Diablo Canyon Power Plant Design Basis Configuration Management Affirmation

PG&E

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EXECUTIVE SUMMARY

This enclosure provides PG&E's response to the NRC's request for information pursuant to 10 CFR 50.54(f), dated October 9, 1996, regarding conformance of PG&E's Diablo Canyon Power Plant (DCPP) to its design bases. In the October 9 letter, the NRC noted that based on recent inspections at some plants, it had identified programmatic weaknesses that had resulted in design and configuration deficiencies. The magnitude and scope of the problems raised NRC concerns about the presence of similar design, configuration, and operability problems, and about the effectiveness of quality assurance programs at other plants. The NRC determined that it required information from licensees to address these concerns, and issued letters to licensees requesting the information necessary to evaluate design basis adequacy.

The NRC request includes several categories of information related to design basis and configuration control. Specifically, the NRC requests that PG&E provide:

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

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

(c) *Rationale for concluding that system, structure, and component 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, action to prevent recurrence, and reporting to NRC; and*

(e) *The overall effectiveness of your [PG&E's] current processes and programs in concluding that the configuration of your [PG&E's] plant(s) is consistent with the design bases.*

In addition, the NRC requests that PG&E indicate whether it has undertaken any design review or reconstitution programs and, if so, that it provide any supporting information.

In developing this response, PG&E reviewed the existing documentation of its configuration control processes and the results of these processes as exhibited in the performance of selected plant systems and programs. Nearly 1,000 documents relevant to design bases and configuration control processes were reviewed and analyzed in this effort, including audit and assessment reports and NRC inspection reports.

Historical Perspective

PG&E recognizes the importance of operating and maintaining DCPP within its design bases and of ensuring that deviations are reconciled in a timely manner. To achieve these objectives, PG&E has established formal controls for activities that may affect plant design and configuration. These controls have evolved over the life of the plant, and have been enhanced based on experience gained through past occurrences at DCPP as well as through industry experience and NRC observations.

In contrast with many other licensees, PG&E was its own architect/engineer (A/E) for the design and construction of DCPP. As the A/E, PG&E staff was extensively involved with the details of DCPP's design bases since well before the plant was licensed to operate. This continuity has contributed to PG&E's familiarity with the design basis history of DCPP and to an understanding of the documentation available and tools necessary for ensuring design and configuration control.

Since initial licensing, PG&E has been sensitive to the importance of ensuring the effectiveness of design and configuration control programs. An early occurrence of improper design control -- the so-called "mirror image" design error, which was discovered by PG&E immediately following initial licensing of DCPP Unit 1 in 1981 -- reinforced the need for vigilance in addressing design issues. Following that discovery, the NRC suspended the Unit 1 license and mandated an Independent Design Verification Program (IDVP) as a condition for reinstating the license. In response to the IDVP, PG&E performed a comprehensive design review effort that required extensive resources and took several years to complete. While the seismic design adequacy of the plant was firmly established by this effort, lessons learned identified necessary improvements to the design and configuration control practices at the time, and they continue to reinforce PG&E's commitment to maintain such controls and to ensure their effectiveness. In short, PG&E learned firsthand the significant price that can be paid if plant design is not properly managed and controlled.

To ensure the effectiveness of design and configuration control processes, PG&E has required that plant systems and control processes be subjected to both internal reviews and independent assessments throughout the life of the plant. Internal reviews have included the original design review; additional checks performed to support subsequent design changes; audits performed by the QA organization; and self-assessments performed by various departments. Independent assessments by external organizations include inspections by the NRC and other industry organizations. In particular, the design and configuration of safety-related systems at DCPP have been reviewed on many occasions through such assessments. Overall, these reviews have contributed to better documentation of the design and to enhanced understanding of the design bases.

Over the years, the aforementioned reviews identified weaknesses in certain of the design and configuration control processes, causing PG&E to undertake several initiatives. For example, several major programs were conducted in the late 1980s to improve the effectiveness of design and configuration controls at DCPP. One of the most important of these programs was the Configuration Management Program (CMP), which included a number of initiatives aimed at improving design and configuration control practices at DCPP. As a result of these initiatives, PG&E is confident that the necessary and appropriate design and configuration controls are currently in place.

The continued operation and maintenance of DCPP involves many extensive and complicated design and configuration control activities. In the face of these on-going challenges, it would be unrealistic to believe that problems will not occur and that the need for additional enhancements to existing programs and processes will not be encountered. The existing controls have evolved based upon extensive experience gained at DCPP and throughout the industry, and PG&E believes that these controls are adequate to provide continued confidence that DCPP is being operated and maintained within its design bases.

Overall Approach to Design and Configuration Control

PG&E's belief that DCPP is built, maintained, and operated consistent with its design bases rests on the fact that it has in place the proper tools, the processes that help to ensure the correct use of these tools, the skilled and experienced personnel to effectively implement the processes, and the continuing oversight and verification from audits and inspections to prevent significant deviations from its design bases.

PG&E developed various tools to assist DCPP personnel in documenting and maintaining plant design, design changes, and other pertinent design basis information. These tools include: (1) enhanced Design Criteria Memoranda (DCMs) (typically referred to in the industry as design basis documents), which allow easy identification of design basis information; (2) various databases to track equipment, components, and procedure revision commitments; (3) programs for materials procurement and spare parts control; (4) a computerized plant information management system (PIMS); and (5) a computerized document library system for DCMs and other key design-related documentation. The CMP, which was conducted from 1989 to 1994, collected the pertinent design basis information into a single set of documents; provided easy access to design documentation; and verified the functionality of the various design control processes.

PG&E has instituted and proceduralized the key processes that specify and control the necessary actions and responsibilities that may affect plant design or configuration management. These key processes control the core design activities, such as design calculation practices; system and equipment setpoints; procurement; operational practices; and other plant work that involves plant design or configuration management.

PG&E has dedicated significant resources to obtaining and maintaining highly qualified personnel who can effectively use their experience, capabilities, tools, and processes to effectively maintain consistency between the design bases and the plant and its documentation. The qualifications of the staff are continually updated and tested by a comprehensive training program.

PG&E has in place a quality assurance (QA) program that provides for the periodic verification, through audits or similar assessments, of the effectiveness of design and configuration control practices. The QA program includes processes for identification and resolution of design-related problems as well as "vertical-slice" audits and other assessments of design and configuration control processes. For instance, PG&E has implemented 18 vertical-slice audits to assess the effectiveness of existing controls, such as Safety System Functional Audit and Reviews (SSFARs) and Safety System Outage Modification Inspections (SSOMIs), patterned after the NRC's corresponding programs.

Beyond the tools, processes, people, and checks described above, another significant factor that is important to maintaining the consistency of the plant with its design bases is PG&E management's commitment to the proper control of design basis information and to a safety culture that continues to rigorously evaluate and maintain the design bases during operation.

While none of these factors alone would be sufficient to provide the required confidence in DCPP's design bases and configuration control processes, taken together they provide confidence that there is an organized, systematic, and effective approach to ensure consistency with the design bases at DCPP. Moreover, the findings from reviews of these various programs and controls, along with problem resolution efforts, provide a clear indication of the effectiveness of these programs and the strong desire to continuously improve the overall design and configuration control processes.

PG&E recognizes that DCPP is a highly complex combination of equipment, systems, programs, and people. Problems can be expected to arise periodically in such an enterprise. However, PG&E believes that when problems are identified, they are resolved through an effective corrective action process. While PG&E cannot unequivocally rule out the presence of inconsistencies with DCPP's design bases, it is confident that overall the plant remains within its 10 CFR 50.2 design bases.

PG&E's rationale for reaching these conclusions regarding the effectiveness of the existing design and configuration controls is explained in response to each of the requests in the NRC's October 9, 1996 letter. These responses are summarized below.

Specific Responses

(a) Design and Configuration Control Processes

PG&E has in place at DCPP procedures that implement processes for engineering design and configuration control. These procedures collectively contain the necessary attributes to maintain engineering design and configuration control. The design change processes employed at DCPP provide for the appropriate development and evaluation of design changes so that the design bases are maintained, as well as for the communication of design change impacts to operating, maintenance, testing, and other support staff organizations. Moreover, the processes for revision of procedures also require a review of the design basis and licensing basis documentation to ensure that the design bases are maintained. Finally, these processes specifically implement the requirements of 10 CFR 50.59, 10 CFR 50.71(e), and Appendix B to 10 CFR 50.

Based on a review of internal assessment reports and NRC inspection reports, PG&E believes that these processes have been implemented in a manner that maintains design and configuration control. At the same time, PG&E recognizes that there have been instances where design-related problems have been identified over the years. However, when such problems have been identified, PG&E has evaluated them and has implemented corrective actions that not only addressed the specific problems, but also strengthened the related processes. Relatively few major issues have been identified since commercial operation and they have not reflected a significant programmatic failure. Nonetheless, they demonstrate the need to remain vigilant and to continually monitor performance in this area.

(b) Design Basis Translation to Operating, Maintenance and Testing Procedures

PG&E has processes for ensuring that DCPP design basis requirements have been properly translated into operating, maintenance, and testing procedures. PG&E believes that these processes have been effective based on several factors. First, the procedures were developed by PG&E's plant staff from the original design bases through interactions between PG&E's Engineering staff, vendors, and contractors. Second, Technical Specifications and operating guidelines that reflect the design bases have been thoroughly reviewed, and are used as a key input to operational activities. Third, following initial development of these procedures, the control processes for procedure changes have provided the necessary attributes to ensure consistency between the procedures and design basis requirements. Fourth, DCM and setpoint enhancement programs have included design basis reviews of plant procedures. Finally, the extensive audits and assessments that have been performed over the years since DCPP has been in operation have found these processes to be effective in maintaining consistency between procedures and design bases.

(c) System, Structure, and Component Configuration, and Performance Consistency

The complicated and lengthy licensing history of DCPP included an extensive preoperational and startup testing program and verification activities that validated configuration and performance consistency with the design bases of the plant. Following commencement of commercial operation and as part of normal operating and maintenance activities, plant personnel routinely have monitored the configuration and operational characteristics of plant systems, structures, and components. Various programs related to configuration control and plant performance, such as the DCPP System Engineering program and implementation of Generic Letters 89-10 and 89-13, provide additional assurance of configuration and performance consistency with design bases. Periodic system and component testing has been performed to demonstrate that plant performance remains within acceptable parameters. Frequent audits and surveillances have been performed to ensure that structure, system, and component configuration, and performance are consistent with the design bases.

(d) Processes for Problem Identification and Resolution

PG&E has reviewed its processes for identification and resolution of problems associated with design issues. PG&E recognizes that these processes are crucial to ensuring that the plant configuration and design bases are being maintained. Accordingly, PG&E has critically reviewed the processes for identifying problems, determining the significance of these problems, resolving the problems, preventing their recurrence, and reporting these problems to the NRC. PG&E believes that these problem identification and control processes have functioned properly and effectively in maintaining design and configuration control.

The original QA program, as approved by the NRC in licensing DCPP, contained PG&E's processes for the identification and resolution of problems. During the ensuing years of operation, these processes have been enhanced significantly. The primary enhancements included (1) refinement of various problem reporting and resolution mechanisms, (2) improvement of problem evaluation and root-cause determination methods, (3) implementation of vertical-slice audits such as SSFARs and SSOMIs, and (4) continuing training of personnel who perform audits and assessments. Many of these enhancements were implemented as a result of findings and observations from PG&E's own audits, assessments, and initiatives; some came as a result of industry developments, and others resulted from an evolution in NRC guidance and requirements.

PG&E concludes that its processes for problem identification and resolution are sound, effective, and well-structured. The self-critical nature of these processes provides valuable insight into the overall viability of the existing programs for design and configuration control, and provides assurance that PG&E is operating and maintaining DCPP in conformity with its design bases. Based on these results, PG&E believes that these problem identification and resolution processes can and will continue to identify and resolve issues that may involve design basis consistency and configuration management.

(e) Overall Effectiveness of Processes and Programs for Configuration Management

PG&E believes its current processes and programs are effective in maintaining plant configuration consistent with the 10 CFR 50.2 design bases and in providing the necessary feedback to PG&E management. PG&E's processes for design and configuration control have been thoroughly assessed and found to be functioning adequately. In the vast majority of cases where verification efforts have been undertaken, plant design bases have been determined to be accurate; applicable design requirements have been properly translated into operating, maintenance, and testing procedures; and DCPP's system, structure, and component configuration and performance have been maintained consistent with its design bases. Furthermore, many design changes have been performed on major plant systems, providing additional opportunities for a thorough review of the design bases, training, and associated maintenance, testing, and operating procedures. Problems that have been identified in design and configuration control have been rectified and the processes and programs improved.

Design Basis Documentation and Review Program

Over the years, PG&E has sought to improve its assessment and control processes and has taken a proactive role in developing methods for improving design and configuration control. The CMP, which evolved from a combination of NRC, industry, and internal reviews, was established as a major program to accomplish the necessary improvements. For example, a CMP element of particular relevance to the current NRC concern was PG&E's effort to enhance its DCMs. The DCM enhancement effort, which involved some 89 system and topical areas, was implemented by PG&E to address design basis issues identified during the course of plant operation. More specifically, the DCM enhancements involved reformatting original DCMs into a more complete compilation of various design bases. In addition, the enhanced DCMs clarified references to sources of design basis information so that the information could be more easily verified if necessary. As part of this activity, PG&E reviewed the design basis information in design, maintenance, testing, and operation procedures, processes, and programs.

Conclusions and Future Actions

PG&E is confident that, as implemented, the design and configuration control processes at DCPP provide reasonable assurance that the plant is maintained and operated in accordance with its design bases as defined in 10 CFR 50.2. In addition, while activities conducted in the development of this response did not result in the identification of the need for major improvement activities at DCPP, they have heightened personnel awareness and have reinforced management commitment to conformance with design and licensing bases.

PG&E has identified additional actions that it plans to take to further improve its ability to maintain conformance with the DCPP design bases. These actions include additional licensing documentation review (Final Safety Analysis Report (FSAR) Update) and further training in the areas of configuration management, FSAR Update, and 10 CFR 50.59 evaluations. These actions also include further DCM reviews of procedures and continuing focused quality assurance audits to assess PG&E's performance in ensuring conformance with the DCPP design bases.

INTRODUCTION

On October 9, 1996, the NRC issued a letter to PG&E entitled, "Request for Information Pursuant to 10 CFR 50.54(f) Regarding Adequacy and Availability of Design Basis Information." The NRC required a response within 120 days of receipt of the letter. This enclosure provides PG&E's response to the NRC request.

In its October 9 letter, the NRC stated that recent "*inspections and reviews have identified broad programmatic weaknesses that have resulted in design and configuration deficiencies at some plants.*" These inspections and reviews also highlighted instances in which timely and complete implementation of corrective actions for known degraded and nonconforming conditions, and for past violations of NRC requirements, had not been evident. The magnitude and scope of the problems identified raised NRC concerns about the presence of similar design, configuration, and operability problems, and about the effectiveness of quality assurance programs at other plants. Further, the NRC expressed concern about whether licensee programs to maintain configuration at their plants are sufficient to demonstrate that plant physical and functional characteristics are consistent with and are being maintained in accordance with their design bases. The NRC concluded that it required information from licensees to address its concerns, and issued similar letters to all licensees requesting the information necessary to evaluate design basis adequacy.

Specifically, the NRC's October 9 letter requested that PG&E provide the following information for each unit at Diablo Canyon:

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

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

(c) *Rationale for concluding that system, structure, and component 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, action to prevent recurrence, and reporting to NRC; and*

(e) *The overall effectiveness of your [PG&E's] current processes and programs in concluding that the configuration of your [PG&E's] plant(s) is consistent with the design bases.*

In addition, the NRC letter requested that PG&E indicate whether, in responding to items (a) through (e), it has *"undertaken any design review or reconstitution programs"* and, if so, provide supporting information.

In the following sections, PG&E provides specific responses to each of the areas of information requested in the NRC letter. Where the information furnished applies to more than one section of the response, cross-referencing is provided to avoid undue repetition. One response is provided for Diablo Canyon Power Plant (DCPP) Units 1 and 2, since the two units essentially are identical and are described in the same design and licensing documents, including the DCPP Final Safety Analysis Report (FSAR) Update, the Technical Specifications, and internal design criteria documents at PG&E. While there are differences between the two units because of, for instance, original design, timing of modifications to each unit, or procedural details in operation and maintenance, the same processes have been in effect and continue to be applied in implementing design and configuration control at both units.[1]

The specific responses to each NRC request have been developed based on a review of the following areas:

(1) Processes that implement design and configuration control

(2) Processes for problem identification and corrective action

(3) Selected operating, maintenance, and testing procedures, with regard to compliance with design basis documents

(4) Selected system and topical areas in plant operation

(5) History of internal and external audits and assessments, relative to evaluation of design and configuration management control

With the exception of the review of a few selected operating, maintenance, and testing procedures, no new audits, assessments, or inspections were performed in developing this response. Thus, the bulk of the supporting data for this response comes from previous or existing programs. This approach is considered reasonable given PG&E's history of having conducted several significant reviews that evaluated program compliance and that provide confidence of compliance with DCPP design and licensing bases. Programs that relate to design or configuration control include: (1) the Hosgri seismic reevaluation program; (2) the Independent Design Verification Program (IDVP); (3) the Long Term Seismic Reevaluation Program (LTSP); and (4) the Configuration Management Program (CMP), as well as the development of detailed procedures for design changes and configuration control. In addition, PG&E has performed five Safety System Functional Audit and Reviews (SSFARs) and 13 Safety System Outage and Modification Inspections (SSOMIs), which provided a "vertical-slice" audit perspective, to verify the effectiveness of these programs. The NRC also has

[1] The definitions of various key terms important to design bases and configuration management, as used at DCPP and in this submittal, are provided in Appendix C, Definitions.

performed its own vertical-slice type inspection that assessed the effectiveness of PG&E's configuration management programs. Finally, PG&E has performed more than 4,000 design changes since 1989 on a number of important systems. The associated design review process provided another critical review.

PG&E has continuously improved its processes and has often taken a proactive role in developing methods for improving design and configuration control. For instance, in 1988 the CMP was established: (1) to provide design basis information in a more accessible and useful format for PG&E staff; (2) to increase overall knowledge of the design bases; and (3) to ensure that compliance with the design bases is maintained in plant operation. Additional details on this program are discussed in Section (b), Design Basis Translation to Operating, Maintenance, and Testing Procedures, and Section (f), Design Basis Review and Documentation Program. PG&E recognizes the importance of these controls, and will continue proactive efforts to ensure conformance with design bases during future plant operation.

Background and Licensing History

Before responding to the specific NRC requests, the following discussion of the background and licensing history of DCPP is provided. During this time, significant reviews and strengthening of DCPP's consistency with its design bases have occurred. This history also provides information pertinent to placing PG&E's current programs into a proper perspective.

During the licensing of DCPP, several evaluations of various aspects of the design and design bases were performed following completion of the initial design. These evaluations were conducted by PG&E and independent engineering organizations, as well as by the NRC, and occurred periodically after the completion of the original plant design in support of the DCPP operating license application originally filed in 1973. These evaluations consisted of major programs that took years to complete and that required extensive resources. This history of DCPP is briefly summarized below.

Initial Licensing and Hosgri Seismic Reevaluation

The construction permits for DCPP Units 1 and 2 were issued in 1968 and 1970, respectively. Much of the initial design bases for the plant were established at that time in support of the operating license application. During the initial period following Unit 1 construction, the systems and components were integrated and thoroughly tested to demonstrate functional capability over a limited range of operating conditions. The original FSAR for DCPP was issued in 1973 in support of the application for the operating licenses for DCPP Units 1 and 2.

Unit 1 essentially was completed in 1976 and ready for operation at that time. However, because of concerns relating to the adequacy of the seismic design criteria for DCPP that surfaced subsequent to the discovery of the Hosgri Fault in the early 1970s, issuance of the operating licenses was delayed while the NRC evaluated additional seismic design information.

Discussions occurred between the NRC and PG&E staff with respect to the appropriate seismic criteria and the seismic capability of the plant. As a result of these discussions, additional analyses of plant systems, structures, and components, and associated plant modifications, were completed. PG&E's documentation of the Hosgri seismic reevaluation consisted of seven volumes of technical reports that were submitted to the NRC in the 1976 to 1979 time frame. Because of the analytical and physical work required, the overall impact of the Hosgri reevaluation was to improve the consistency of DCPP with its seismic design bases.

Impact of Three Mile Island.

In 1979, DCPP Unit 1 was essentially complete and ready for operation. However, the event at Three Mile Island (TMI) caused a delay in the licensing of nuclear power plants in the United States, including DCPP. During this delay, the NRC reevaluated the design bases for DCPP. PG&E addressed the numerous issues identified by the NRC as a result of the TMI event. Resolution of these issues required additional analyses, plant modifications, and procedure changes, which provided further opportunities to improve consistency with design bases.

During this period, PG&E also addressed several other generic NRC concerns that provided confidence that DCPP was conforming to design basis details that the NRC had specified in additional regulatory guidance. These concerns included piping design (in NRC Bulletins 79-02, 79-04, and 79-14), fire protection (10 CFR 50.48 and Appendix R), and environmental qualification (10 CFR 50.49). After completing actions to satisfy the NRC concerns, DCPP received a low-power operating license for Unit 1 in September 1981. Eight volumes of PG&E reports relating to TMI issues were submitted to the NRC during the 1979 to 1984 time frame. The NRC staff's evaluations supporting approval of the license were documented in the original and Supplemental Safety Evaluation Reports (SSERs) 1 through 15 for DCPP.

