in the UFSAR update process toward plant changes, an upgrade effort was undertaken to improve the content in the area of generic issue implementation. A review was done of major NRC/industry issues to determine how well they were represented in the UFSAR. Discussions were added for those issues that were under-represented. In addition, the content of the UFSAR was reviewed and consolidated into topic areas that make the information easier to find. The upgrade effort continues with each revision. The goal is to make the UFSAR as useful and relevant as possible for the engineering staff. The UFSAR current revision is located on the Electronic Docket (without drawings). This allows engineers to perform a full text search of the UFSAR whenever information is needed. Improvements to the UFSAR continue to be made.

NRC COMMITMENTS

Regulatory Commitment Management Project

The Regulatory Commitment Management Project was undertaken in order to improve the ability of BGE to manage our regulatory commitments and to determine whether we had met all of the commitments that we made in the past. This project was modeled on and followed after the Commitment Implementation Assessment Project. The Commitment Implementation Assessment Project provided an assessment of BGE's historical ability to identify, implement, and maintain licensee commitments to the NRC. At the conclusion of the Commitment Implementation Assessment Project, the Regulatory Commitment Management Project was begun. This project resulted in the reform of the regulatory commitment process at Calvert Cliffs by revising the commitment management and regulatory correspondence process. This project was organized into three separate tasks: 1) establish a formal process for managing commitments; 2) convert all of the documents contained on the Calvert Cliffs docket (50-317/318) into a machine readable form; and 3) review all of this docketed correspondence for commitments and verify that they were implemented. The results of this project were integrated into ongoing plant practices. In order to establish a formal process for managing commitments, a policy was developed based on internal interviews and benchmarking studies done in the nuclear industry. Th_ policy was then used to help develop a commitment management process model. The commitment management procedures were developed from this model. A discussion of the conversion of the Calvert Cliffs docket into a machine-readable form is described in the Electronic Docket section above. A review of all the docketed correspondence was done to identify and record any occurrences of regulatory commitments. Approximately 16,000 commitments were identified and ranked according to safety significance. Those with a medium or high ranking received additional attention to check that they were appropriately dealt with. The final results of this review were summarized in a letter from Mr. R. E. Denton to Mr. T. T. Martin (NRC), dated March 11, 1994, Completion of Regulatory Commitment Management Review.