Independent Design Verification Program (IDVP)

Immediately after issuance of the low-power license for Unit 1 on September 22, 1981, PG&E discovered a design implementation error, immediately reported it to the NRC, and suspended fuel loading activities. This discovery resulted in the suspension (in November 1981) of the Unit 1 low-power license and postponement of Unit 2 licensing. The NRC required an IDVP for both units as a prerequisite to reinstatement of the operating license for Unit 1. The IDVP was developed, conducted, and managed by an independent consultant.

Concurrent with the IDVP, PG&E implemented an Internal Technical Program (ITP). The purpose of the ITP was to efficiently respond to the findings of the IDVP and to complete a thorough review of structural design. Thus the elements of the IDVP and the ITP, which together formed the DCPP Design Verification Program (DVP), provided added assurance that the plant conformed with its design and licensing bases. More than 10 volumes of program documents and several dozen supporting technical reports from these programs were submitted to the NRC.

The Unit 1 low-power license was reinstated in stages beginning in November 1983. The NRC's review of the IDVP was documented in the 1983 to 1984 period in SSERs 18, 19, 20, and 24. The IDVP results were also reviewed by the NRC's licensing boards as well as by the Advisory Committee on Reactor Safeguards.

The NRC reviewed the results of the ITP and the IDVP and concluded that the IDVP had been completed successfully and that there was reasonable assurance that the plant met the conditions of the license. The Unit 1 full-power operating license was issued in November 1984, and commercial operation was achieved in May 1985. Unit 2 received its operating license in 1985 and achieved commercial operation in 1986. Figure 1 presents a timeline of the key licensing milestones, internal programs, and industry events relevant to this discussion. Additional details on the IDVP and the DVP are provided in Section (c), System, Structure, and Component Configuration and Performance.

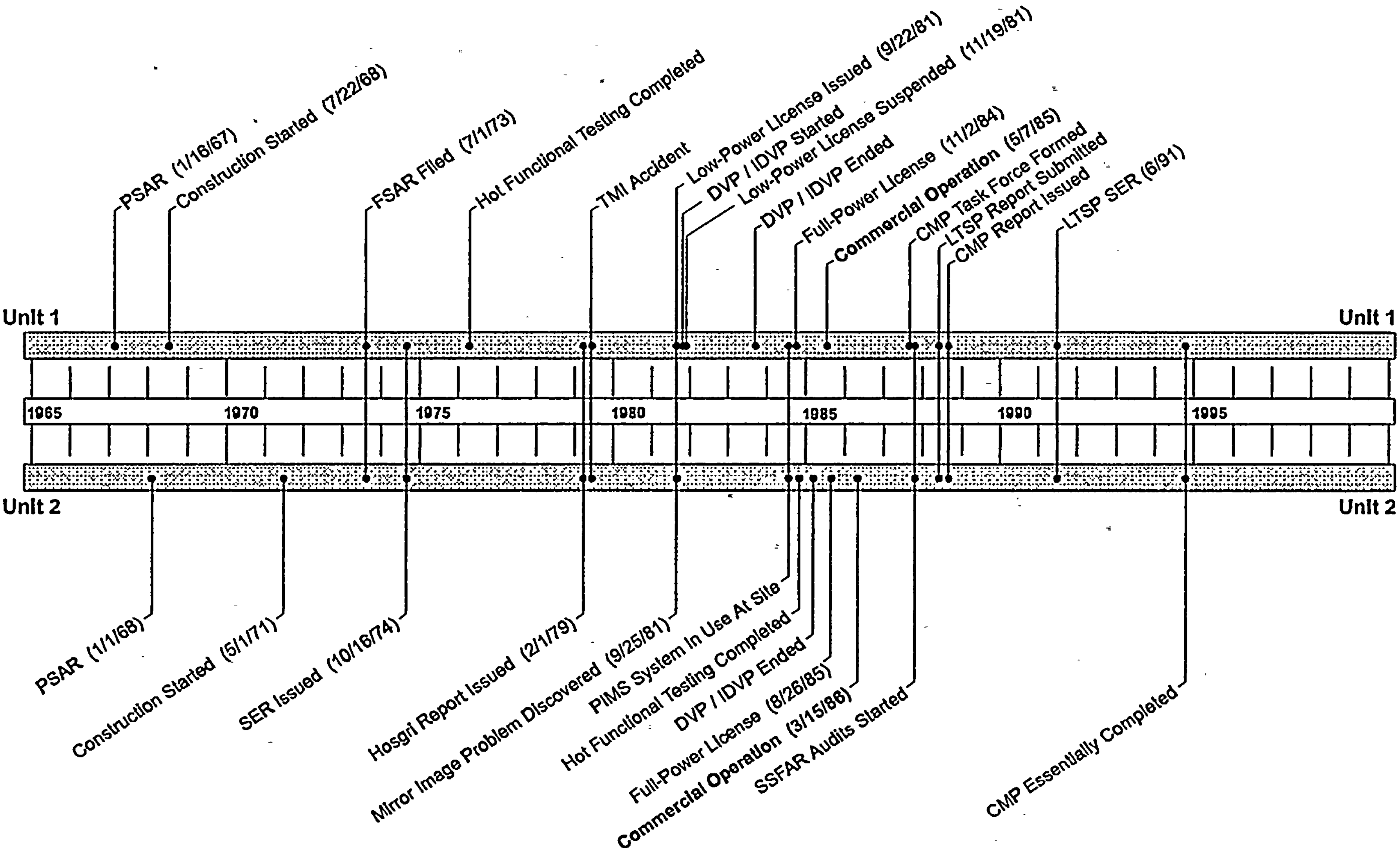
As a result of this prolonged licensing process, the initial FSAR Update (Revision 0) required by 10 CFR 50.71(e) for DCPP was issued in 1984. Subsequent revisions have been issued thereafter in accordance with regulatory requirements.

Long Term Seismic Program (LTSP)

In reinstating the Unit 1 license in November 1983, the NRC imposed a license condition requiring that PG&E conduct an LTSP to reevaluate the seismic design bases for DCPP. PG&E conducted the LTSP review between 1985 and 1988, and the results of the program reconfirmed the adequacy of the seismic design and seismic margins for the plant's systems, structures, and components. The LTSP Final Report was submitted in July 1988 as required by the license. The NRC conducted a three-year review of the LTSP Final Report and issued its approval of the LTSP in 1991 in SSER 34, wherein the NRC staff concluded that "*The LTSP has served as a useful check on the adequacy of the seismic [design] margins and has generally confirmed that the margins are acceptable.*"

In addition, and as a direct result of the LTSP, PG&E was among the first licensees to develop and use a probabilistic risk assessment (PRA) program to aid in assessing plant operational safety. The NRC staff noted this fact in SSER 34 stating that "*The PRA methodology used represents state-of-the-art methodology, and in many cases has advanced the state of the art.*" This PRA model has been updated regularly and has contributed to other PG&E activities relevant to design, such as responding to the NRC's requirements on Individual Plant Examination (IPE). In addition, PRA insights are integrated into plant activities in operation, maintenance, and outages.

Figure 1: DCPP Licensing, Construction & Operation Timeline



Commercial Operation

Prior to and following commercial operation of Units 1 and 2 in 1985 and 1986, respectively, various programs and initiatives were implemented at DCPP that involved design basis and configuration management enhancements. In the early to mid-1980s, these efforts included actions to upgrade the control of design basis information through several mechanisms, such as plant as-built documentation enhancements; design and design change procedure improvements; more detailed design criteria, procedures, and design documentation; and revised construction and maintenance practices to support the other improvements.

In the mid- to late 1980s, PG&E's design and configuration control improvement efforts included the establishment of a formal, simplified replacement parts program; the development of more explicit and extensive construction and maintenance quality control procedures; and the enhancement of the design and safety reviews performed for each design change to the plant. During this time, PG&E also formally instituted the Plant Information Management System (PIMS), a computerized system used on a daily basis to implement and monitor information related to nearly all plant activities including, for example, design, modifications, maintenance, testing, and operations.

In the late 1980s, PG&E performed several SSFARs and SSOMIs for a number of the significant safety-related systems. As a result of the findings from these vertical-slice audits, as well as from concurrent NRC activities, PG&E management recognized the need to have plant design and configuration control information more readily available during operation. Consequently, the CMP was established in 1988 to provide a focused effort to enhance configuration management. The CMP resulted in the creation of 89 separate Design Criteria Memoranda (DCMs, referred to generally as design basis documents in the rest of industry) for all safety systems, numerous nonsafety systems, and other topical areas. In addition, the CMP included the enhancement of the design change, setpoints, and vendor manual control processes. While the CMP was essentially completed in 1994, the programs initiated during that period remain as important and evolving parts of PG&E's configuration management program today.

Along with these efforts, additional activities were implemented at DCPP as specific issues were identified by operational experience, the NRC, or by other industry efforts. For example, PG&E led the development of the Region V Engineering Managers Forum Design Bases Guide (a significant input to NUMARC 90-12, "Design Basis Program Guidelines," Ref. 5.29); actively participated in the Technical Specification Improvement Program for Westinghouse plants; and led Region V in upgrading design basis documentation. As mentioned earlier, PG&E was among the first licensees to develop a PRA program and has pursued the use of PRA in areas relevant to design, including the IPE program. Other activities included implementation of a system engineering program; ongoing efforts to further improve the design basis-related training; and plant improvement projects, such as installation of the Eagle 21 process protection system and addition of a sixth emergency diesel generator.

Collectively, these activities have increased PG&E's confidence in the reliability, operability, and maintainability of plant systems, as well as forcing reexamination of the design bases. Additionally, efforts continued in other areas relevant to plant design and configuration control, such as motor-operated valve performance, equipment qualification, and fire protection. By remaining current on industry and NRC developments, PG&E has been able to enhance its programs and processes for maintaining design basis and configuration control.

Preparation of This Response

In developing this response, PG&E staff conducted a retrospective review of existing documentation of configuration control processes and the results of these processes. Nearly 1,000 documents relevant to design bases and configuration management processes were reviewed. These documents included: (1) selected plant procedures for operation, maintenance, and testing; (2) administrative procedures for design and design changes, as well as configuration control; (3) licensee event reports (LERs) since 1987; (4) nonconformance reports (NCRs) since 1987; (5) Design Criteria Memoranda (DCMs); (6) internal assessments and audit reports; (7) NRC inspection reports (IRs) and notices of violation since 1987; (8) NRC safety evaluation report (SER) and supplements; (9) program reports from the IDVP; and (10) various other program and results documents. This review focused on the adequacy of design and configuration management processes as demonstrated in DCPP documents since the late 1980s, such as the design control process and the FSAR updating process. PG&E's review of this selected documentation, summary information, and conclusions formed the majority of the support for this response.

A similar review was performed for several specific plant systems and topical areas to demonstrate the adequacy of the design bases and configuration management processes in achieving appropriate design control and configuration management. This review was conducted to determine whether conclusions reached in the above program examinations were valid when measured from the perspective of the capability of a system or structure to meet its design basis requirements. The systems and topical areas reviewed included the auxiliary feedwater system, the emergency diesel generators, and the fire protection program. Based on review of this selected documentation, PG&E assembled summary information, conclusions, and an overall rationale for response to the NRC request. This information further demonstrated the adequacy (and shortcomings) of existing design and configuration management processes. Again, no new audits or assessments were performed for this response; rather, the reviews primarily relied on historical information. However, PG&E did conduct a few selected new reviews of the FSAR Update and DCMs in the maintenance and operations areas.

PG&E recognizes that both technology and industry standards of quality have continually evolved over the nearly 30-year history of DCPP licensing, design, construction, and operation. Thus, some of the historical information relied upon in this response might now be considered less than adequate in detail or technology given today's perspective. Therefore, PG&E has relied in greater part on the more recent assessment activities in reaching its conclusions in this review. Nonetheless, PG&E believes that observations based on earlier historical information relative to key design bases are useful in gaining additional insight on configuration control and the ability of systems, structures, and components to meet their intended safety functions.

The requisite reviews conducted to support PG&E's response were performed internally by a PG&E team with a working knowledge in the areas of design, operation, maintenance, and testing. Team members included system engineers, design engineers, reactor operations personnel, maintenance personnel, quality assurance personnel, as well as other plant support staff. Two directors in PG&E's Nuclear Power Generation (NPG) organization were responsible for overall direction of the reviews and development of this response, and participated full time to provide leadership and guidance to the review team. These directors had periodic meetings with the Senior Vice President of NPG to provide status updates on the review effort and to ensure that the reviews were responsive to management expectations. NPG functional managers provided management and personnel support. Other supervisory level, operational, and technical staff in NPG were involved as needed during the review effort. In addition, NPG management emphasized to the organization that the request, and the focused resources needed to respond to it, provided an opportunity to validate and also improve the existing design control and configuration management processes.

Finally, the information supporting this response received multilevel verification during development. Each specific process and system review was verified by another qualified individual who did not directly participate in the review. A Senior Review Board consisting of former PG&E executives and managers, a representative from Westinghouse, and an individual consultant was established to provide additional overview and perspective for the effort. In addition, the response was reviewed by two external members of the DCPP Nuclear Safety Oversight Committee (NSOC), as well as by PG&E's Executive Vice President of Electric Generation (who formerly served as Senior Vice President of NPG).

The discussions in the following sections provide details on the information reviewed and the justification for the conclusions that were reached. The descriptions in this enclosure represent DCPP processes as they currently exist. Accordingly, the process descriptions contained in this enclosure do not reflect any new commitments. The related improvement activities that are planned for implementation subsequent to this review are identified specifically in the "Conclusions and Future Actions" section.

(a) DESIGN AND CONFIGURATION CONTROL PROCESSES

This section provides PG&E's response to the following NRC request:

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

Introduction

Engineering design and configuration control for DCPP have been and continue to be maintained through the integrated requirements of many administrative programs and procedures, together referred to as "plant processes." In fact, most plant processes play some role in ensuring that design and configuration control are maintained properly. These processes are defined and controlled by the Administrative Controls Program, covered by PG&E Program Directive AD1 (Ref. 1.1).

PG&E believes that its design and configuration control processes contain the necessary attributes to properly maintain consistency between the plant, its design bases, and its operation and maintenance. This belief is based on the following factors:

(1) The processes are comprehensive and meet the requirements of 10 CFR 50 Appendix B.

(2) The processes have been refined over many years to incorporate lessons learned from past experience.

(3) Extensive audits and inspections have generally found the processes to be adequate. As mentioned above, PG&E has responded to problems that were identified by improving the processes affected and the tools that support them.

In presenting the bases for these conclusions, PG&E will provide:

(1) The background and evolution of PG&E's current processes

(2) An overview of the major process (program) areas that provide for engineering design and configuration control

(3) A more detailed description of design change processes

(4) A more detailed description of the procedure change control process

(5) A description of the processes that implement 10 CFR 50.59 reviews

(6) A description of the processes that implement 10 CFR 50.71(e), FSAR Updates

(7) A description of the processes that implement 10 CFR 50, Appendix B

(8) A discussion of other potential impacts to the design bases

(9) A description of process-related training

(10) A discussion of the overall effectiveness of the design change, procedure control, 10 CFR 50.59, and 10 CFR 50.71(e) processes

In this section, the current state of the processes is described. However, it is expected that they will continue to evolve and improve. Some discussion of history is included to the extent that it is relevant to the conclusion that operation and maintenance of the plant is in conformance with its design bases.

In addition to having well-defined processes, success depends on having capable people to implement the processes. The required capability is achieved through a combination of base educational and experience qualifications, training in the specific processes and the related tools, and a clear understanding of performance expectations. Training is briefly discussed in this and subsequent sections. PG&E's approach to provide committed, qualified personnel is further discussed in Section (e), Overall Effectiveness of Processes and Programs for Configuration Management.

Background

From 1981 to 1984, as DCPP was transitioning from construction to operation, the design control processes went through major improvements. This was coincident with the time frame when the external Independent Design Verification Program (IDVP) and the Internal Technical Program (ITP) were being performed.

Further upgrades to the design and configuration control processes occurred in the 1989 to 1993 time frame. This was coincident with the Configuration Management Program (CMP) (Refs. 5.1, 5.2) and some of the improvements were a direct result of that program. The initial improvements and the origin of the CMP were driven by increasing industry concerns with configuration management and issues as noted in NRC Inspection Report 50-275/88-15 and 50-323/88-14 (Ref. 3.15). By 1990, PG&E's processes were developed sufficiently to address current expectations relative to maintaining design and configuration control. Subsequently, significant additional improvements resulted from the Design Change Process Initiative Project (DCPIP) (Ref. 4.5), which took place in 1992 and 1993. During this project, the DCPIP team developed and implemented an improved design change process that facilitated maintaining consistency with the design bases, while improving the effectiveness of personnel involvement in the process. As part of DCPIP, improved tools for the development of design changes were also developed.

Overview

PG&E's processes for operating and maintaining DCPP are controlled by the Administrative Controls Program as defined in Program Directive AD1 (Ref. 1.1). This program has been in place in its current form since 1994. Prior to that time, similar process controls existed in Administrative Procedures prepared by each department (e.g., Operations, Engineering, General Construction).

In the Administrative Controls Program, the highest-tier process control documents are Program Directives (PDs). The PDs are grouped by general topical categories, and apply to the entire Nuclear Power Generation organization. Each topical area may contain one or more PDs and their subordinate procedures, Inter-Departmental Administrative Procedures (IDAPs), Departmental-Level Administrative Procedures (DLAPs).[2] Some PDs may be identified as quality-related (such as inspections) and others are nonquality-related (such as project management), based on the nature of the activity described in the procedure. The Program Directive topical areas that play a significant role in maintaining design and configuration control include:

PD Topical Categories	Category Description
AD	Administrative Support
CF	Configuration Management
MA	Maintenance
OM	Organization & Management Control
OP	Operations Control
TQ	Training & Qualification
TS	Technical Support
XI	External Interface

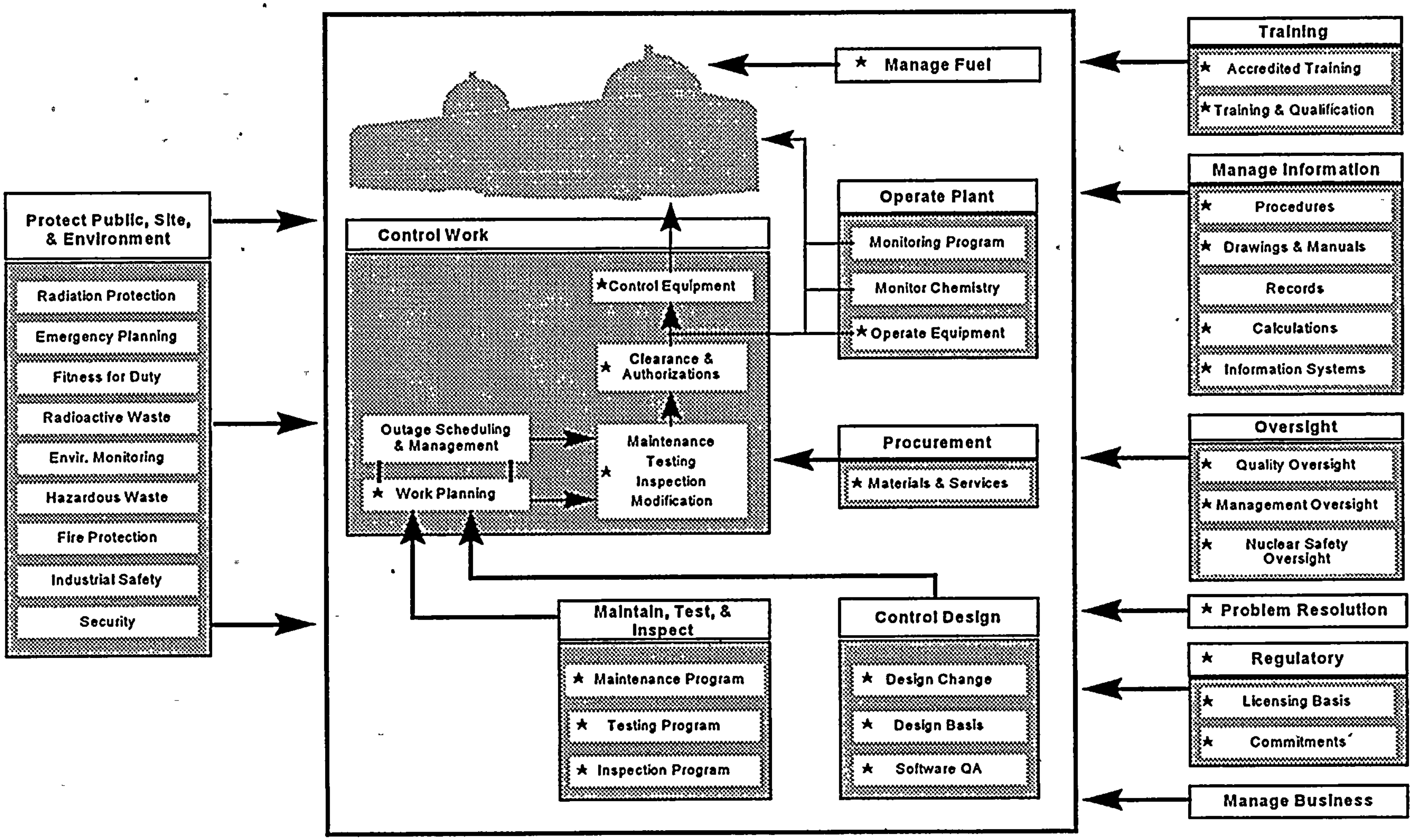
[2] Nomenclature of procedures: Program Directives are identified by a two-letter topical identifier and a numeral (e.g., AD1). IDAPs are identified by the PD number followed by the suffix "ID" and a numeral (e.g., AD1.ID1). DLAPs are identified by the PD number followed by a two-letter suffix, indicating the department, and a numeral (e.g., AD1.DC1).

Figure 2 illustrates the major process areas addressed within the DCPP Administrative Controls Program. Those process areas that have a primary role in maintaining design and configuration control are identified by an asterisk. Some of the major relationships between areas are also indicated for illustrative purposes. There are approximately 450 administrative procedures represented.

A more detailed listing of Program Directives that play a role in maintaining design and configuration control are listed in Appendix B, along with a brief description of their role. Nearly one-half of the 450 administrative procedures have some role in maintaining consistency between the design bases and the physical plant, plant documentation, operation, maintenance, and training. Figure 3 provides an overview of the general relationships that exist between the groups of processes that are key to maintaining design and configuration control. As this figure illustrates, there are many information exchange interfaces and each interface typically needs to accommodate changes that can flow in either direction. The procedures that define the details of these processes are heavily integrated.

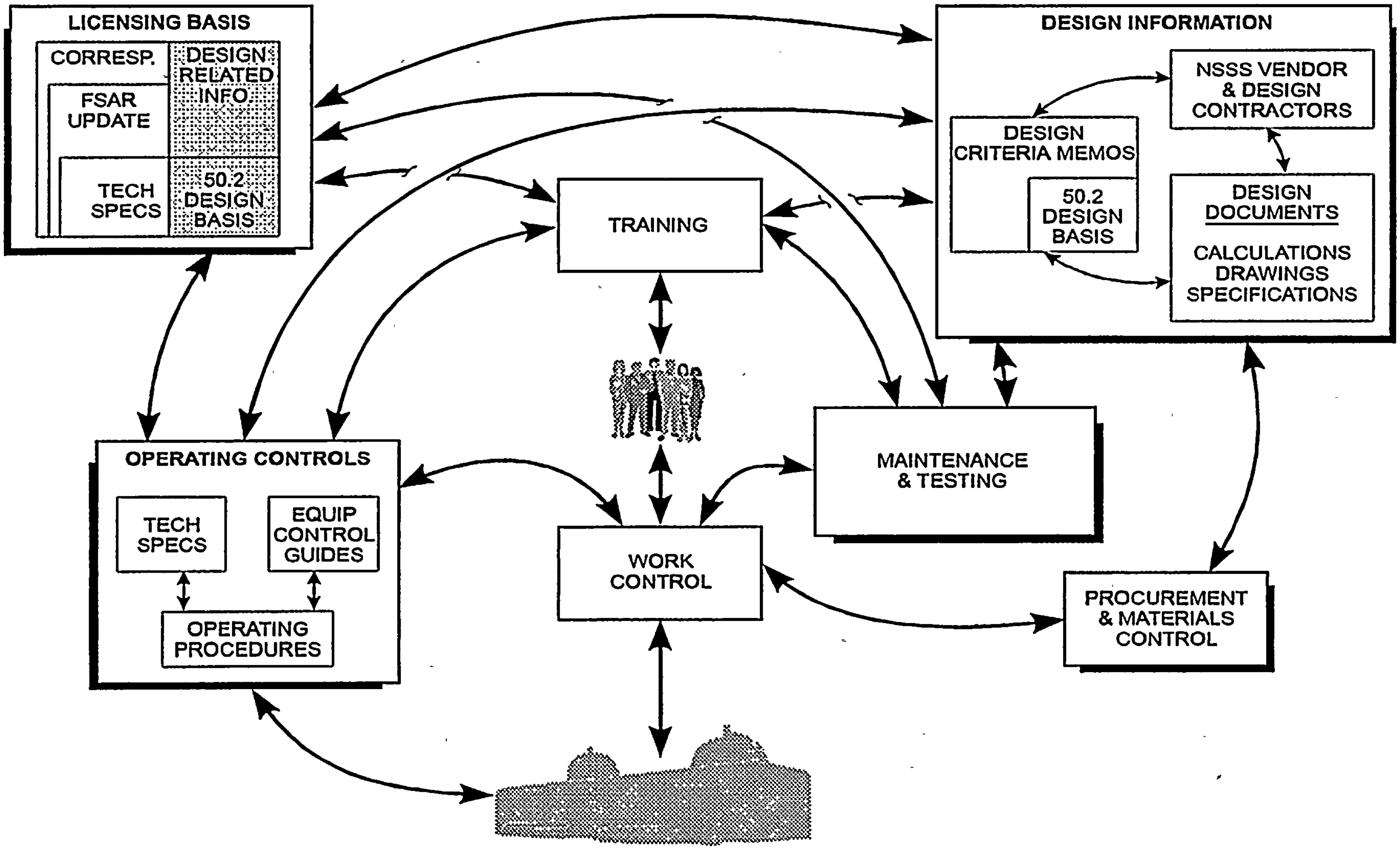
While all of these processes are important, the remainder of this process discussion will focus on several that play the most significant role in design bases and configuration control.

Figure 2: Process Area Relationships



★ Note: Key Design and Configuration Control Related Process Areas.

Figure 3: General Design and Configuration Control Relationships



Design Change Processes

Description

Design changes represent one of the most direct and frequent opportunities to impact the design bases and configuration of a plant. PG&E's design change processes are among the key processes that maintain design and configuration control. The DCPP design change processes are defined primarily by Program Directives on Design Control (CF3, Ref. 1.19) and Modification Control (CF4, Ref. 1.34) and their underlying Inter-Departmental and Department-Level Administrative Procedures. These processes complement one another in an integrated fashion and provide the interface with the other Program Directive areas discussed above.

The design change process as it relates to design control and configuration management is described below. The specific procedures that implement key attributes relevant to maintaining design and configuration control also are identified. They are presented in a sequence that generally matches the flow of a design change.

(1) Identification and Request. The design change process begins with the identification of the need or desire for a design change and the development of a design change request that is controlled by Procedure CF4.ID1 (Ref. 1.35). The request for design changes may arise for many reasons, including performance improvements, corrective actions for performance problems, component obsolescence, and operational experience.

(2) Management Screening and Scope Approval. Design change requests are screened by management to determine their suitability and are approved for further development (CF4.ID1, Ref. 1.35).

(3) Design Change Vehicle Selection. The next step is the selection of the appropriate design change vehicle (CF4.ID1, Ref. 1.35) for the development and processing of the design change. Several design change vehicles have been developed over the years in recognition of the fact that there are various types of changes. Each of these vehicles has been carefully developed to contain appropriate reviews, evaluations, authorizations, and documentation commensurate with the complexity and safety significance of the change to ensure that an adequate level of design and configuration control are maintained. Criteria for the selection and use of each vehicle have been established to limit their use to the appropriate type of design change. The use of any vehicle provides adequate consideration and documentation of consistency with the design bases or leads one through the steps needed to change the design bases.

The most complex changes are addressed by a Design Change Package (DCP) (CF3.ID9, Ref. 1.26). A DCP is required for a design change that meets one or more of the following conditions: (1) a Licensing Basis Impact Evaluation (LBIE, PG&E's process that implements 50.59 safety evaluations) is required because of an affirmative response to LBIE screening questions; (2) it involves a change to the design bases of the plant; or (3) management requires a Design Change Evaluation (DCE) (a detailed interdiscipline technical evaluation) to be formally documented. The DCP provides an organized and systematic way of considering the change in the context of the design bases.

Other design change vehicles and the procedures that define their content and use include:

(a) Maintenance Modification Packages (CF3.ID8, Ref. 1.25)

(b) Maintenance Modification Action Requests (CF3.ID10, Ref. 1.27)

(c) Replacement or New Part Evaluations (CF3.ID13, Ref. 1.30)

In the following discussion, the basic content and flow of a DCP from development through implementation and closure are described. These other design change vehicles follow a generally similar path, but use only portions of the DCP process, appropriate to the changes they are implementing. Scope and screening requirements provide assurance that important considerations are not missed by the use of the wrong vehicle.

(4) Detailed Design and Documentation. The documentation for a design change is produced through the development and/or revision of controlled design and implementation documents (CF3, Ref. 1.19). This process is rigorously controlled to maintain the consistency of design documents and the design bases. It is also controlled to allow a complete and traceable record of the change to assist current and future evaluations of design bases and configuration. The key IDAPs and DLAPs that control design activities are a part of the Quality Assurance Program and comply with ANSI N45.2.11-1974 requirements, and are listed below. Other procedures that may be required depending on the nature of the change are also included below. This list is necessarily long because of the complex nature and the many requirements that apply to nuclear power plant design and licensing. Procedure CF3.ID9 (Ref. 1.26) provides the user with guidance, checklists, and forms for the proper implementation of these activities.

(a) Design Criteria Memoranda (CF3.ID2, Ref. 1.20). This procedure requires careful review and documentation of the design bases. If changes are required, the procedure controls them to ensure that the revisions are available and acceptable to the parties affected, and that it is properly documented upon completion of the associated physical work.

(b) Specifications (CF3.ID16, Ref. 1.32). This procedure requires development of technical requirements to ensure associated equipment and services meet the design bases. Checks are built into this process and the procurement process to ensure proper understanding and conformance with the design bases and requirements described in the specification.

(c) Design Calculations (CF3.ID4, Ref. 1.22). This procedure requires identification, revision or creation, coordination, and approval of relevant calculations in a controlled manner that ensures design basis margins are maintained as required and are available to affected personnel at the various stages of the DCP.

(d) Drawing Preparation and Approval (CF3.ID5, Ref. 1.23). This provides for identification and development of detailed revisions to existing drawings and/or development of new drawings in a controlled manner, with the appropriate approvals, and updating of the permanent plant records upon completion of the associated physical work.

(e) Setpoint Change Control Program (CF6.ID2, Ref. 1.43). This procedure provides a graded program with more rigorous requirements for the most important setpoints. It requires identification of setpoint changes resulting from a DCP (or other change vehicle) and revision by appropriate organizations, and coordinated review by the affected organizations, including Operations, Westinghouse, analysis groups, and instrumentation and control groups. Through this review and coordination process, consistency between the design bases and implementation is maintained.

(f) Classification of Structures, Systems, and Components (CF3.NE1, Ref. 1.112). This procedure defines the codes, standards, regulatory guides, and commitments that govern the classification of structures, systems, and components (SSCs) for DCPP. These classifications reflect the design bases of the plant, and determine the requirements and procedures to be applied during design, fabrication, installation, testing, operation, maintenance, and parts-replacement activities to ensure that the design bases are maintained.

(g) Design Documents Prepared by External Contractors (CF3.ID17, Ref. 1.33). This provides for the proper and controlled communication of the design bases, design requirements, and information between PG&E and external contractors. This also provides controls for the review and acceptance of external contractor work.

(h) Coordination of Safety-Related Analytical Work Performed by Vendors (TS3.ID1, Ref. 1.73). This procedure provides for the proper and controlled communication of the design bases, design requirements, and information between PG&E and external contractors doing safety-related analytical work that supports or impacts DCPP activities. It also ensures that the resulting analysis information is reviewed and disseminated to appropriate departments to ensure maintaining the design bases.

(i) Environmental Qualification (EQ) Program (CF3.ID3, Ref. 1.21). This procedure provides for the development and implementation of the requirements of 10 CFR 50.49. The equipment within the scope of the EQ Program is electrical equipment located in harsh environments that is relied upon to perform required post-accident safety functions as delineated in 10 CFR 50.49.

(j) Design Change Package Development (CF3.ID9, Ref. 1.26). As noted above, this procedure is the overall procedure that provides for the development and coordination of design changes. A portion of this procedure provides the requirements and process for performing independent design verification of the design changes to ensure that the design meets specified design inputs and design bases.

It also provides direction and requirements for performing a Seismically Induced Systems Interaction Program (SISIP) evaluation. The SISIP evaluation provides assurance that no SSC required to perform its design basis functions will be adversely affected by another system, structure, or component in a seismic event.

(k) Seismic Configuration Control Program (CF3.ID11, Ref. 1.28). This procedure establishes the requirements for the graded quality program for seismic configuration control of certain existing Design Class II and III[3] structures, systems, and components that have seismic qualification requirements. The Seismic Configuration Control Program (SCCP) defined by this procedure provides measures to identify SCCP equipment to ensure that NPG personnel are aware of their seismic qualification requirements and do not invalidate such qualifications through engineering, construction, maintenance, or procurement activities. Equipment within the scope of this program must be seismically qualified to satisfy license or FSAR Update commitments or to ensure the functionality of Design Class I components.

(l) Processing of Information Provided by Suppliers (CF7.ID3, Ref. 1.121). This procedure provides the guidance and methods to be used to ensure that supplier-provided information associated with existing or future plant

[3] PG&E Design Classes II and III do not correspond to ASME Code Classes 2 and 3 classification. DCPP piping systems are committed to meet USAS B31.1 Code and other Code requirements. This commitment preceded the development of ASME Section III, which identifies and uses ASME Code Class designations.

equipment is processed in an efficient and consistent manner. This procedure provides a method for screening and transmitting that information to the appropriate individuals for disposition to ensure control of the configuration and design bases of the plant.

(m) Graded Quality Program for Regulatory Guide (RG) 1.97 Category 2 and 3 Instrumentation (CF3.ID12, Ref. 1.29). This procedure establishes the quality and configuration control requirements for certain RG 1.97 post-accident monitoring instrumentation that must meet its design bases, but is not required to meet 10 CFR 50 Appendix B quality assurance requirements. RG 1.97 adopts a graded approach to design, qualification, and quality requirements depending upon the importance to safety of the measurement of a specific variable. This procedure applies to the instruments with less stringent requirements.

(n) Licensing Basis Impact Evaluations (LBIE) (TS3.ID2, Ref. 1.74). This procedure establishes the requirements of and controls the processes for evaluating the impact on the licensing basis of changes to various activities associated with the design and operation of the plant. It also determines whether prior regulatory agency approval is required before implementing activities or conducting tests or experiments that will result in changes to the facility, its procedures, or licensing basis documents.

(o) Technical Specification Change Process (XI3.ID1, Ref. 1.78). This procedure provides direction and controls for processing license amendment requests for proposed changes to the DCPP Technical Specifications. This process ensures regulatory approval is received prior to undertaking these related activities.

(p) Post-Modification Testing (AD13.ID2, Ref. 1.86). This procedure establishes the administrative controls to ensure that adequate Post-Modification Testing (PMT) is identified and conducted following a plant modification to verify the capability of the equipment affected to meet the functional requirements of the related design bases.

(q) Component Database Program - Change Process (CF2.ID7, Ref. 1.18). This procedure describes the requirements for initiating, processing, implementing, and tracking changes made to the PIMS Component Database (CDB) records, which include technical and design data, design and field setpoints, and manufacturing data. This process has a security system that ensures that the CDB data continues to reflect the physical configuration of the plant, its operating procedures, and the current design bases of the associated systems, structures, and components. Some of the functions of the CDB are to provide current information to control and direct activities such as clearances, work orders, and material control.

(r) Field Correction Transmittal Processing (CF3.ID6, Ref. 1.24). This procedure establishes the process and controls for maintaining the configuration of the plant through an as-built process. This process is provided to ensure incorporation of information that is within approved design bases into the various design documents.

(s) DCPP Final Safety Analysis Report (FSAR) Update Revision and Maintenance (XI3.ID2, Ref. 1.79). This procedure provides the administrative controls necessary to revise and maintain the DCPP FSAR Update current and reflective of the design and licensing bases. Controls are included for the initiation, processing, and implementation of changes to the FSAR Update, filing with the NRC, and controlled distribution of revisions to meet the requirements of 10 CFR 50.71(e).

(t) Development and Independent Verification of Calculations or Computer Programs (CF3.ID15, Ref. 1.31). This procedure establishes the requirements for the development and verification of technical calculations, computer programs, and subsequent revisions that are themselves part of, or which are bases for, testing, analysis, calibration, operating, maintenance, and other procedures that are important to safety or important to environmental quality. This procedure does not cover computer system software or design calculations covered by "Design Calculations" (CF3.ID4, Ref. 1.22).

(5) Design Change Package Development. Design Change Packages (DCPs) are developed to assemble the design change information described above in an integrated package to facilitate review and communication to the sections of the organization affected (CF3.ID9, Ref. 1.26). This process requires a review for technical and licensing impacts, including those that affect multiple parts of the organization. This review is guided by discussion, requirements, and checklists within the design change procedures, as well as discussion and requirements within the related procedures and documents.

(6) Design Change Package Distribution Coordination. Draft DCPs are distributed for review to the NPG organizations affected (Advance DCP Review) prior to being finalized. This is done to check that the design change impacts are acceptable and compatible with other plant requirements and restraints (CF3.ID9, Ref. 1.26). The organizations involved in these reviews typically include Engineering, Operations, Maintenance, Materials Services, and Learning Services.

(7) Final Review. Final DCP review and approval involves LBIE screening and development of an LBIE if required in accordance with Procedure TS3.ID2

(Ref. 1.74). This also involves the performance of independent verification (CF3.ID9, Ref. 1.26).

(8) Approval. The completed DCP is forwarded to the design change coordinator to initiate formal plant acceptance for implementation in accordance with Procedure CF4.ID3 (Ref. 1.36). The Plant Staff Review Committee (PSRC) reviews DCPs that require completion of an LBIE (i.e., one or more of the LBIE screening questions answered "Yes") and others that management requests in accordance with Technical Specifications and the procedure that specifies the PSRC charter (OM4.ID2, Ref. 1.130). DCPs are approved by the plant manager or his designee.

(9) Implementation. The processing and implementation of the DCP then proceeds through the following steps:

(a) Work Planning (AD7, Ref. 1.10) - Controlled work packages that contain the necessary information to complete the activity are developed in accordance with "Use of PIMS Work Order Module" (AD7.ID1, Ref. 1.136) and follow the work through its implementation. The following are included in these packages, as needed. (Other changes in support of the DCP may be required; some are discussed under Temporary Modifications). The DCP planning and work package development process is thorough and provides for effective implementation without compromise of the design bases.

(i) Controlled procedures for performing work (AD2.ID1, Ref. 1.138)

(ii) Specific tests (AD13, Ref. 1.15)

(iii) Identified inspections (AD5, Ref. 1.9)

(iv) Scaffolding requirements (AD7.ID5, Ref. 1.137)

(v) Inservice Inspections (ISI) (AD5.ID2, Ref. 1.90)

(vi) Post-modification testing (AD13.ID2, Ref. 1.86)

(vii) Inservice Testing (IST) (AD13.ID5, Ref. 1.88)

(viii) Post-maintenance testing (AD13.ID4, Ref. 1.87)

(ix) Procurement of materials (AD9.ID1, Ref. 1.122)

(x) Control and staging of materials (CF5, Ref. 1.41)

(xi) ALARA reviews and Radiation Work Permits (RP1, Ref. 1.63)

(b) Implementation - The implementation of the work orders requires the performance of the following associated activities:

(i) Request and obtain clearances (OP2.ID1, OP2.ID2, Refs. 1.123 and 1.124)

(ii) Perform inspections (AD5.ID1, AD5.ID2, Refs. 1.125, 1.90)

(iii) Request field changes (CF4.ID4, Ref. 1.37)

(iv) Perform testing (AD13.ID2, AD13.ID4, AD13.ID5, Ref. 1.86, 1.87, 1.88)

(v) Provide training (Operations, Maintenance, etc.) (TQ2.ID4, Ref. 1.126)

(vi) Provide as-built documents to the control room, if required (CF4.ID3, Ref. 1.36)

(vii) Return equipment to service (OP1, Ref. 1.61)

(c) Configuration Updates - Documents and information system records affected that are identified and reviewed during the preparation stage are formally updated after the change has been implemented. These include:

(i) Design Documents (CF3.ID2, CF3.ID3, CF3.ID4, CF3.NE1, Refs. 1.20, 1.21, 1.22, and 1.112)

(ii) Control Room Drawings (AD3.ID2, Ref. 1.7)

(iii) Training and Simulator Updates (TQ1, TQ2; Refs. 1.67, 1.69)

(iv) PIMS Component Database Updates (CF2.ID7, Ref. 1.18)

(v) Operating, Maintenance, and Surveillance Test Procedures (AD1.ID2, AD1.ID3, Refs. 1.3 and 1.4)

(vi) FSAR Update (XI3.ID2, Ref. 1.79)

(d) Tracking - Activities associated with the design change process are tracked using PIMS as defined in Procedure OM7.ID1 (Ref. 1.56). This provides a mechanism for tracking the status and for recording the proper closure of required activities, including documentation.

(10) <u>Document Control and Records</u>. Document control requirements are applied to safety-related design and configuration control documentation such that revision control and traceability are maintained and current documents are available for use. Document control requirements are either specified in the individual procedures that control the specific document or in procedures associated with PD-AD3, Document Control (Ref. 1.6). Record copies of these documents are maintained on microfilm with indices to a Records Management System such that past revisions are retrievable. Records requirements are specified in the procedures associated with PD-AD10, Records (Ref. 1.13).

Temporary Modifications

A number of processes ensure that modifications of a temporary nature, often required in the performance of design changes and maintenance activities, are properly controlled. This is essential to maintaining design and configuration control. Specific procedures that control these processes include, but are not limited to:

(1) Temporary Modifications - Plant Jumpers and Measuring and Test Equipment (M&TE) (CF4.ID7, Ref. 1.38)

(2) Temporary Attachments (CF4.ID8, Ref. 1.39)

(3) Seismically Induced Systems Interaction Program (SISIP) Review of Housekeeping Activities (AD4.ID3, Ref. 1.131)

(4) Control of Doors Important to Safety (AD7.DC5, Ref. 1.113)

(5) Use and Control of Temporary Radiation Shielding (RP1.ID2, Ref. 1.65)

(6) Control of Scaffolding (AD7.ID5, Ref. 1.137)

(7) Control of Plant Floor Loading (MA1.ID7, Ref. 1.49)

(8) Control of Temporary Rigging from Plant Equipment, Piping, and Structural Members (MA1.ID8, Ref. 1.50)

(9) Rigging and Load Handling (MA1.ID11, Ref. 1.51)

(10) Plant Crane Operating Restrictions (MA1.ID14, Ref. 1.52)

External Analysis and Design Support

The previous discussion has focused on internal PG&E design and work control processes. These internal processes cover a significant part of DCPP's design, as PG&E has and continues to function as its own architect and engineer. However, PG&E has also relied on equipment vendors, other architect/engineer firms, and consultants (service providers) for specific parts of the DCPP design. In some cases, their services are still used (e.g., Westinghouse for fuel design, safety analysis and Nuclear Steam Supply System (NSSS) support). Since these activities are an integral part of the plant design, they also must conform to the design bases and require effective control. This control is provided through interfaces with the design change process and other processes as described below.

The exchange of information and requirements between these service providers and PG&E is controlled by procedures that include:

(1) Nuclear Fuel Fabrication and Analysis Services (TS2.ID1, Ref. 1.139)

(2) Processing of Information Provided by Suppliers (CF7.ID3, Ref. 1.121)

(3) Design Documents Prepared by External Contractors (CF3.ID17, Ref. 1.33)

(4) Coordination of Safety-Related Analysis Work Performed by Vendors (TS3.ID1, Ref. 1.73)

(5) Processing of Supplier Engineering Documents (CF7.ID4, Ref. 1.145)

These procedures provide assurance, through specific documented communications and reviews, that the design requirements and bases are understood by the service provider, that PG&E understands the providers' products and methodology, and that both parties have sufficient understanding of the work done to avoid compromising the design bases.

The service-provider interface and providers' products generally have been satisfactory, as shown by independent verification and review of products such as the fuel design and associated safety analysis. However, there have been some significant problems in this area in the past. One example was the design interface problem that occurred in the late 1970s and the early 1980s, which resulted in the DVP and IDVP described in the Introduction section. Substantial changes in interface control were made as a result of the QA reviews and activities in response to the IDVP. Further improvements have been made over time based on the heightened sensitivity in this area.

No significant issues have been identified in recent years, and ongoing audits and reviews show generally satisfactory performance. Any problems identified have been handled through the normal problem identification and resolution process, which is described in Section (d), Processes for Problem Identification and Resolution. This supports the conclusion that the current DCPP processes provide adequate monitoring and control of service provider interfaces and products. Low level problems do surface periodically, indicating that continued vigilance in this area is needed, particularly as expectations for more rigorous adherence to design details continue to increase.

Vendor Manual Program

In addition to plant analysis and design details developed by PG&E and its providers, the plant design relies on the performance of vendor-supplied equipment. This equipment was provided by the vendors to meet the requirements of PG&E and/or Westinghouse specifications, which provided the vendor with design requirements. The vendor provided equipment to meet those requirements and provided certifications and/or test results to demonstrate compliance. To continue to provide the intended functionality, the equipment must be operated and maintained in accordance with the vendor's requirements. PG&E design details, as well as operating and maintenance procedures, were originally based on vendor information.

As the vendors continue to develop and sell new products, additional experience may result in changes and improvements to their products, manuals, recommendations, and limitations. Major vendors like Westinghouse have formal programs to alert customers to these changes and to provide upgrades to previously purchased and installed equipment when needed.

In 1990, PG&E assembled available information and worked with vendors of key equipment to determine if their manuals were up to date, or if there was new information that should be included in the manuals to support maintenance and/or operating procedures. About 200 key vendor manuals were upgraded to incorporate current information and recommendations, during a program that lasted several years. Procedure CF7.ID1 (Ref. 1.45) now controls these manuals.

Procedure Change Control Process

PG&E's process for the development and revision of procedures is designed to ensure that changes are reviewed specifically for their impact on the design and licensing bases. This process is defined in Program Directive AD1 (Ref. 1.1), Administrative Controls Program, and its associated IDAPs and DLAPs.

The procedure control process was established as part of the Quality Assurance program described in the FSAR Update, (Ref. 3.2) Chapter 17. This process was developed to meet the requirements of RG 1.33, Revision 2, February 1978; ANSI N18.7/ANS 3.2-1976 and DCPP's Technical Specifications. (Ref. 3.3)

The specific attributes associated with the procedure change control process (AD1.ID1, Ref. 1.2) that are relevant to maintaining design and configuration control include:

(1) Procedure sponsors are required (AD1.ID1, AD1.DC1; Refs. 1.2, 1.127) to ensure that the procedure and changes conform to applicable technical criteria and company and regulatory requirements, such as:

- (a) Applicable vendor manuals
- (b) Approved PG&E design documents
- (c) Commitments in the Procedure Commitment Database[4]
- (d) NRC regulations
- (e) Design Criteria Memoranda

[4] The Procedure Commitment Database (PCD) contains recurring regulatory commitments as well as commitments generated internally by PG&E, such as Nonconformance Report (NCR) corrective actions and recommendations from industry operating experience. The majority of design basis requirements are not contained in the PCD; they are found in DCMs and associated documents.

(f) Final Safety Analysis Report Update

(g) Safety Evaluation Reports

(h) Supplemental Safety Evaluation Reports

(i) Technical Specifications

(2) In addition, the procedure sponsor is required (AD1.ID1, AD1.DC1; Refs. 1.2, 1.127) to ensure that the procedure will work and that it is technically correct. Ensuring the technical correctness includes, but is not limited to, confirmation that:

(a) Calculations performed are correct

(b) Scaling calculations that support values in procedures are reviewed and/or verified

(c) Setpoints are correctly specified

(d) The procedure is consistent with the license, including whether 10 CFR 50.59 applies

(e) Technical specifications, cautionary notes, and other such references are specified clearly

(f) Valve lineups, valve numbers, switches, breakers, limits, acceptance criteria, and other similar information are correct

(3) Licensing Basis Impact Evaluation (LBIE) screening questions (AD1.ID2, AD1.ID3; Refs. 1.3, 1.4) are specifically included in the review process to determine if there is:

(a) A change to the Operating License and attachments

(b) A change to a commitment in the Procedure Commitment Database (PCD)

(c) A change that would require a 10 CFR 50.59 safety evaluation

(d) A change that would impact the Environmental Protection Plan implementation

(e) A change that would impact Security Plan implementation

(f) A change that would impact Emergency Plan implementation

(g) A change to the FSAR

If the answer to any of the screening questions is "Yes" then the sponsor is required to document the formal LBIE screen and perform a full LBIE, as appropriate, in accordance with Procedure TS3.ID2 (Ref. 1.74). This process is discussed in more detail in the 10 CFR 50.59 subsection below.

(4) The PSRC reviews many new or revised safety-related procedures[5] and recommends them for approval. These procedures are then approved by the plant manager, prior to implementation (AD1.ID2, Ref. 1.3).

(5) On-the-Spot Changes (OTSCs) to procedures are allowed, provided that the intent of the original procedure is not altered. OTSCs are temporary changes to procedures that can be implemented, after approval, on a temporary basis while final revision, review, and approval of the procedure are being obtained. This process is controlled by Procedure AD1.ID7 (Ref. 1.5). The change must be approved by two management staff members who meet the applicable qualification requirements of ANS 3.1-1978, and are knowledgeable in the subject area of the procedure. For changes to certain types of procedures, at least one approver must also hold a Senior Reactor Operator (SRO) license. For the OTSC process to be used, all LBIE screening questions must result in "No" answers and the change cannot modify or delete a commitment in the Procedure Commitment Database.

Processes that Implement 10 CFR 50.59 Reviews

PG&E implements the reviews required by 10 CFR 50.59 as part of the LBIE process. This process is defined in Procedure TS3.ID2 (Ref. 1.74). The LBIE process addresses the major documents and programs that constitute the Diablo Canyon Power Plant's licensing bases, including the Final Safety Analysis Report (FSAR) Update, the Fire Protection Program, the Quality Assurance Program, the Environmental Protection Plan, the Emergency Plan, and the Security Plan. One part of the LBIE process involves performing 10 CFR 50.59 safety evaluations for effects of DCPP activities on the licensing bases as described in the FSAR Update. Separate evaluations are made for environmental, emergency, and security issues, if necessary.

Although the term LBIE was defined in 1993 to better reflect that evaluations were done for various facets of the licensing bases, 10 CFR 50.59 safety evaluations have been performed in accordance with NPG-written procedures since DCPP received an operating license.

The current LBIE process provides a systematic and consistent method of performing evaluations of changes being made to the plant facilities and procedures. The intent of this process is to prevent changes to the configuration of the plant, procedures, or methods of

[5] A recently approved license amendment (Ref. 3.39) reduces the PSRC review requirement to focus on key procedures. This change has not yet been fully implemented.

operation that may have an adverse effect on safety from occurring without required reviews and prior regulatory approval. The application of this process serves to verify that the plant continues to be operated and maintained in a manner that is consistent with the design and licensing bases.

The LBIE process, as described in IDAP TS3.ID2, is divided into three parts:

(1) Screening to determine the need for prior regulatory approval

(2) Screening to determine the need for a specific evaluation (LBIE screening); there is a separate section for each of licensing basis programs being screened

(3) Performance of the required evaluations (LBIE)

The procedures that govern various activities that can change plant configuration and/or plant procedures contain steps that require that the LBIE process be followed. In some cases, such as for the Procedure Control Process, the LBIE screening questions are integrated into the specific activity procedure, while for other activities, the LBIE procedure (TS3.ID2, Ref. 1.74) is referenced for use. Activities to which the LBIE process is applied and their associated procedures include:

(1) FSAR Update changes (XI3.ID2 , Ref. 1.79)

(2) Procedures, procedure revisions and rescissions (AD1.ID2, 3, 7, Refs. 1.3, 1.4, and 1.5)

(3) Equipment Control Guidelines (ECGs) and changes (see Appendix C for definition of ECG) (OP1.DC16, Ref. 1.114)

(4) Design changes (CF3.ID8, 9, 10, Refs. 1.25, 1.26, and 1.27)

(5) DCMs and their changes (CF3.ID2, Ref. 1.20)

(6) Setpoint changes (CF6.ID2, Ref. 1.43)

(7) Temporary Modification Control, Plant Jumpers and M&TE (CF4.ID7, Ref. 1.38)

(8) Temporary Shielding Requests (RP1.ID2 , Ref. 1.65)

(9) Event Investigation/Response Teams (OM7.ID3, Ref. 1.57)

(10) Fire Hazards Appendix R Evaluations (FHAREs) (Engineering, Mechanical Implementing Procedure M-1, Ref. 1.115)

(11) Commitment changes (XI4.ID2, Ref. 1.81)

(12) Q-List changes (Q-List, Ref. 5.65)

The LBIE process contains a question as to whether the activity causes a change to the Technical Specifications. If the activity causes a change to the Technical Specifications, submittal of a license amendment request to the NRC is required.

The current LBIE screen questions (Ref. 1.74) that are associated with determining the need for a 10 CFR 50.59 safety evaluation are stated in the LBIE procedure (TS3.ID2, Ref. 1.74) as follows:

> *"SECTION 1.* *<u>10 CFR 50.59, 10 CFR 50.54(a)(3), and OL Condition 2.C.(5)b./2.C.(4)b. Screen</u>*
>
> *a)* *Does it involve a change to the facility design, function or method of performing the function as described in the SAR, including text, tables, and figures and including the Fire Protection Program (FSAR Update, Section 9.5) and Quality Assurance Program (FSAR Update, Chapter 17)? (See Appendix 7.5 of Ref. 1.74)*
>
> *b)* *Does it involve a change to procedures, system operation or administrative control over plant activities as described in the SAR, including procedures related to the Fire Protection Program (FSAR Update, Section 9.5) and the Quality Assurance Program (FSAR Update, Chapter 17)?*
>
> *c)* *Does it result in a test, experiment, condition or configuration that might affect safe operation of the plant but was not anticipated, described or evaluated in the SAR?"*

If any of the 10 CFR 50.59 screen questions is answered "Yes," a 10 CFR 50.59 safety evaluation must be completed.

The 10 CFR 50.59 Safety Evaluation in the LBIE procedure contains nine questions. The first seven questions are directly derived from the three 10 CFR 50.59(a)(2) criteria involving an unreviewed safety question (USQ), and follow the guidance of NSAC-125[6] (Ref. 5.23). If any of these seven questions is answered "Yes," then the proposed activity involves a USQ and NRC approval is required prior to implementing the activity.

The remaining two questions of this portion of the LBIE involve the Fire Protection Plan (FPP) and the QA Program. If the proposed activity involves a change to either of these programs, further evaluation is required: The questions concerning the FPP and the QA Program were

[6] PG&E recognizes that the NRC is continuing to evaluate NSAC-125 and its compatibility with the 10 CFR 50.59 regulations. In the interim, PG&E has provided guidance to LBIE preparers reflecting the NRC's position.

added to this section of the LBIE because these programs are contained in the FSAR Update and a consolidated evaluation of FSAR Update programs was deemed effective.

Completed LBIEs are presented to the PSRC for discussion, review, and recommendation regarding approval. The plant manager then approves the LBIE before the proposed activity can be implemented. The Nuclear Safety Oversight Committee (NSOC) also is responsible for reviewing the 50.59 Safety Evaluation section of LBIEs to verify that the USQ determination was correctly performed. A summary report of 10 CFR 50.59 evaluations is periodically submitted to the NRC.

Processes that Implement 10 CFR 50.71(e) FSAR Updates

PG&E's process for controlling the FSAR Update is designed to ensure that the document is maintained up to date and consistent with current design, physical configuration, analyses, and operation of the facility. The current FSAR Update process is controlled procedurally by XI3.ID2, "DCPP FSAR Update Revision and Maintenance" (Ref. 1.79).

The format and content of the FSAR Update comply with Revision 1 of Regulatory Guide 1.70. PG&E's commitment to this regulatory guide establishes the primary elements of the licensing bases.

The FSAR Update process complies with 10 CFR 50.71(e). Consistent with these requirements, PG&E files a revision to the FSAR Update applicable to DCPP Units 1 and 2 within six months following completion of each Unit 2 refueling outage, with the interval between revisions not to exceed 24 months. As specified in 10 CFR 50.71(e), the revision to the FSAR Update includes the effects of:

(1) All changes, permanent or temporary, made in the plant or plant procedures as described in the FSAR Update

(2) All safety evaluations performed by PG&E since the previous revision to the update, either in support of issued license amendments or in support of the conclusion that the change did not involve an unreviewed safety question

(3) All analyses of new safety issues performed by or on behalf of PG&E at the NRC's request since the last revision to the update

The FSAR Update process (Ref. 1.79) specifies that individuals have the responsibility to initiate an FSAR Update Change Request if they are aware of any of the above items that would require a change to the information presented in the FSAR Update or if they are aware of an apparent deviation from the information presented in the FSAR Update that is discovered in the plant, procedures, or associated documentation.

The origin of FSAR Update Change Requests has direct ties to the following processes:

(1) The Design Control Process (CF3.ID9, Ref. 1.26; CF4.ID3, Ref. 1.36)

(2) The Procedure Control Process (AD1, Ref. 1.1)

(3) The LBIE Process (TS3.ID2, Ref. 1.74)

(4) License Amendments/Technical Specifications Change Process (XI3.ID1, Ref. 1.78)

(5) Coordination of Safety-Related Analytical Work Performed by Vendors (TS3.ID1, Ref. 1.73)

The documentation that is developed as a part of these processes typically serves as the basis for the FSAR Update changes.

In addition to individual items that are identified as part of the above-noted change processes, the FSAR Update process assigns organizational ownership for each FSAR section and specifies that reviews be performed on a scheduled basis to identify inconsistencies and needed changes. These FSAR section owners also are responsible for reviewing the requested changes submitted by others. This provides a secondary means of identifying and validating necessary changes.

The FSAR is available to the DCPP organization in two formats: (1) controlled hardcopies, and (2) an electronic version. The electronic version shows pending FSAR changes developed since the last formal revision submitted to the NRC.

Processes that Implement 10 CFR 50, Appendix B

The Quality Assurance (QA) program at DCPP implements the requirements of 10 CFR 50, Appendix B for the safety-related aspects of design, procurement, modification, operation, maintenance, and support activities associated with DCPP. Elements of the QA program also are applied to nonsafety-related items and activities based on their potential to affect safe and reliable plant operation.

The QA program is described in Chapter 17 of the FSAR Update, and is implemented in many DCPP procedures.. The QA program is defined in OM5 (Ref. 1.54). This program has been established in accordance with the requirements of 10 CFR 50, Appendix B. While the processes that implement the QA Program have evolved with organizational changes over the years and the program itself has been enhanced, procedures have been in place to ensure compliance with the requirements of 10 CFR 50, Appendix B, since the regulation was promulgated in 1970. Table 1 identifies the PG&E Program Directives that implement the QA program. Specifically, this table identifies the 18 criteria associated with 10 CFR 50, Appendix B, and identifies the Program Directives that implement each criterion. This table is maintained as part of Procedure OM5 (Ref. 1.54).

The majority of the processes that implement the QA program, particularly those that relate to design and procedure control, were described in the earlier part of this subsection. The processes that implement corrective actions and audits are described in Section (d), Processes for Problem Identification and Resolution.

TABLE 1

MATRIX OF 10 CFR 50, APPENDIX B CRITERIA AND PROGRAM DIRECTIVES

Program Directives / CRITERIA		AD 1	AD 2	AD 3	AD 4	AD 5	AD 7	AD 9	AD 10	AD 13	CF 1	CF 2	CF 3	CF 4	CF 5	CF 6	MA 1	MA 2	MA 3	OM 1	OM 4	OM 5	OM 7	OP 1	OP 2	TS 2
I.	Organization																			■						
II.	Quality Assurance Program																					■				
III.	Design Control										■	■	■	■	■	■										
IV.	Procurement Document Control							■																		■
V.	Instructions, Procedures and Drawings	■	■				■																			
VI.	Document Control			■																						
VII.	Control of Purchased Material				■			■							■											■
VIII.	Identification and Control of Materials, Parts and Components										■				■										■	
IX.	Special Processes																		■							
X.	Inspection					■																				
XI.	Test Control									■																
XII.	Control of Measuring and Test Equipment																	■								
XIII.	Handling, Storage, and Shipping														■											
XIV.	Inspection, Test and Operating Status					■				■	■						■						■	■	■	
XV.	Nonconforming Materials, Parts or Components																						■			
XVI.	Corrective Action																						■			
XVII.	Quality Assurance Records								■																	
XVIII.	Audits																				■					

Other Potential Impacts to the Design Bases

In addition to the key change processes described above, it is important to note how PG&E controls the more subtle forms of changes in a manner that maintains consistency with the design bases. Some examples of the more subtle forms of changes and the controls that PG&E employs to prevent any adverse impacts are described here.

(1) Operator Work Arounds

Operator work arounds are activities required to compensate for design or maintenance problems (e.g., operation with control rods in manual instead of automatic due to equipment problems). Operator work arounds are tracked by the Operations director, who maintains a list of them on the plant's electronic bulletin board for viewing by plant personnel. PG&E's policy is to limit the number of work arounds by aggressive tracking, review and resolution by Engineering and/or Maintenance.

(2) Technical Specification Interpretations

Technical Specification interpretations have been used in the past to clarify requirements that could be fulfilled in different ways. These interpretations are reviewed by the PSRC and approved by the Plant Manager in accordance with Procedure XI3.ID3 (Ref. 1.143). Additionally, existing Technical Specification interpretations were reviewed recently for consistency with design and licensing bases and PG&E believes that current interpretations comply with the license.

(3) Shift and Standing Orders

Shift and standing orders provide written guidance describing an operational problem, and direct that certain operator actions be taken. Procedure OP1.DC31 (Ref. 1.144) requires that these orders be written by senior Operations management, with the involvement of applicable engineering personnel when required, to carefully control possible conflicts with the design bases. This procedure clearly specifies that such information shall not be used in lieu of approved procedures and shall not contradict approved procedures or regulatory requirements.

(4) Use of "Not Applicable" (N/A) for Steps in a Procedure

Use of N/A could lead to compromise of the design bases, if, for example, a step in the procedure is designed to ensure isolation of a redundant component before testing. On the other hand, use of N/A for procedure steps has been used for years as a means to select only the applicable parts of a test that cover many aspects of a system or component. The use of N/A for procedures is controlled by AD2.ID1 (Ref. 1.138). Use of N/A is only allowed under the following circumstances: (1) steps that are specifically indicated as not being always required; and (2) actions or conditions called for already exist, or plant/equipment conditions are such that the step clearly does not apply, and the reason for the N/A and unexpected actions or conditions are evaluated by the shift foreman.

(5) Formal Communications

Formal communications consist of written instructions that may be used to coordinate the use of multiple procedures, other work documents, or to direct simple operations evolutions for which no procedure exists. Formal communications must be approved by the shift foreman, who holds an SRO license. Formal communications may not be used in lieu of procedures, or in situations of such complexity or safety significance that an approved plant procedure is required. The Operations senior engineer periodically reviews the formal communication log to determine the need for a procedure. Formal communications are controlled in accordance with Procedure OP1.DC12 (Ref. 1.128).

PG&E is aware that these activities could, if not properly controlled, lead to inadvertent design basis changes. These activities have, therefore, been addressed in procedures and require the appropriate level of supervision and management control. PG&E also relies on qualified, knowledgeable individuals to be aware of configuration control requirements in avoiding other inadvertent changes to the design bases.

Training

Knowledgeable, well-qualified personnel are required to implement even the best processes for maintaining and operating the plant in a manner that maintains design and configuration control. PG&E has provided significant training in many areas related to design bases and configuration management to improve awareness of the design bases and to qualify personnel who are involved with design bases.

Engineering personnel who are involved in the design and configuration control processes are trained in accordance with the Engineering Support Personnel (ESP) Training Program (TQ2.ID10, Ref. 1.140), which is accredited by the National Academy for Nuclear Training. This training program consists of orientation, position-specific, and continuing training.

ESP orientation training is a nine-week course that covers nuclear power plant administration, fundamentals, systems and operations. This course contains the following content that is applicable to design and configuration control:

(1) Administration - Provides the knowledge necessary to locate and retrieve applicable documents at DCPP. (This includes a lesson on configuration management and the supporting procedures that the engineers need to use.)

(2) Fundamentals - Provides the fundamental knowledge necessary to understand how technical concepts are applied in nuclear power plants

(3) Systems - Provides the knowledge necessary to understand the (a) design bases of plant systems and (b) component function and operation and the interrelationship between the two

(4) Operations - Utilizes a combination of classroom, simulator and in-plant walkthroughs to observe integrated plant operation; improves the knowledge of equipment operation; develops an understanding of transients, accident sequences, and plant response; and instills a respect for reactor safety and the reactor core

ESP Position-Specific Training consists of completing specific knowledge and task requirements as specified in Qualification Guides for the following engineering positions:

(1) Nuclear Technical Services Engineer

(2) Reactor Engineer

(3) Inservice Inspection Engineer

(4) Nuclear Safety Engineer

(5) Licensing Basis Management Engineer

(6) Procurement Design Engineer

(7) Quality Assurance Assessment Personnel

(8) Regulatory Services Engineer

Task qualification, including on-the-job training, is completed prior to independently performing, directly supervising, or performing a final comprehensive review of the associated task.

ESP Continuing Training is designed to keep Engineering support personnel current with respect to plant modifications, procedure changes, industry and operating experience, and technical advances associated with their job functions. Subjects addressed have included, but are not limited to, the following:

(1) License Basis Impact Evaluation
(2) Design Criteria Memoranda
(3) Environmental Qualification
(4) Station Blackout
(5) FSAR Chapter 15 - Accident Analyses
(6) FSAR Chapter 8 - Electric Power
(7) Design Change Sponsorship
(8) Temporary Modifications
(9) Probabilistic Risk Assessment
(10) Plant Clearances
(11) Maintenance Rule
(12) Plant Aging Management
(13) Offsite Power Nonconformance and Actions
(14) Ten-year Inservice Testing Program
(15) Component Database
(16) License and Design Bases
(17) Prompt Operability Assessments
(18) Design Changes
(19) Industry Events
(20) Procedure Changes

Collectively, this ESP training provides sufficient information to personnel so that they are aware of and know how to maintain the design bases.

Personnel who prepare and review safety-related procedures are qualified through procedure qualification training and safety evaluation training in accordance with TQ1.ID10 (Ref. 1.68). This includes Engineering, Operations, and Maintenance personnel.

Overall Effectiveness of Change Processes

Design Change Process Internal Assessments

PG&E's internal Quality Assurance audits have examined extensively the effectiveness and the results of the design change processes. From 1989 to the present, these examinations have primarily included the performance of "vertical-slice" Safety System Functional Audit and Reviews (SSFARs) and Safety System Outage Modification Inspections (SSOMIs). PG&E's SSFAR and SSOMI programs are discussed in more detail in Section (d), Processes for Problem Identification and Resolution. Since 1988, five SSFARs and 13 SSOMIs have been performed. The results of these audits have demonstrated a continually improving trend relative to the implementation of design changes and have determined that these processes currently are programmatically sound.

One of the early SSOMIs (Ref. 2.6) identified the need for improvement in the areas of the interface between the departments involved in design changes, design reviews and verification, design change installation, and turnover to operations. Subsequent SSOMIs (Refs. 2.12 and 2.17) recognized that corrective actions and recommendations from previous SSOMIs had led to noticeable improvements in the implementation of the design change process. The results of a more recent SSOMI (Ref. 2.25) assessment have shown a continuing improvement in the clarity, completeness, and quality of design change packages developed by Engineering. Specific improvements noted by the SSOMI teams include the level of detail addressed in the safety evaluations, the extent of documentation of engineering judgment, and the documentation of the design change technical evaluations. Also, the high level of technical knowledge of Engineering personnel has been repeatedly recognized by the SSOMI teams. Occasionally, a SSOMI team has identified issues during the design phase of the assessment that have resulted in the delay of the design change to a subsequent outage. Such was the case with the Boron Injection Tank Removal design change and the changeout of the 4-kV safety-related breakers. For the most part, however, corrective actions taken to address the SSOMI teams' findings, comments, and concerns have been successful in enabling the implementation of the design change to proceed as scheduled.

In addition to QA audits, several self-assessments have examined the design change process. The 1992 to 1993 DCPIP carefully examined existing processes, benchmarked other organizations, and surveyed users. While the primary purpose of the DCPIP was not to assess the adequacy of the design change process, it did examine the processes closely and concluded, "The existing design change process at DCPP was found to be effective, but not as efficient as desired" (DCPIP Final Report, Ref. 4.5).

In 1994, the Unit 1 sixth refueling outage "installation" SSOMI (Ref. 2.27) focused on the use of the new (introduced in late 1993) minor modification design change vehicle (AT-MM AR) and identified concerns about how it was being used and the potential reduction in involvement by organizations potentially impacted by operational and maintenance considerations. Corrective actions were identified and implemented for these findings.

The March 28, 1996, Engineering Self-Assessment (Ref. 2.40) examined work performed in 1995 and identified a number of problems in the areas of procedural adherence, scope control, and configuration management related to the AT-MM AR design change process. The self-assessment findings were consistent with the 1994 SSOMI previously mentioned (Ref. 2.27). To address these findings, the AT-MM AR procedure has been refined, a process owner to monitor AT-MM AR process health has been appointed, and training has been performed to address the issues identified in this assessment.

A subsequent QA Technical Support Outage Assessment (TSOA) performed for the Unit 2 seventh refueling outage from April to June of 1996 (Ref. 2.33), has followed up and noted significant improvement in AT-MM AR usage. This TSOA evaluated 33 AT-MM ARs for the Unit 2 seventh refueling outage, and found them to be well documented, technically sound, and in compliance with procedural requirements.

Design Change Process External Assessments

Numerous NRC inspections have assessed the design change process over the last seven years. In the 1989 to 1990 time frame, there was an inspection focus on the design change process. NRC Inspection Report 90-23 (Ref. 3.33) summarized a number of the inspections that were performed and "*noted progress in ... areas such as the system design criteria documents, the QA system audits, and the increased communication between design and system engineering.*" The same inspection report noted that the inspectors would continue to emphasize the role of Engineering and the design change process in future inspections.

Subsequent NRC inspections have continued to assess the design change process on a regular basis. Inspections of design change packages and products include 91-11 (Ref. 3.5), 92-30 (Ref. 3.16), 92-31 (Ref. 3.17), 93-26 (Ref. 3.25), and 95-06 (Ref. 3.45). NRC Inspection Report 91-11 (Ref. 3.5) identified that "*Within the design change process, communication between [PG&E's] onsite and corporate design personnel appeared to be less than adequate....*" The same inspection report also indicated that "... *the design change process appeared to have an adequate procedural structure.*"

Inspection Reports 92-30 and 92-31 (Refs. 3.16 and 3.17) reviewed emergency diesel generator and RHR system design change packages, respectively, and found them to be acceptable. Inspection Report 93-26 (Ref. 3.25) shows evidence of a thorough examination of the design change process, including proper consideration of 10 CFR 50.59 reviews, FSAR Update changes, testing specifications, operating and testing procedure updates, and training revisions. This same report concluded that "*The licensee had also implemented appropriate process and* *procedure control through engineering and design process control, Quality Control and Quality Assurance oversight, review, and independent verifications.*"

A recent Inspection Report, 96-20 (Ref. 3.46), provided a positive indication that the design change process is working well. Regarding the 4160-V system, the NRC stated that the "*current design and testing of the 4160 V vital AC power system is in conformance with the FSAR [Update] and plant [Technical Specifications]. The licensee has been proactive in identifying and correcting degraded conditions and system design deficiencies. Engineering, operations, and maintenance staffs have demonstrated the ability to coordinate efforts in the implementation of design changes and problem resolution.*" The NRC also stated that "*the system engineer was very knowledgeable on both [4160 V] system requirements and component design basis.*"

Inspection Reports 90-23 (Ref. 3.33), 91-11 (Ref. 3.5), and 94-03 (Ref. 3.44) have noted the effectiveness of Quality Assurance audits in evaluating the design change process and in identifying significant issues.

Design Change Process Effectiveness Summary

PG&E believes that the design change processes have been and are functioning adequately in maintaining design and configuration control. Considering that many thousands of design changes have been processed over the operating life of the plant, the number of identified problems have been relatively few. Some of these problems have been significant, but they have not rendered a system incapable of performing its intended safety function or indicated a serious programmatic deficiency. The problems that have been identified have been or are being evaluated and resolved as part of the Problem Resolution Process, which is discussed in Section (d), Processes for Problem Identification and Resolution.

Procedure Change Control Process Internal Assessments

Internal Quality Assurance audits have examined the effectiveness of the procedure change control process by evaluating the consistency of operating, maintenance, and testing procedures with design bases and by reviewing the products and results of the design change processes as part of the SSFARs and SSOMIs discussed in Section (d), Processes for Problem Identification and Resolution. These audits have generally not expressed concerns with the defined procedure change control process. They have, however, noted problems associated with implementation that have resulted in inconsistencies between operating, maintenance, and testing procedures and the design bases. Corrective actions have focused on attention to detail, training, and work prioritization. Procedure adjustments have also been made to help resolve implementation issues.

Self-assessments performed have not identified specific issues related to the procedure change control process.

Procedure Change Control Process External Assessments

NRC inspections have not typically focused on the direct examination of the procedure change control process itself, but they have routinely examined procedures for any problems that exist. Over the past five years, NRC inspections have identified a number of instances involving inconsistencies of procedures with design and licensing basis documents, lack of needed procedural guidance, and inappropriate procedural guidance. NRC Inspection Report 91-11 (Ref. 3.5) identified two Emergency Operating Procedures (EOPs) that were revised to document a changed setpoint, before a technical basis was provided. Inspection Report 96-21, (Ref. 3.24) recently identified a failure to perform a 10 CFR 50.59 review for a change to Emergency Operating Procedure E-1.3.

The number of procedure change control problems identified in NRC inspection reports have been few and have not identified serious programmatic issues. Often, the precise cause is not immediately apparent, but on occasion it has been noted to be a lack of timeliness in incorporating changes and a failure to perform required reviews. In most cases, the problems have been implementation issues and not process definition issues.

Procedure Change Control Process Effectiveness Summary

The procedure change control process has the necessary attributes to ensure that procedures remain consistent with the DCPP design and licensing bases. Although occasionally PG&E has not correctly implemented all aspects of the procedure change control process, PG&E believes that this process is fundamentally sound and that the processes for problem identification and resolution described in Section (d), Processes for Problem Identification and Resolution, identify and correct the problems that occur.

10 CFR 50.59 (LBIE) Process Internal Assessments

Internal Quality Assurance audits have examined the effectiveness of the 10 CFR 50.59 (LBIE) process as part of performing the SSFARs and SSOMIs that were previously discussed. The SSOMI results from the Unit 1 fifth refueling outage (Ref. 2.17) stated, "*specific improvements noted by the audit team included the level of detail addressed in the safety evaluations.*" This has been a repeated SSOMI observation for audits of design change packages.

In the Unit 1 sixth refueling outage SSOMI, (Ref. 2.27), two Field Change notices were identified as having been used in such a manner that they resulted in a design change that was not evaluated in accordance with the requirements of 10 CFR 50.59. In the same audit, several problems were identified with the accuracy and completeness of safety evaluations performed by Westinghouse. This was an increase in the number of 10 CFR 50.59 safety evaluation issues identified compared to prior SSOMIs. Corrective actions have been identified and implemented for these findings. Subsequent TSOAs for the Unit 1 seventh refueling outage and the Unit 2 seventh refueling outage (Refs. 2.31 and 2.33) did not find deficiencies with 10 CFR 50.59 safety evaluations, and the TSOA for the Unit 2 seventh refueling outage reviewed Field Changes and found that they were being used appropriately.

A DCPP Engineering Self-Assessment in early 1996 (Ref. 2.40) performed an in-depth review of a sample of five safety evaluations associated with design change packages and concluded that the LBIEs were technically correct and appropriate.

A Quality Assurance audit (Audit 962700005, Ref. 2.48) was performed in December 1996 to examine 10 CFR 50.59 evaluations in operations procedure revisions. This audit was requested by the Operations director as an action related to evaluating the results of NRC Inspection Report 96-21 (Ref. 3.24), which identified the failure to perform a required 10 CFR 50.59 evaluation for an Emergency Operating Procedure (EOP) E-1.3 change. The results of this audit have not identified significant issues with the defined procedure change process or its linkage to the LBIE process, but have identified instances of incorrect implementation of process requirements. The results of this audit are being further evaluated as part of an NCR (N0002003, Ref. 5.63) that has been initiated to address the EOP E-1.3 issue and as part of another NCR on the LBIE process (N0002008, Ref. 5.25).

10 CFR 50.59 (LBIE) Process External Assessments

NRC inspections continually examine the implementation of 10 CFR 50.59 requirements in design changes and operations, maintenance, and testing activities.

In the past, there have been instances where 10 CFR 50.59 evaluations have not been properly performed. Inspection Reports 93-11 (Ref. 3.47) and 93-14 (Ref. 3.48) identified a change to the post-LOCA sampling system capabilities that did not receive such an evaluation. Inspection Report 96-06 (Ref. 3.49) identified that a safety evaluation had not been performed prior to departure from core offload practices as described in the FSAR Update. As mentioned earlier, Inspection Report 96-21 (Ref. 3.24) identified a change to Emergency Operating Procedure E-1.3 without a proper 10 CFR 50.59 evaluation.

During past NRC inspections, the NRC reviewed many 10 CFR 50.59 evaluations and found them to be acceptable. NRC Inspection Report 91-11 (Ref. 3.5), which reviewed the Unit 1 fourth refueling outage Design Change Packages, concluded that the 10 CFR 50.59 evaluations performed for the modifications "*... appeared to be adequate.*" In Inspection Report 93-26 (Ref. 3.25), the NRC inspector concluded, based on a review of 10 CFR 50.59 evaluations, that PG&E had performed the evaluations and that they "*... were technically correct.*" Inspection Report 93-32 (Ref. 3.6) contained an extensive review of 10 CFR 50.59 evaluations prepared for design changes, and concluded that "*in general, a good program had been established with good* *engineering support of activities*" and that PG&E "*produced timely and technically sound 10 CFR 50.59 reviews.*" In Inspection Report 95-06 (Ref. 3.45), the NRC observed engineering activities associated with the design change for replacing safety injection Pump 2-2 and stated that the "*safety evaluations ... appeared to have appropriately addressed the complex issue.*"

10 CFR 50.59 (LBIE) Process Effectiveness Summary

PG&E believes that 10 CFR 50.59 safety evaluations have, for the most part, been adequately performed in accordance with NRC regulations and NPG procedures. There have been some instances in which 10 CFR 50.59 safety evaluations have not been properly or formally performed. PG&E believes that they have been relatively few in number and have not resulted in a USQ. As a result of the recently identified instances where 10 CFR 50.59 evaluations have not been performed as required[7], as previously mentioned, PG&E has issued an NCR (N0002008, Ref. 5.25) to further evaluate this situation and identify corrective actions to resolve this weakness. PG&E already plans to perform additional training in the 10 CFR 50.59 area to raise awareness of the importance of safety evaluations. This is discussed further in the section on "Conclusions and Future Actions."

10 CFR 50.71(e) (FSAR Update) Process Internal Assessments

During 1988 and 1989, reviews of the FSAR Update were performed by Design Engineering and System Engineering to ensure compatibility with the design bases and to ensure appropriate implementation of FSAR design requirements in plant procedures. While these efforts resulted in some improvements in the quality of the FSAR Update at that time, some inaccuracies that had been in the FSAR Update since its inception in 1984 were not fully corrected (Refs. 5.1 and 5.16).

In 1996, as a result of findings at Millstone and FSAR Update inconsistencies identified in NRC Inspection Report 96-06 (Ref. 3.49), PG&E initiated an effort to find and correct inaccuracies in the DCPP FSAR Update. Many inaccuracies were found and most were corrected in Revision 11 of the FSAR Update, issued in November 1996. The remainder will be addressed in a supplemental FSAR Update in April 1997. These inaccuracies were reviewed at the time they were found and were determined not to be safety significant. Process improvements in the form of enhanced periodic training of NPG engineers, communication of management expectations regarding FSAR Update document quality, and improved procedural guidance were also developed and implemented in 1996 to address this issue.

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[7] Emergency Operating Procedure E-1.3, on switchover to cold leg recirculation, was revised without adequate 10 CFR 50.59 evaluation of certain design basis timing assumptions. This problem was the subject of a Notice of Violation issued by the NRC on January 9, 1997, based on findings identified in Inspection Report 96-21 (Ref. 3.24).

As a result of a finding from the 1996 Engineering Self-Assessment (Ref. 2.40), an "FSAR Update Process Owner" was assigned to provide for better awareness of FSAR Update requirements and to monitor the health of the process.

Late in 1996, as a result of continuing emphasis on FSAR Update accuracy at a greater level of detail, PG&E initiated further reviews of the FSAR Update from an operations perspective. The initial phase of this review was completed in December 1996. The results were screened to ensure that identified discrepancies did not require near-term actions. The discrepancies were found to be minor. At this time, this review effort is approximately 50 percent complete. Approximately seven procedures and eight FSAR Update paragraphs have been identified as needing revision.

10 CFR 50.71(e) (FSAR Update) Process External Assessments

The FSAR Update has been reviewed periodically as part of NRC inspection activities. In inspection reports over the past few years, the NRC has noted that it has reviewed the FSAR Update relevant to areas inspected and has not identified discrepancies. There also were some instances where discrepancies were noted.

NRC Inspection Report 96-06 (Ref. 3.49) identified a number of instances where design information was not consistent with the FSAR Update. These included DCM information and license amendment information that had not been reflected in the FSAR Update. In Inspection Report 96-21 (Ref. 3.24), addressing the issue on Emergency Operating Procedure E-1.3, the NRC also identified discrepancies with the FSAR Update.

While the discrepancies noted have been determined to be not safety significant, PG&E believes that additional efforts in this area will be required to address any remaining inconsistencies.

10 CFR 50.71(e) (FSAR Update) Process Effectiveness Summary

PG&E recognizes that in the past certain information in the FSAR Update has not been maintained entirely current and compatible with design documents and procedures. However, PG&E believes that the safety significant design basis information in the FSAR Update has been adequately maintained. PG&E also believes that its current process for maintaining the FSAR Update is adequate.

PG&E realizes the importance of maintaining an accurate FSAR Update and is planning additional review efforts to further enhance and ensure the accuracy of information contained therein. PG&E has committed to participate in the Nuclear Energy Institute (NEI) Licensing Basis Initiative (NEI 96-05) and will use this effort, in part, to determine the extent of further reviews. Planned future efforts in this area are further discussed in the section entitled "Conclusions and Future Actions."

Summary Conclusions

Based on a review of its current design and configuration control processes, PG&E believes that they collectively contain the necessary attributes to properly maintain engineering design and configuration control. The design control processes provide for: (1) the proper recognition and evaluation of design changes to ensure that the integrity of the design bases is maintained; (2) the communication of design change impacts to operating, maintenance, testing, and other support organizations; and (3) the incorporation of the change impacts into the documentation affected. Procedure change processes require the review of the design basis and licensing basis documents for procedure changes that are made to ensure that consistency with the design and licensing bases is maintained. In addition, PG&E's processes specifically require the implementation of 10 CFR 50.59, 10 CFR 50.71(e), and 10 CFR 50, Appendix B requirements.

PG&E recognizes that the recent issue with EOP E-1.3 has identified a need to further evaluate the LBIE process, and is committed to take appropriate corrective actions. PG&E is also committed to a further review of the FSAR Update to identify remaining inaccuracies. PG&E is confident that these actions will result in further improvements to existing documents and processes.

Based on examination of internal QA audits and assessments and NRC inspection reports, PG&E believes that its processes are being implemented in an acceptable manner to maintain design and configuration control. Some implementation problems have been found and it is expected that some problems will be identified in the future. PG&E has and will continue to evaluate problems that occur and take corrective actions to resolve the specific problems and to strengthen the processes. Overall, PG&E believes that its processes have been and continue to be effective in maintaining design and configuration control.

(b) DESIGN BASIS TRANSLATION TO OPERATING, MAINTENANCE AND TESTING PROCEDURES

This section provides PG&E's response to the following NRC request:

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

Introduction

PG&E believes that design basis requirements have been properly translated into the appropriate plant operating, maintenance, and testing procedures. This belief is based upon the following factors:

(1) The procedures were originally developed by experienced PG&E personnel who had operated Humboldt Bay nuclear plant and had interacted with Engineering and the NSSS supplier during the initial DCPP design, providing good consistency with the design bases.

(2) Technical Specifications and Equipment Control Guidelines (ECGs) reflect the design bases, have been thoroughly reviewed against the bases, are used as a primary input to operational activities, and are well-understood by Operations personnel.

(3) The change control processes contain the necessary attributes to maintain the consistency between procedures and design basis requirements.

(4) The Design Criteria Memoranda (DCM) enhancement and Setpoint programs have reviewed operating, maintenance, and testing procedure consistency with the appropriate design basis information.

(5) Extensive audits and assessments of operating, maintenance and testing activities have been performed, and confirm that the processes have been generally effective in maintaining consistency between procedures and design bases.

The following topics are discussed to support the rationale that design basis requirements have been properly translated into procedures:

(1) The original operating, maintenance and testing procedure development process

(2) Technical Specifications and ECGs

(3) Review of procedures against the design bases

(4) Procedure change control processes

(5) Training

(6) Overall effectiveness of design basis translation

Original Procedure Development

This subsection describes the original development of procedures for operations, surveillance testing, and maintenance[8]. Personnel experienced with the operation of the Humboldt Bay nuclear plant were trained with design engineering personnel and interacted with Engineering and the NSSS supplier during initial DCPP design. They used the existing design basis information in procedure preparation. This information included design documents such as electrical schematics and piping schematics, Preliminary Safety Analysis Report (PSAR), Final Safety Analysis Report (FSAR), vendor manuals, a setpoint study supplied by Engineering, and equipment acceptance tests. In short, a significant effort was made to ensure that the original procedures adequately reflected the design basis information.

The development of each of these specific types of procedures is discussed below.

(1) Development of Operating Procedures:

Key plant personnel became familiar with the design basis very early in the design of Diablo Canyon by working with PG&E Engineering and Westinghouse in the writing of the PSAR sections on operations and accident analysis, as well as in the review of the entire document prior to its submittal. Senior plant personnel also participated in early design activities, including electrical and annunciator panel design. They spent an extensive amount of time in the PG&E Engineering design office (where the majority of the original plant engineering was done), and in Westinghouse's design office reviewing design documents and operating procedure guidelines and discussing accident scenarios and control room design. Plant personnel also attended a Westinghouse design school for three months, at which a variety of design topics were addressed. These individuals then wrote system descriptions for plant systems using that information and other design information from Engineering as well as data from equipment suppliers.

[8] Much of the information in this subsection is based on discussions with personnel involved in the original operating, maintenance and surveillance testing procedure development.

Key members of the original plant staff engaged in a variety of other activities to better prepare them for their roles at DCPP. For example, two senior members spent several months at the Ginna Nuclear Station assisting in the startup using Ginna's procedures. Other members of the staff were also temporarily assigned to other pressurized water reactor (PWR) plants in various stages of startup and operation. Moreover, most operations and technical personnel trained on the simulator at Zion Nuclear Station, using Zion's procedures. Building upon the experience thus gained, coupled with the aforementioned access to Engineering, Westinghouse, and other equipment suppliers, plant-specific operating procedures were prepared for DCPP. After writing the DCPP-specific operating procedures, plant personnel conducted more sessions on the Zion simulator, testing the DCPP-specific procedures. The DCPP procedures then were revised to incorporate lessons learned from the simulator experience. They also were revised, as needed, when changes were made to the design bases or accident scenarios. Finally, they were reviewed and approved by the Plant Staff Review Committee (PSRC).

For PG&E-designed systems, the plant staff used the design information provided by PG&E Engineering and documents from equipment suppliers (including NSSS information from Westinghouse) to write the operating procedures. Originally, the Engineering department did not routinely review operating procedures, but did review them for the CCW System (the most complex of the PG&E-designed safety-related systems), to ensure that the operating procedures were in accordance with the design bases.

The DCPP plant staff who prepared and/or directed the preparation of the operating procedures had Senior Operator Licenses at Humboldt Bay Power Plant, and were qualified for DCPP cold licenses. The operating procedures were also used for conducting certain integrated pre-operational and startup tests, such as the hot functional tests, to assist in validating them.

The Construction Start-Up Group also wrote pre-operational and startup test procedures using PSAR information, as well as other design documentation provided by PG&E Engineering, Westinghouse and other equipment suppliers. The startup and pre-operational test procedures were reviewed and approved by the plant staff. After performance of the startup and pre-operational tests, the results were reviewed and approved by the plant staff. This process provided an independent check that appropriate design bases were considered and demonstrated prior to systems turnover to operations. As mentioned above, these startup tests were also available as background material for the development of the operating procedures.

After the Three Mile Island (TMI) incident in 1979, PG&E participated in the Westinghouse Owners Group (WOG) efforts to address post-TMI requirements. Existing Emergency Operating Procedures (EOPs) were revised, and additional procedures were written to incorporate lessons learned from TMI, and to implement WOG emergency operating procedure guidelines and function restoration guidelines. This process incorporated plant-specific design basis information into the generic guidelines. Also, the WOG EOP bases were controlled, and were subject to PSRC review.

(2) Development of Surveillance Test Procedures:

10 CFR 50.36 specifies requirements for Technical Specifications, which include Safety Limits, Limiting Safety Systems, Limiting Conditions for Operation, Surveillance Requirements, Design Features, and Administrative Controls. The initial Technical Specifications effort resulted in "custom" specifications which were developed by qualified engineers on the plant staff working with the NSSS vendor and the PG&E Engineering department. This work was conducted in concert with the operating procedure development effort described above.

In the late 1970s, the NRC initiated efforts to shift to vendor Standard Technical Specifications (STS) as opposed to the custom specifications previously mentioned. Diablo Canyon was one of the initial plants selected for STS implementation, and extensive development and review work was conducted between the plant staff engineers, the PG&E Engineering department, the NSSS vendor, and the NRC to ensure that the DCPP specifications properly reflected the design and design bases. In some cases it was later determined that certain values in the specifications were not consistent with design basis requirements (such as in the case of emergency diesel generator fuel oil volume). However, such inconsistencies were corrected during the reviews as part of the Design Criteria Memoranda (DCM) enhancement program. The Diablo Canyon STS were reviewed by the PSRC, the PG&E Engineering department, and the NSSS vendor numerous times during the STS development.

In parallel with this STS development work, Surveillance Test Procedures (STPs) were prepared to satisfy the STS surveillance requirements and were reviewed by the PSRC. While some of the bases for these STPs were documented, there were instances where they were not, or where they were not maintained in the permanent plant records. However, such instances were corrected as part of the subsequent STP Bases reconstitution effort in the early to mid-1990s.

The Technical Specifications were included in the Design Verification Program (DVP) review, and a few changes to the Technical Specifications were required as a result of this verification program. Technical Specifications and surveillance test procedures have been the subject of many reviews and improvements over the years, such as the Westinghouse Technical Specifications Improvement Program. Although there have been a few minor problems with the Technical Specifications and STPs, experience gained by their use, as well as numerous audits of their effectiveness, have demonstrated that they properly reflect the significant design basis information.

(3) Development of Maintenance Procedures:

Maintenance procedures were developed by the plant staff using design information provided by PG&E Engineering personnel and by the equipment suppliers (e.g., the operations and maintenance manuals) to properly incorporate design basis requirements into the maintenance procedures. Equipment suppliers were contacted as necessary for supplemental information. The procedures also implemented recommendations from various industry sources (e.g., INPO, EPRI, and NRC bulletins and information notices), and incorporated established PG&E maintenance practices.

Technical Specifications and ECGs

The Technical Specifications are one of the primary documents used by plant operations personnel in the performance of operations activities. The Technical Specifications address the key systems and components in the plant, and define their functional and performance requirements. The Technical Specifications were derived from the analyses and evaluations contained in safety analysis reports, which are in turn consistent with plant design bases. The Technical Specifications provide significant input to operational decisions, and limit system operation, configuration, and performance. Thus the extensive use of the Technical Specifications by operations provides assurance that operations procedures and activities are within the design bases.

The surveillance test requirements specified in the Technical Specifications, and the corresponding test acceptance criteria, help ensure that safety-related equipment is capable of performing its intended safety functions.

The Limiting Conditions for Operation defined in the Technical Specifications provide insight into the importance of equipment in overall plant operation, and help define the potential contribution of that equipment to plant safety risk.

In addition to the Technical Specifications, PG&E has developed and uses ECGs. The ECGs provide administrative controls and operability requirements for selected equipment not addressed by the Technical Specifications. The ECGs are also developed when controls are required by regulatory commitments. Also, Technical Specifications that have been relocated to licensee-controlled documents, in accordance with the NRC's Final Policy Statement on technical specification improvements, are generally transferred to the ECGs.

Similar to the Technical Specifications, the ECGs provide operability requirements, action statements, and surveillance requirements. The preparation and revision process for ECGs requires evaluation under the 10 CFR 50.59 safety evaluation guidelines. ECGs are reviewed by the PSRC and are approved by the DCPP plant manager. ECGs provide another means of ensuring operation within the design bases.

PG&E has also developed the outage safety scheduling program (AD8.DC55, Ref. 1.146) to minimize shutdown risk during DCPP plant outages, when Technical Specifications requirements do not apply for some safety-related equipment. The program identifies higher-risk activities and periods prior to entering an outage, so that comprehensive analyses can be performed and measures taken to optimize the availability of safety systems and electrical power sources. The fundamental goals for shutdown risk reduction are:

(1) To minimize the time at reduced inventory and mid-loop operation, and other higher risk evolutions

(2) To optimize the pathways for adding water to the reactor coolant system

(3) To optimize the availability of safety systems

(4) To optimize the availability of electrical power supplies

(5) To maximize work on safety systems during periods when the core is off-loaded, except for those systems required for spent fuel pool cooling

Contingencies are factored into the outage safety schedule such that a conservative level of equipment availability exists during high-risk periods. In some cases, this provides a margin between planned equipment availability and that required by Technical Specifications and the ECGs with regard to the safety functions of reactivity control, reactor coolant system inventory control, decay heat removal capability, containment capability, and electrical power availability.

This program incorporates recommendations from NEI, INPO, industry experience, and DCPP lessons learned. The program provides another level of assurance that DCPP remains within its design bases.

Review of Procedures Against Design Bases

From 1989 to the present, there have been a number of reviews that have helped confirm the consistency of operating, maintenance, and testing procedures with the design bases. This subsection describes these reviews. The majority have been associated with the Configuration Management Program (CMP), which was initiated in 1989, and with the related effort known as the DCM enhancement program (Refs. 5.1, 5.2)

As part of general program improvements that were implemented as part of the CMP, the following reviews were performed:

(1) A list of selected mechanical and electrical maintenance procedures that required consideration of design basis information was identified by the Maintenance organization, and was reviewed and adjusted by Engineering (Refs. 5.10 and 5.11). Design basis information is procedurally required to be considered when developing procedures, including maintenance procedures (Ref. 1.2)

(2) Plant surveillance procedures associated with the CMP draft pilot DCMs were reviewed by System Engineering to ensure that they reflected the appropriate design-basis functions and that these functions were demonstrated (Ref. 5.9).

In addition, a number of reviews were performed as part of the DCM enhancement program, between 1989 and 1994. Section (f), Design Basis Review and Documentation Program, provides a more detailed discussion of this program.

Specific reviews that were performed as part of the DCM enhancement program to verify the consistency of operating, maintenance, and testing procedures included:

(1) The enhanced DCMs received informal reviews from various groups. These reviews are now controlled by procedures (Ref. 1.20), which require that new or revised DCMs be reviewed to ensure that pertinent design basis information is translated into appropriate plant procedures.

(2) The Surveillance and Maintenance Requirements (SMRs) are the system, component, and structure functions and features that must be maintained and/ or demonstrated through test, inspection, or maintained in conformance with the design bases. The SMR requirements contained in many DCMs have been reviewed by the System Engineering group at DCPP. These reviews, which are now procedurally controlled (Ref. 1.20), are required to be documented on SMR review forms. The reviews ensure that there are tests, inspections, or maintenance procedures to verify the appropriate design basis requirements defined in the DCMs. As a result of these reviews, some tests and procedures

were required to be written or revised. The reviews that were conducted showed that very few tests and procedures needed to be prepared or revised, thus demonstrating that there was already good consistency between the procedures and the design bases. At the present time, the reviews have not been completed for all DCMs, and are currently ongoing. They are scheduled for completion during the first half of 1997. This initiative is discussed further in the section, "Conclusions and Future Actions."

(3) Selected operating, emergency operating, and annunciator response procedures were reviewed to ensure that they were consistent with the design bases contained in the enhanced DCMs. Initially, this was done for three systems (safety injection, component cooling water, and 4160V) and subsequently for another three systems (residual heat removal, auxiliary feedwater, and backup air/nitrogen supply) (Refs. 5.14, 5.15). The original plan to review more DCMs was discontinued because there were no significant findings for the systems that were reviewed.

The following additional reviews were conducted in developing this submittal.

(1) The Surveillance and Maintenance Requirements for four current DCMs (reactor coolant system, nuclear instrumentation system, plant protection system, and remote shutdown system), and for the Eagle 21 process protection system Safety Evaluation, were reviewed against Instrumentation and Controls surveillance and testing procedures. The purpose of the review was to determine if appropriate surveillance requirements were included in the procedures. The procedures were found to adequately address the SMR requirements.

(2) Operating, emergency operating, and annunciator response procedures were reviewed against the design bases contained in the enhanced DCMs for the residual heat removal (RHR) and emergency diesel generator (EDG) systems. The purpose of the review was to determine if appropriate design basis information contained in these DCMs was reflected properly in the operating procedures. As a result of this review, no safety-significant discrepancies were identified, but it was determined that additional reviews would be of value. These are discussed in the section, "Conclusions and Future Actions."

Setpoint Program

Additional assurance of consistency between operating and maintenance procedures and the design bases is gained through the setpoint program. Procedures exist (Refs. 1.42, 1.43, 1.135) to ensure the control of plant setpoints, including the identification of the setpoints to be controlled, the necessary organizational responsibilities and interfaces, calculation methodologies, setpoint change control, and maintenance of setpoint information. The overall objectives of the setpoint program are to ensure that safety systems operate within their design bases and to prevent unnecessary challenges to safety and nonsafety-related systems that could degrade overall plant performance and reliability. These objectives are accomplished by:

(1) Establishing a consistent methodology for the calculation of setpoint values and documentation

(2) Ensuring that setpoints conform to system design basis requirements (including regulatory requirements, and commitments)

(3) Ensuring that setpoint changes are evaluated properly and controlled in a manner that supports overall plant configuration management

(4) Ensuring that setpoint values are listed, and available for use, in approved and controlled documents

A major effort in setpoint reconstitution began in 1988, as a part of the CMP, involving PG&E Engineering and Westinghouse personnel. The objective of the effort was to ensure that important setpoints were properly maintained in accordance with the plant design bases, and that appropriate calculation documentation was maintained.

The setpoint reconstitution effort consisted of:

(1) Identifying, on a system-by-system basis, the setpoints for that system

(2) Determining which of these identified setpoints were to be categorized as "engineering-controlled." Engineering controlled setpoints are setpoints that are safety-related, important to safety, or otherwise critical to system operation

(3) Determining and documenting specific design values for each engineering-controlled setpoint, via formal engineering design documentation

(4) Ensuring that these design values were properly incorporated into the plant information management system (PIMS) setpoint database

The bases required for setpoint calculations were taken from appropriate design basis documentation, such as plant calculations, NSSS information, accident analyses, vendor information, and DCMs.

The setpoint control reconstitution effort for Instrumentation and Controls and for MOVs was completed in 1996. Engineering-controlled setpoints are currently contained in the PIMS database.

Changes to controlled setpoints are processed in accordance with plant modification control requirements (Ref. 1.34), which ensures that appropriate design control measures, technical reviews, safety evaluations, and other pertinent engineering and plant staff reviews and approvals are implemented.

Inservice Testing Program

Further assurance of consistency between design bases and test procedures is gained through the implementation of the Inservice Testing (IST) Program (AD13.ID5, Ref. 1.88). As required by 10 CFR 50.55(a), Technical Specifications stipulate that Inservice testing of ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda. The development of the test requirements for the IST Program entails defining the appropriate design basis requirements for all pumps and valves within the scope of the program, and establishing the necessary test acceptance criteria to demonstrate the functional capability of the components. Design change procedures (Ref. 1.26) stipulate that changes to design basis information that could affect pump or valve testing or test results must be coordinated with the Inservice Test Program Coordinator to ensure that IST testing is in conformance with design bases.

The above programs and reviews provide improved consistency between design bases and plant operating, maintenance, and testing procedures. The change control process discussed below provides assurance that the consistency will be maintained.

Procedure Change Control Processes

This subsection describes the DCPP procedure change control processes, and how they help ensure consistency between design bases and procedures.

As described in Section (a), Design and Configuration Control Processes, change control processes maintain consistency between design bases and procedures by ensuring that changes to the design bases result in a corresponding change to procedures, and changes to procedures include a review of design bases to determine potential design basis impact. PG&E believes that its change control processes maintain consistency between the design basis requirements and the appropriate operating, maintenance, and testing procedures.

The majority of changes to operating, maintenance, and test procedures that can impact design basis consistency are the result of design changes. These design changes are initiated and controlled through the design change procedures (Refs. 1.19, 1.34, 1.35, 1.36). These procedures clearly identify necessary changes in operating, maintenance, and testing requirements brought about by a design change, and provide controls to ensure that other appropriate organizations are cognizant of such changes and make the necessary procedure changes. Required actions necessitated by such design changes are identified and tracked to ensure proper completion and closure. Change control processes were enhanced as part of the

CMP and other initiatives in the 1989 time frame to include advance coordination reviews of design changes by the organizations that were affected prior to final approval of the design changes.

For changes necessitated by reasons other than design changes, the procedure change control process requires reviews for design bases and licensing basis impacts, including the proper consideration of 10 CFR 50.59 safety evaluations (Ref. 1.74).

Other controls providing additional assurance that these processes are being implemented in a manner to maintain design basis consistency are:

(1) New and revised surveillance procedures are reviewed independently by qualified personnel who are subject matter experts (Ref. 1.3).

(2) Procedure sponsors and Independent Technical Reviewers are qualified to perform 10 CFR 50.59 reviews and are knowledgeable about design basis requirements (Ref. 1.3).

(3) Design basis information is readily accessible to operation, maintenance and test procedure writers.

(4) Cross-discipline reviews are performed when another discipline will be affected by surveillance procedure changes, and walkdowns are performed when required (Ref. 1.3).

Training

Additional assurance regarding design basis and procedural consistency is gained from the extensive programs that provide training on numerous topics for Operations, Engineering, and supervisory Maintenance personnel. This training emphasizes procedural requirements and the importance of procedural compliance.

Engineering personnel who perform activities associated with the design change processes receive Engineering Support Personnel Training as described in Section (a), Design and Configuration Control Processes. This training acquaints them with the importance and the mechanics of accurately translating design change impacts to operations, maintenance, and testing organizations.

Operators receive extensive reactor operator licensing and requalification training that exercises the normal, abnormal, and emergency procedures in the classroom and on a simulator that is continually updated to reflect the design of the plant. Discrepancies are fed back to the procedure group for evaluation and incorporation. Feedback is also provided on shift when procedural discrepancies are identified.

Procedure sponsors and personnel who perform independent technical reviews of procedures are appropriately trained in procedure development and change activities, Licensing Basis Impact Evaluation (LBIE) screening, and safety evaluations as described in Section (a), Design and Configuration Control Processes. This training applies to Operations, Maintenance, and Engineering personnel.

Overall Effectiveness

This subsection describes the consistency between design bases and procedures as measured by various audits and assessments. Internal and external audits and assessments are discussed separately. Internal activities include QA audits, Safety System Functional Audit and Reviews (SSFARs) and Safety System Outage Modification Inspections (SSOMIs), as well as the results of Engineering Self-Assessments. External activities include NRC inspections.

Internal Audits and Assessments

PG&E's Quality Assurance (QA) Internal Audit Program has evaluated: (1) the consistency of operating, maintenance, and test procedures with design bases; and (2) the change control processes. These audits use vertical-slice audit techniques, and have consisted of SSFARs and SSOMIs, as well as performance-based Topical Audits that have covered the majority of DCPP safety systems. SSFARs, SSOMIs and Topical Audits are discussed in greater detail in Section (d), Processes for Problem Identification and Resolution. The SSFARs that have been performed have helped to demonstrate the consistency between design basis information and procedures. In some cases they have identified discrepancies in this area. For example, the SSFAR on the component cooling water (CCW) system noted that the acceptance criteria for CCW flow to the containment fan coolers did not adequately account for flow diverted to the fan cooler motor, and therefore, the flow rate specified by the Technical Specifications could not be assured (Ref. 2.10). For this issue, engineering calculations were performed to document the flow requirements, which were incorporated into a Surveillance Test Procedure (Ref. 5.32). Another SSFAR, on the auxiliary feedwater (AFW) system (Ref. 2.8), noted that containment isolation design bases were not properly translated into training lesson plans, emergency procedures, and the DCM.

The SSOMIs have provided significant information in terms of their review of modifications and design control processes. Although one of the early SSOMIs identified the need for improvement in the design change process (Ref. 2.6), later SSOMIs have shown a continuing improvement in the quality of design change packages, specifically with regard to the level of detail addressed in the performance of safety evaluations associated with the design change packages.

The results of the Engineering Self-Assessment, completed in March 1996 (Ref. 5.21), indicated that plant procedures, calculations and analyses were found to be generally consistent with the design bases. However, in a small number of cases regarding the AFW system, a lack of consistency between specific design basis requirements and surveillance procedures was identified. The discrepancies were found to be technically acceptable. No issue requiring an Operability Evaluation or a Nonconformance Report was identified, but procedure revisions were necessary in most cases. Examples of the discrepancies included:

(1) A surveillance test procedure allowed the AFW pump speed to be greater than that assumed in the system analysis (however, the resulting AFW flow rate was still within the maximum allowed by the Steam Generator Tube Rupture Analysis). This issue was addressed by engineering evaluations and calculations by taking into account "droop" phenomenon (speed decrease due to increased flow) (Ref. 5.33).

(2) A quarterly test allowed the AFW pump differential pressure to be higher than that allowed by piping design (although still within the maximum piping pressure allowed by stress analyses). The subsequent engineering evaluation determined that, due to the differences between the tests, the quarterly test would not exceed pipe design pressures (Ref. 5.34).

(3) A revision to an AFW surveillance test procedure was made without appropriate revision to the DCM and the FSAR (however, the test procedure revision had been reviewed for design basis impact and found to be acceptable through analysis). Procedural guidance was improved and the DCM was revised (Ref. 5.35).

The self-assessment also found minor discrepancies in surveillance tests developed by System Engineering personnel. These discrepancies were identified and corrected by Operations personnel before the tests were run, thereby demonstrating overall adequacy in verification processes. Nonetheless, the discrepancies were indicative of the need for improved engineering performance in the area of surveillance test development.

The self-assessment included a review of emergency diesel generator system surveillance tests and maintenance procedures. No discrepancies were identified.

The results of these audits and assessments have identified some issues related to inconsistencies between operating, maintenance, and test procedures and the design bases and some issues related to the change control processes. These issues have been or are being evaluated and addressed by corrective actions through PG&E's problem resolution processes. Collectively, there have been no significant programmatic deficiencies related to translation of design bases into operating, maintenance, and testing procedures, and the issues identified have not resulted in a condition in which a system would have been incapable of performing its intended safety function.

External Audits and Assessments

The results of external audits and assessments, such as NRC inspections, serve as an important measure of the level of design bases and procedure consistency. They also help substantiate the findings of internal audits and assessments, and thereby provide a check of the effectiveness of DCPP auditing and problem identification processes. Certain NRC inspections have identified inconsistencies between design basis information and procedures. Examples include:

(1) Vendor instructions were not included in a work order on the turbine-driven AFW pump governor (Ref. 3.20).

(2) Acceptance criteria for EDG air starting system check valve leakage surveillance procedure did not ensure 45 seconds of continuous engine cranking, as specified in the FSAR Update (Ref. 3.7).

(3) Acceptance criteria were not included in the post-modification test procedure for the EDG fuel oil day tank level switch setpoint verification (Ref. 3.8).

(4) Operating procedure did not provide for verification of proper boron concentration in the cation bed demineralizer following regeneration to preclude an unplanned reactivity increase (Ref. 3.21).

(5) Surveillance test procedures for calibration of safety injection (SI) accumulator pressure instruments did not specify adequate initial test condition requirements to ensure that the pressure instrument calibration was not impacted adversely by other maintenance activities (Ref. 3.22).

(6) Surveillance procedure as written did not fulfill the requirements of Technical Specifications regarding accident monitoring instrumentation (Ref. 3.23).

These issues were addressed and appropriate corrective actions taken (e.g., revision of administrative procedures, STPs, operating procedures, and training), strengthening PG&E's overall program (Refs. 5.36 - 5.41). With respect to design bases and procedure consistency, the above issues did not represent a major challenge to plant safety or significant design basis programmatic deficiencies. This is taken as further evidence that consistency between design bases and procedures is generally well maintained. However, although the specific issues are not of major individual significance, they do indicate the need for continued emphasis on ensuring that applicable procedures (particularly surveillance procedures, due to their importance in verifying design basis parameters) properly reflect appropriate design basis requirements.

NRC inspections have identified issues similar to those identified in PG&E's internal audits. They have been dispositioned in the same manner as internally identified issues. PG&E believes that the significance of issues identified by external sources is comparable to those that were internally identified in that they have identified no significant programmatic deficiencies related to the management of DCPP's design bases.

Summary Conclusions

PG&E believes that its operating, maintenance, and testing procedures adequately reflect the design bases for the following reasons:

(1) Original development of the DCPP operating, maintenance, and testing procedures were performed by experienced Operations and Maintenance personnel, who worked closely with Engineering, the NSSS vendor, and other equipment vendors

(2) Technical Specifications and ECGs that reflect the design bases are extensively used by operations personnel

(3) Design change and procedure change processes have maintained reasonable consistency of procedures with design bases

(4) Specific programs, such as DCM enhancement and setpoints, have reviewed procedural consistency with the design bases

As noted in the earlier discussion, PG&E has not yet completed the reviews of the DCMs against maintenance and testing procedures. These reviews are scheduled for completion during the first half of 1997. In addition, PG&E has determined that there would be value in performing some additional reviews of DCMs relative to operating procedures. These efforts will provide additional assurance of the consistency between the procedures and the design bases. Plans for these further reviews are discussed in the section, "Conclusions and Future Actions."

Extensive audits and assessments have demonstrated a reasonable consistency between procedures and design bases. Where problems have been identified, PG&E has evaluated these problems and implemented corrective actions to rectify them. While PG&E expects that future activities will identify other discrepancies, PG&E is confident that its processes for problem identification and resolution will properly resolve these discrepancies in a timely manner. Overall, PG&E believes that the operating, maintenance, and testing procedures adequately reflect the design bases.

(c) SYSTEM, STRUCTURE, AND COMPONENT CONFIGURATION AND PERFORMANCE

This section provides PG&E's response to the following NRC request:

(c) *Rationale for Concluding System, Structure and Component Configuration and Performance are Consistent with Design Basis*

Introduction

PG&E believes that both the configuration and performance of structures, systems and components (SSCs) are consistent with the design bases. The rationale for this belief is different for the two topics of configuration and performance and the responses will, therefore, be provided separately.

PG&E's belief that the **configuration** of SSCs is consistent with the design bases is based upon the following:

(1) Specific configuration verification programs, including preoperational and startup testing programs and the Design Verification Program (DVP)

(2) Continuing SSC configuration verification, including operation and maintenance activities, modifications, testing, and inspections

(3) Adequate configuration control process and effective implementation

(4) Results of audits, assessments, and inspections that confirm that SSC configuration is generally maintained consistent with the design bases

PG&E's belief that the **performance** of SSCs is consistent with the design bases is based upon the following:

(1) Testing requirements and acceptance criteria consistent with design bases

(2) Pre-operational and startup testing

(3) Ongoing performance testing associated with operations, maintenance, and modifications

(4) Other specific programs, such as Generic Letter (GL) 89-10, Motor-Operated Valves, and System Engineering

(5) Analytical extrapolation, ensuring adequate performance for those SSCs that cannot be tested under design basis conditions

(6) The results of audits and assessments that confirm that the tests are properly performed, reviewed, and dispositioned

The following two subsections discuss configuration consistency and performance consistency separately. A common discussion of training and overall performance is then provided, followed by summary conclusions for this response topic.

Configuration Consistency

PG&E's belief that the configuration of SSCs is consistent with the design bases is based upon the following:

(1) Specific configuration verification programs

(2) Continuing SSC configuration verifications

(3) Adequate configuration control processes and tools implementation

(4) Results of audits, assessments, and inspections

These areas are discussed in the following subsections.

Specific Configuration Verification Programs

Programs that have included the review of SSC configuration consistency with design bases include the pre-operational and startup testing programs, the Design Verification Program (DVP), the development of the Component Database (CDB), and other focused design review programs. These programs are discussed below.

(1) Pre-Operational and Startup Testing Programs

A part of the pre-operational and startup testing programs included system walkdowns and equipment inspections that evaluated the configuration consistency of systems, structures, and components with the design bases.

Prior to commercial operation, configuration of DCPP systems was verified during the turnover of plant systems from PG&E's construction organization to the startup organization, and subsequently during turnover from the startup organization to the plant Operations department. Plant systems were walked down and determined to adequately meet configuration requirements. Discrepancies were documented and resolved, and appropriate design documentation was revised to reflect as-built configuration.

(2) Design Verification Program

The DVP (Ref. 4.3) also contributed to the assurance of SSC configuration consistency with the design bases. The DVP consisted of an Independent Design Verification Program (IDVP) managed by Teledyne Engineering Services, and an Internal Technical Program (ITP) performed by PG&E. In combination, these programs provided a comprehensive review and/or reanalysis of the design of Unit 1 safety-related structures, systems and components, including:

(a) The seismic design of the containment structure, the auxiliary building (including the fuel handing building), the turbine building, and the intake structure

(b) Safety-related large bore piping and pipe supports, and generic and sampling review of small bore safety-related piping and pipe supports

(c) Reviews of the seismic qualification of all safety-related mechanical, electrical and instrumentation and control systems equipment, Class I electrical raceway and HVAC ducting and supports, and a sampling of instrumentation tubing and supports

Walkdowns were conducted to verify that correct as-built configuration was used in the analyses. When inconsistencies were identified, physical modifications were made, if necessary, or analyses revised to confirm the acceptability of the configuration ("Independent Design Verification Program - Diablo Canyon Nuclear Power Plant - Unit 1," prepared by Teledyne Engineering Services, dated October 10, 1983, Ref. 4.2).

The DVP also reviewed, on a sampling basis, other selected design areas, including pipe break analysis, system and component design, electrical design, separation for fire protection and quality assurance. Specific systems selected for review included the: (1) auxiliary feedwater system, (2) control room ventilation and pressurization system, and (3) the safety-related portions of the 4160-volt electrical system (Ref. 4.2). Walkdowns were conducted to verify as-built conditions in each of these individual activities. When inconsistencies were identified, they were resolved.

The IDVP included a review of a sample of construction work to verify that the quality of the construction was acceptable and that the as-built condition was consistent with the design. This review was documented in Interim Technical Reports (ITRs) and the final IDVP Report. The IDVP found the work to be satisfactory (Ref. 4.2).

The NRC staff's review of the IDVP Final Report was contained in SSERs 18, 19, 20, and 24 (NUREG - 0675, "Safety Evaluation Report Related to the Operation of Diablo Canyon Nuclear Power Plant, Units 1 and 2," prepared by the U.S. Atomic Energy Commission, dated October 16, 1974, with Supplements, Ref. 3.4). The NRC, the Atomic Safety and Licensing Appeal Board (ASLAB), and the Advisory Committee on Reactor Safeguards (ACRS) concluded that the Design Verification Program had been completed successfully and that there was reasonable assurance that Unit 1 adequately met the conditions of the license.

PG&E conducted an Internal Review Program (IRP) for Unit 2 to address those issues identified for Unit 1 by the IDVP, the ITP, and the NRC. Seismic reviews and reanalyses, including walkdowns, were conducted for Unit 2 safety-related systems, structures, and components, similar to those of Unit 1. Nonseismic and generic issues that were identified for Unit 1 were reviewed for applicability to Unit 2. The total of these efforts provided an extensive review of the design bases and configuration of the plant. The results of the IRP were reviewed and found acceptable by the NRC in SSERs 29, 30, 31, and 32 (Ref. 3.4).

In testimony before the California Public Utilities Commission in the Diablo Canyon Rate Case, it was stated that:

> *The magnitude of PG&E's efforts in verifying the plant's seismic design was unprecedented in the history of the nuclear industry.* (Ref. 4.4)

(3) Component Database Development

During 1984 and 1985, a CDB was developed as part of the Plant Information Management System (PIMS) (Ref. 1.18). As part of this development effort, accessible components were walked down to verify nameplate data and location. While this was not designed to be a complete verification of system and component configuration, it did serve as an additional means to check the consistency of design documentation with physical as-built conditions. This CDB serves as a central repository for component design-related information that is used extensively for design, procurement, material control, and work control functions. The CDB has been a valuable tool in maintaining design and plant configuration control.

(4) Regulatory Guide (RG) 1.97 Review Project

In response to concerns identified during a design change, PG&E conducted a self-initiated detailed review of the redundancy, electrical isolation and separation, qualification and other aspects of the RG 1.97 systems. This review was conducted from 1989 to 1994. This effort involved detailed review of system configuration consistency with design bases and resulted in greater awareness of potential failure modes and implementation of design changes to provide improved redundancy and electrical isolation and separation (NCR DC0-91-EN-N005, Ref. 5.66, Operability Evaluation OE 91-13, Ref. 5.18).

(5) Breaker Review Project

As a follow on to the RG 1.97 Review Project, the Breaker Review Project was conducted from 1992 to 1994. This review was initiated due to the potential compromise of redundant Class I functions by Class II loads on some Class I circuits. The review involved verification of configuration consistency with the design bases (NCR DC0-91-EN-N005, Ref. 5.17; Operability Evaluation OE 91-13, Ref. 5.18; and PG&E Letter No. DCL-92-246, Ref. 5.19).

Collectively, the programs discussed in this subsection have contributed significantly to establishing SSC configuration consistency with the design bases.

Continuing SSC Configuration Verifications

Other activities that continue to verify configuration consistency with design bases include operations walkdowns, maintenance activities, modification implementation, testing and inspections. Each of these is briefly described below.

(1) Operations

Operations personnel are required to perform routine walkdowns of plant systems to verify proper operational configuration, alignment, and material condition. This process is controlled by the following procedures:

(a) General Authorities and Responsibilities of Operating Shift Personnel (OP1.DC10, Ref. 1.133)

(b) Nuclear Operator Routine Plant Inspections (OP1.DC3, Ref. 1.132)

(2) Maintenance

Preventative and corrective maintenance activities result in plant personnel reviewing existing configuration and verifying that this configuration is in conformance with design requirements when problems or concerns are identified. Corrective actions for configuration inconsistencies are implemented as appropriate. Post-maintenance testing and system restoration are accomplished as the final steps to maintenance activities, to ensure that the plant physical configuration is consistent with appropriate design documentation and operational procedures (AD13.ID4, Ref. 1.87).

(3) Modifications

Additional assurance of SSC configuration consistency with design bases is gained through the established processes for design change development and implementation of plant modifications. (CF3, Ref. 1.19; CF3.ID9, Ref. 1.26; CF4, Ref. 1.34; and CF4.ID3, Ref. 1.36) The process often starts with the review of the as-built condition of the design. Changes to the design bases must be incorporated into the appropriate design documents (CF3.ID9, Ref. 1.26). After completion of plant modification, required as-built documentation is completed, the modified configuration is tested to ensure performance consistency with design basis requirements, and then restored to appropriate operational configuration (AD13.ID2, Ref. 1.86).

(4) Testing and Inspections

In addition to the post-maintenance tests and post-modification tests described above, other testing and inspection activities serve to verify configuration consistency with design bases (Control of the Surveillance Testing Program, Ref. 1.85 and Inservice Testing Program, Ref. 1.88). Inservice inspection activities ensure that the physical configuration of plant components within the scope of the ISI program are repaired and maintained in accordance with appropriate design basis documentation (AD5.ID2, Ref. 1.90).

(5) System Engineering Program

The System Engineering Program plays an important role in ensuring consistency of SSCs configuration with the design bases. DCPP maintains a System Engineering Program that is administered procedurally (TS5.ID1, Ref. 1.89). The purpose of the System Engineering Program is to provide appropriate technical support for the plant. Individuals designated as System Engineers maintain overall "ownership" of a particular plant system or multiple systems and are considered the primary contact for questions regarding the design bases for their system.

The System Engineer also is responsible for temporary modifications to the system and monitors these modifications during the monthly system walkdowns. Extensions of these temporary modifications beyond a refueling cycle requires management approval. This ensures that temporary modifications receive the proper review and that impacts on the design bases of the system are understood fully.

The System Engineer normally serves as sponsor for design changes to the system. As the design change sponsor, the System Engineer coordinates implementation to ensure that configuration changes are incorporated into plant operational, maintenance and surveillance procedures, the CDB, appropriate training materials, and other relevant documentation. As the design change sponsor, the System Engineer ensures the as-built configuration is reflected in plant drawings and procedures (CF4.ID3, Ref. 1.36).

Configuration Control Processes and Tools

SSC configuration consistency with design bases is maintained through the effective implementation of the processes that control work and necessary changes. These processes, which have been described in Section (a), Design and Configuration Control Processes, provide the necessary attributes to recognize changes, evaluate their impact, and maintain configuration consistency with the design bases.

There are also a number of tools that have been developed to improve the ability to effectively implement these processes. These tools include:

(1) Enhanced DCMs as described in Section (f), Design Basis Review and Documentation Program

(2) The CDB, discussed earlier in this section, which serves as a central repository for component design-related information

(3) The Procedure Commitment Database

Performance Consistency

PG&E's belief that the performance of SSCs is consistent with the design bases is based upon:

(1) Test requirements and acceptance criteria consistent with the design bases

(2) Preoperational and startup testing

(3) Ongoing performance testing

(4) Other specific programs, such as GL 89-10 (Motor-Operated Valves) and System Engineering

(5) Analytical extrapolation

(6) Results of audits, assessments, and inspections (discussed in the subsection on overall performance)

These areas are discussed in the following subsections.

Test Requirements and Acceptance Criteria

The first step in establishing that SSC performance is consistent with design basis requirements is to ensure that design bases have been translated appropriately into testing requirements and associated acceptance criteria. PG&E's discussion in Section (b), Design Basis Translation to Operating, Maintenance, and Testing Procedures, provides the basis for the conclusions in this area.

Pre-Operational and Startup Testing

The pre-operational and startup testing programs, described earlier in this section, also provided a solid initial baseline for determining system, structure and component performance consistency with the design bases. Plant systems were walked down and performance-tested at the component and system level and determined to adequately meet performance requirements.

During pre-operational testing, initial plant performance was measured against specified acceptance criteria. Results were documented in pre-operational test procedures, and in the cases where specified acceptance criteria could not be met, corrective actions were implemented. This testing permitted the baselining of system and component performance characteristics, which established the benchmark values for acceptance criteria for subsequent system and component testing (Ref. 1.142).

Following receipt of a low-power license, a startup testing program, which included an initial criticality and low-power physics program and a power-ascension test program, was undertaken to demonstrate that initial core performance and plant performance were consistent with the plant design bases. For Unit 1, a series of Special Low-Power Tests were performed, including natural circulation and simulated loss of all site AC power. In addition to providing experience and information to plant operators, these tests provided actual plant data for verification of design conservatism and improvement of plant modeling and analysis.

Ongoing Performance Testing

To maintain continuing consistency between SSC performance and the design bases, periodic testing is performed on plant systems and components. Testing is also performed whenever changes that could affect component or system performance are made. Such testing verifies system and component alignment and conformance with design documentation, and demonstrates the capability of the systems to meet the acceptance criteria of their specified testing requirements. Some of the key testing that is routinely performed includes:

(1) Surveillance Testing

Periodic and conditional surveillance tests are performed to comply with Technical Specification requirements, licenses, and other documents relating to maintenance and operation of the plant (AD13.ID1, Ref. 1.84; and AD13.DC1, Ref. 1.85). These tests include those associated with the Inservice Testing (IST) program for pumps and valves (AD13.ID5, Ref. 1.88). These tests confirm that the systems and components are capable of meeting the acceptance criteria consistent with design basis requirements.

(2) Post-Maintenance Testing

As part of planning maintenance activities, post-maintenance test requirements necessary to confirm acceptable performance and operability are identified (AD13.ID4, Ref. 1.87). These tests are performed following the maintenance activities to provide continued performance consistency with the design bases.

(3) Post-Modification Testing

Similar to maintenance activities, modifications also require the identification of appropriate testing to confirm the acceptable performance of the components and systems affected (AD13.ID2, Ref. 1.86). This testing provides an acceptable level of confidence that the modified equipment will function as designed and is properly integrated into plant systems.

After these testing activities, verification of configuration restoration and realignment is performed to ensure that the as-left condition of the plant is consistent with appropriate design documentation (Operations Management, OP1, Ref. 1.61). Taken collectively, PG&E's extensive ongoing testing programs provide a regular check on and assessment of performance consistent with the design bases.

Other Specific Programs

PG&E has implemented a number of other specific programs that have provided additional assurance that SSC performance remains consistent with the design bases. Some of the more notable programs include:

(a) Implementation of GL 89-10, Safety-Related Motor-Operated Valve (MOV) Testing and Surveillance (PG&E Letter No. DCL 94-262, 1994, Ref. 5.5). To implement the requirements of this generic letter, a significant review of system design bases, configuration, and component (MOV) functional performance was performed. Testing was performed to confirm the acceptable performance of the valves. Periodic testing continues as part of this program (MA1.ID1, Ref. 1.141).

(b) Implementation of GL 89-13, Service Water System Problems Affecting Safety-Related Equipment (PG&E Letter No. DCL 90-027, Ref. 5.3 and PG&E Letter No. DCL 91-286, Ref. 5.4). To implement the requirements of this generic letter, reviews of the plant heat removal and ultimate heat sink functions were performed, including system and component design basis requirements and associated system and component performance test requirements.

(c) Electrical Calculation Enhancement Program (NCR DC0-92-EN-N010, Ref. 5.24). This was a long-term result of the Station Blackout compliance to 10 CFR 50.63. The program updated electrical design calculations and provided a common database for related information in all calculations.

(d) Design Calculation Index. This index was the result of a Design Calculation Continuous Improvement (CI) team. The program provided a common database for related information of design calculations.

(e) Implementation of the Maintenance Rule (MR). To implement the new MR requirements, system design bases were reviewed, and performance parameters were identified for safety-related components and components important to safety. A monitoring program was established as required by the MR to ensure component performance is monitored against appropriate acceptance criteria and trended to ensure adequate maintenance requirements are in place.

(f) Long Term Seismic Program. This program, a 1983 license condition, required PG&E to reevaluate seismic design bases. PG&E performed extensive state-of-the-art geological studies, a probabilistic risk assessment, and evaluated the fragility of plant SSCs. Plant design and design bases were reviewed, and walkdowns of selected SSCs were performed. The program was completed in 1988 and accepted by the NRC in 1991.

(g) System Engineering Program. The System Engineering Program, described earlier in this section, also plays an important role in assuring consistency of

SSCs performance with the design bases. System Engineers are familiar with the performance, acceptance criteria, and bases for surveillance testing on their systems.

Analytical Extrapolation

The final element in determining that SSCs performance is consistent with the design basis requirements is often analytical extrapolation. Since testing frequently cannot be performed at design basis conditions, analysis is used to project the performance of systems, structures, and components based on testing at conditions that can be achieved. Thus, the specification of required testing, acceptance criteria, and design analysis needs to remain consistent. PG&E's processes for design control and the procedure change process, discussed in the response to Section (a), Design and Configuration Control Processes, provide assurance of consistency.

Training

Operations personnel who perform testing meet the requirements of training programs that are accredited by the National Academy for Nuclear Training. Licensed operator training complies with 10 CFR 55 and ANSI N18.1-1971, Section 5.5. Maintenance personnel who participate in testing activities are qualified in accordance with training programs that are also accredited by the National Academy for Nuclear Training. Maintenance supervisors receive additional training in the following topics that relate to maintaining design and configuration control:

(1) Revising plant procedures
(2) LBIE screen training
(3) Design basis configuration maintenance impacts
(4) Design changes
(5) Surveillance Test Procedures
(6) Technical Specifications
(7) Work Orders
(8) Supporting work packages in the field

System Engineers who participate in testing activities and review of test results receive Engineering Support Personnel Training as described in Section (a), Design and Configuration Control Processes.

Overall Effectiveness

The internal and external assessments of SSC configuration and performance are discussed below.

Internal Audits and Assessments

Numerous internal audits and assessments have evaluated the consistency of SSC configuration and performance with the design bases. These include the SSFARs, the SSOMIs, and topical audits that have been performed by the Quality Assurance organization as well as the results of an Engineering Self-Assessment. The details of these audit programs, including the extent and depth of their coverage, are discussed in Section (d), Processes for Problem Identification and Resolution.

(1) Quality Assurance Audits

The SSFARs, SSOMIs, and topical audits have been performed to determine whether:

(a) Configuration and conditions of the systems are in compliance with the applicable drawings and procedures.

(b) Testing is adequate to demonstrate that the system will perform the safety functions required by the licensed design bases.

Two topical assessments specifically focused on GL 89-10, Motor Operated Valves (Audit 94016I, Ref. 2.28), and GL 89-13, Service Water System Performance (Surveillance QP&A-93-0031, Ref. 2.39).

Overall, results from the audits performed to date have confirmed that the systems are capable of performing their designated safety function(s) and that there are no immediate operability concerns. In addition, they have not identified significant programmatic deficiencies. However, the audits have been intrusive and have identified some technical issues that could impact the functionality of the targeted systems and/or their supporting systems. Some of the findings have been significant. Examples of some of the more significant technical issues include:

(a) RHR pump performance not consistent with FSAR Update Figure 6.3-1. Results of full flow performance testing of RHRP 1-1 indicated that the pump performance would not meet that specified in the FSAR Update. Subsequent analysis by Engineering demonstrated that the injection profiles used in the FSAR Update, Chapter 15, analyses could be met (Audit 93015I, Ref. 2.24).

(b) Valve 8703 single failure susceptibility. A review of the safety injection system configuration identified that a single failure of valve RHR-8703 could preclude establishment of RHR flow to the hot leg as required for long term recovery from a design basis LOCA (Audit 92001I, Ref. 2.16). An EOP was revised to provide compensatory actions in the event of failure of the valve during recovery from a LOCA. An STP was revised to specify the minimum flow requirements (Ref. 5.45)

(c) CCW flow balance issues. The assurance that adequate flow was available to ESF components during accident conditions could not be determined since neither procedural guidance nor adequate indication was provided to allow flow balance of the CCW system (Audit 90811T, Ref. 2.10). Engineering provided input regarding flow requirements, and an STP was developed to verify flow balancing once each outage (Ref. 5.46).

(d) Performance test results for CCW heat exchanger 1-2 predicted a heat removal capability less than the design basis value assumed in the accident analyses (Surveillance QP&A-93-0031, Ref. 2.39). Heat exchanger performance tests were reperformed with more accurate instrumentation, and the performance was acceptable. PG&E determined that there may have been times when the design basis requirements were not met, and issued a one-hour report pursuant to 10 CFR 50.72. The root cause was that design basis requirements were not adequately incorporated into test acceptance criteria. Corrective actions included revisions to calculations, the DCM, STPs, and an administrative procedure; and issuance of a new administrative procedure and an ECG (Ref. 5.47).

(e) PIMS Component Database accuracy. The usability of the CDB was impacted adversely by ineffective procedures for the processing of as-built information in a timely manner, untimely resolution of previously identified concerns associated with the CDB, workload management and prioritization decisions. A general lack of understanding and sensitivity was identified relating to the importance of the CDB relevant to plant configuration management. The improvement of the CDB is an ongoing process. The importance of CDB accuracy was emphasized in training (Ref. 5.50).

(f) Blowout panels in the auxiliary building that were credited in the outside containment pressure /temperature transient analyses were found to be blocked closed (Audit 93014I, Ref. 2.23). Labels were added to the blowout panels to alert personnel to the design basis function of the panels (Ref. 5.48).

Each of these issues has been evaluated and corrected, and has served to strengthen the design and configuration control processes and prompt additional reviews to identify and resolve similar problems.

(2) Self-Assessments

The 1996 Engineering Self-Assessment (Ref. 2.40) was conducted to determine the overall effectiveness of engineering activities and programs. Some of the assessment comments were:

(a) Surveillance tests and one post-modification test for the AFW system were reviewed. Results were acceptable, and interviews with the System Engineers confirmed Engineering involvement and review.

(b) One post-modification flow test of the AFW turbine-driven pump failed the acceptance criteria. The results of the test were acceptable when adjusted for differences between the test conditions and the accident scenario. A "Prompt Operability Assessment" (see Section (d), Processes for Problem Identification and Resolution) documented the acceptability of the test results. A calculation, a Technical Specifications interpretation, and an STP were revised to reconcile the differences (Ref. 5.49).

(c) Monthly walkdowns were not routinely performed as required by procedure.

(d) The overall performance and effectiveness of the System Engineering program was viewed as a strength.

At the completion of the assessment, a report was issued, the assessment team debriefed Engineering supervision and management, developed action plans to address the issues, and an issue closure team (ICT) was formed that tracked them to completion using PIMS.

The general conclusion from these audits and assessments was that although problems were identified, safety systems would have performed their intended safety functions and generally conformed to the design bases.

External Audits and Assessments

The results of external audits and assessments, such as those performed by NRC inspections, are presented in this subsection. They provide a valuable source of information regarding the effectiveness of processes for maintaining the consistency between design bases with plant configuration and performance, and support the findings of internal audits and assessments.

Between 1990 and 1996, the NRC documented approximately 30 instances where the physical configuration of the plant was verified to be consistent with the design documents. Systems addressed in these verification activities included RHR, SI, CS, CCW, AFW, Emergency Boration, Fuel Handling Building HVAC, Auxiliary Building HVAC, Control Room Ventilation, ASW, Instrument Air, Solid State Protection, and EDG. It can be inferred from these findings that the consistency between design bases and the physical plant generally is well maintained. However, there were instances in which the NRC identified areas of inconsistency between configuration and the design bases; some examples were:

(1) A reactor coolant system loose parts monitor strip chart recorder was out of service in the control room, contrary to FSAR Update requirements (NRC Inspection Report 90-30, Ref. 3.26). An investigation of the Vibration and Loose Parts Monitor (VLPM) output determined that there was no vibration or loose parts. An interim data collection and review system was established. New VLPM equipment was purchased. An administrative procedure was written for the control of equipment not required by Technical Specifications, and an ECG was specifically prepared for the VLPM (Ref. 5.44).

(2) A test gauge was installed on the discharge of the CCW pump for an extended period of time without the required jumper log in place (Ref. 3.38). A review was conducted and no other similar deficiencies were identified. A lessons-learned memorandum was issued, and training was provided (Ref. 5.42).

(3) A jumper was installed on a Class 1E bus to receive power for a spent fuel pool cooling pump from a nonvital bus, and no safety evaluation was written (NRC Inspection Report 96-09, Ref. 3.28). The FSAR Update was revised to provide clarification on the classification of the power supply, a review of the FSAR Update was completed to identify and correct incorrect or incomplete information, and an administrative procedure was revised (Ref. 5.43)

(4) The licensee discovered tube fretting damage at baffle plate locations in both of the redundant Unit 2 CCW heat exchangers tubes in March 1993. (NRC Inspection Report 93-34, Ref. 3.30) Tube plugging was completed where necessary, and an operating procedure was changed (Ref. 5.51).

Other configuration inconsistencies have been identified as a result of NRC inspections, including breaker mispositioning (NRC Inspection Report 93-32, Ref. 3.6; and NRC Inspection Report 94-24, Ref. 3.27) and improper valve orientation (NRC Inspection Report 91-10, Ref. 3.11). In response, personnel training, documentation enhancements, and additional work instructions were completed (Refs. 5.55, 5.56, and 5.57).

The NRC routinely reports on the observation of the performance of STPs. Typical statements of results are:

The inspectors found that the surveillances reviewed and/or observed were being scheduled and performed at the required frequency. The procedures governing the surveillance tests were technically adequate and personnel performing the surveillance demonstrated an adequate level of knowledge. The inspectors also noted that test results were appropriately dispositioned. (NRC Inspection Report 96-16, Ref. 3.14)

Numerous Inspection Reports note observations of personnel performing surveillances. A number note procedural errors such as:

(a) *The inspector found that the licensee had not assured that the ASW system maintenance and surveillance controls were sufficient to assure system operability.* (NRC Inspection Report 94-08, Ref. 3.29) To address this finding, an administrative procedure and STP changes were made (Ref. 5.53).

(b) *The licensee identified that MSSVs were incorrectly set during periodic testing due to setpressure inaccuracy introduced by the use of valve specific correction factors.* (Ref. 3.37). In response, a new STP was written to implement an augmented test program, personnel counseling was completed, and a project manager was appointed to manage the augmented test program. (Ref. 5.54)

Inspection reports have noted observations regarding the System Engineering Program: "*There is not a clear definition or understanding of system engineer responsibilities during system testing. . . The NRC views the increased involvement of the system engineer as a strength of the outage testing program; however, increased system engineer involvement without clear definition of system engineer responsibilities during the conduct of testing creates an increased potential for errors in communications.*" (NRC Inspection Report 94-28, Ref. 3.31) A lessons-learned memorandum was issued, and an administrative procedure was revised to clarify the responsibilities in the performance of STPs (Ref. 5.52).

The problems identified have not had a significant impact on the safe operation of the plant, and the appropriate corrective actions have been taken. It is concluded, therefore, that although there were weaknesses in procedural implementation, no significant programmatic concerns regarding consistency of design bases with plant configuration and performance have been found.

Summary Conclusions

PG&E believes that there is adequate consistency between the plant design bases and plant configuration and performance and that the applicable processes are effective in maintaining this consistency. PG&E's extensive pre-operational and startup testing programs combined with the

IDVP provided a firm foundation for ensuring consistency with the design basis. As part of normal operation and maintenance activities, plant personnel monitor the operational state of the plant, including configuration and performance acceptability, using controlled work processes and supporting tools. System and component testing demonstrates that performance requirements are satisfied. Various programs such as implementation of GL 89-10 and 89-13, electrical calculation enhancements, implementation of the Maintenance Rule, System Engineering Program, and the Long Term Seismic Program, provide additional assurance of consistency. Frequent audits and surveillances are performed to ensure that this design basis consistency is maintained. When problems do occur, they are addressed through PG&E's corrective action programs. Overall, PG&E believes that system, structure, and component configuration and performance are consistent with the design bases.

(d) PROCESSES FOR PROBLEM IDENTIFICATION AND RESOLUTION

This section provides PG&E's response to the following NRC request:

> (d) *Processes for identification of problems and implementation of corrective actions, including actions to determine the extent of problems, action to prevent recurrence, and reporting to NRC*

Introduction

PG&E believes that it has effective processes for the identification and resolution of problems. This belief is based on the following:

(1) The extent and thoroughness of existing processes for problem identification

(2) The existence and implementation of an effective Quality Assurance (QA) audit program

(3) The existence and implementation of a problem resolution process that evaluates and determines causal factors and extent of problems; defines and implements corrective actions, including those that prevent recurrence; and reports problems to the NRC

(4) The results of audits and assessments that evaluated and determined the effectiveness of the problem identification and resolution process

This section is divided into the following discussion elements:

(1) Processes description
- (a) Processes for the identification of problems
- (b) Significance classifications and associated levels of evaluation
- (c) General problem resolution process flow from identification through resolution

(2) Training

(3) Overall effectiveness of problem identification and resolution process in supporting design and configuration control

Process Description

Processes for Problem Identification

There are a number of processes at Diablo Canyon Power Plant (DCPP) that provide for the identification and resolution of problems. Many of these processes control activities associated with operating and maintaining the plant, and those that directly relate to maintaining design and configuration control were already described in Section (a), Design and Configuration Control Processes. Others include internal audits and assessments, external audits and assessments, assessments of external industry issues and events, input from vendors and suppliers, and employee observations. The processes for problem identification include:

(1) Routine work processes

(2) Internal audits and assessments

(3) External inspections and assessments

(4) External industry issues and events

(5) Employee observations

These processes are discussed in detail below.

(1) Routine work processes

The primary source of problem identification is simply people observing problems as a part of routine daily work. Personnel are trained to document problems that they observe. In addition, a number of specific work processes are designed to detect and/or address problems that can impact design and configuration control. Examples of these processes include:

(a) Supplier audits and surveys (AD9.ID11, Ref. 1.91)

(b) Processing of 10 CFR 21 notifications (CF7.ID2, Ref. 1.92)

(c) Processing of information provided by suppliers (CF7.ID3, Ref. 1.121)

(d) Materials receipt inspection (AD9.ID7, Ref. 1.94)

(e) Identification and resolution of loose, missing or damaged fasteners (AD4.ID8, Ref. 1.95)

(f) Plant leakage evaluation (AD4.ID2, Ref. 1.96)

(g) Performance monitoring equipment calibration and usage control (MA2.ID2, Ref. 1.97)

(h) Readiness-for-restart program (OP1.ID1, Ref. 1.98)

(i) Balance-of-plant reliability program (OM4.ID11, Ref. 1.99)

(2) Internal audits and assessments

Internal audits and assessments are key mechanisms designed to identify and prevent problems. These mechanisms aim to ensure that the necessary processes and controls are in place to comply with the requirements of 10 CFR 50, Appendix B, and that performance is monitored in accordance with those processes. The internal audit and assessment processes include:

(a) Nuclear Quality Services (NQS) audits

(b) Inspection programs

(c) Self-assessments

Each of these is briefly described below.

(a) Nuclear Quality Services (NQS) Audits

This process monitors the adequacy and effectiveness of the QA program through a comprehensive system of internal audits. As prescribed by 10 CFR 50, Appendix B, these audits are performed in accordance with written procedures or checklists by trained personnel not having direct responsibilities in the areas audited. Audit findings are documented and addressed in accordance with the Problem Identification and Resolution process (OM7.ID1, Ref. 1.56), the Quality Evaluation Process (OM7.ID2, Ref. 1.107), the Nonconformance Report Process (OM7.ID3, Ref. 1.57), and the Internal Auditing process (OM4.ID13, Ref. 1.108), which are described below.

The primary method employed by the QA (now NQS) department to verify the control and implementation of the DCPP design and licensing bases is the technical audit program. In the past 10 years, this program has consisted primarily of three types of audits:

(i) Safety System Functional Audit and Review (SSFAR) - SSFARs are "vertical-slice" audits of selected safety-related systems to assess their operational readiness by reviewing their design bases, operation, maintenance, and testing. SSFARs were initiated in

1989 and were patterned after the NRC's Safety System Functional Inspection (SSFI) process. SSFARs consist of six individual inspection elements: design, operations, maintenance, testing, documentation, and training. The SSFAR is an intensive effort, performed by a team comprised of approximately 12 to 18 persons and lasting for about four to seven weeks. The SSFAR is accomplished through:

A. Review of design and vendor documentation, procedures, and training materials

B. A physical inspection and walkdown of the system

C. Interviews with cognizant personnel

The objective of the SSFAR is to verify:

- System design is consistent with the design bases
- Testing is adequate to demonstrate that the system will perform the safety functions required by the design bases
- Maintenance is adequate to ensure operational readiness
- Training of appropriate plant personnel is adequate
- Procedures for operating normal, abnormal, and alarm response conditions are adequate
- Configuration and conditions of the system are in compliance with the applicable drawings and procedures

PG&E has performed SSFARs on five systems. The results from each are briefly summarized as follows:

A. Vital electrical system (1989) - The SSFAR concluded that "*electrical distribution systems had been adequately designed and configured to meet the intent of the original design and licensing basis.*" However, the SSFAR added that increased attention is required to maintain the completeness of the design basis documentation (QA Audit 89800T, Ref. 2.7).

B. Auxiliary Feedwater (AFW) system(1989) - The SSFAR concluded that "*the AFW Design Criteria Memorandum (DCM) developed as part of the design bases review was effective in summarizing and defining the design bases of the system.*" However, the SSFAR also identified a number of concerns regarding the functionality of the AFW and interfacing systems (QA Audit 89808T, Ref. 2.8).

C. Component cooling water (CCW) system (1990) - The SSFAR identified a number of concerns regarding the functionality of the CCW and interfacing systems. However, the SSFAR concluded that "*there were no immediate operability concerns ....*" (QA Audit 90811T, Ref. 2.10).

D. Intermediate head safety injection (IHSI) system (1992) - The SSFAR identified a number of concerns regarding the functionality of the IHSI and supporting systems. However, the SSFAR determined that "*there were no immediate operability concerns ....*" (QA Audit 92001I, Ref. 2.16).

E. Residual heat removal (RHR) system (1993) - The SSFAR identified weaknesses that challenged the design and licensing bases and, in some cases, resulted in reduced design margin. However, the SSFAR concluded that the RHR system "*would perform its intended function, and that it was in conformance with its design basis and licensing requirements*" (QA Audit 93015I, Ref. 2.24).

The issues identified in these SSFARs have been addressed through PG&E's problem resolution program. Resolution activities include a range of improvements, from new enhanced electrical calculations to training.

Prior to SSFARs, system audits had been performed to assess the adequacy of plant systems. In contrast with SSFARs, which provide for an assessment of most aspects of a system (including design, operation, surveillance, maintenance, QA, and material condition, as well as accident analyses and other supporting calculations), system audits were performed primarily to verify the effectiveness of implementation of QA requirements pertaining to operation, surveillance, maintenance, and modification activities of a system. Thus, system audits were typically more limited in scope and less resource intensive. Nevertheless, the system audits provided an effective means for identifying problems with system configuration control and confirming the design control of such systems. System audits were performed on the auxiliary saltwater system (Ref. 2.1), the control room ventilation system, (Ref. 2.2) the emergency diesel generators (Ref. 2.3), and the 4160 volt system, (Ref. 2.4).

(ii) Safety System Outage Modification Inspection (SSOMI) - SSOMIs are vertical-slice audits of plant modification and technical support activities performed for refueling outages. SSOMIs focus on the operational readiness of safety systems through assessments of design modifications and their implementation as well as through testing. SSOMIs were developed and implemented to evaluate the effectiveness of the design change process to ensure that design changes were effective in accomplishing their objectives and that the plant design bases were preserved in the process. SSOMIs are patterned after NRC inspections of the same name. They have six elements: modification design, procurement, modification installation, testing, documentation, and training. SSOMIs typically consist of two parts: a design assessment prior to the outage, and an implementation assessment during the outage. SSOMIs verify whether:

A. Appropriate programmatic controls exist for conducting design modification activities and outage technical support activities

B. Modification activities and technical support activities are being accomplished in accordance with established procedures and commitments

C. Modifications have been properly designed, installed, inspected, and tested to ensure proper performance of their intended functions

D. Modifications are consistent with design bases and design margins of systems have not been compromised

E. Modified portions of the systems are ready for plant startup and technical support activities are performed in accordance with approved procedures.

SSOMIs have been performed for refueling outages for each unit since the second refueling outage of Unit 1. Major design changes that have been assessed include: Boron Injection Tank Removal, digital feedwater system installation, 10 percent atmospheric dump valve upgrade, installation of the sixth emergency diesel generator, reactor coolant system resistance temperature detector bypass elimination, Eagle 21 process protection upgrade, and 4-kV breaker replacements (SSOMI surveillances and audits; Refs. 2.5, 2.6, 2.9, 2.11, 2.12, 2.14, 2.15, 2.17, 2.18, 2.22, 2.25. 2.27, and 2.30).

(iii) Topical Audits - In addition to SSFARs and SSOMIs, performance-based audits of selected technical subjects or programs are performed to verify consistency with applicable regulatory criteria and implementation in accordance with established procedures. Typically these audits are performed to verify the adequacy of key engineering programs. In addition, focused assessments are performed occasionally on selected systems or subsystems based on specific concerns relating to system performance. Topical areas for assessment are selected based on various factors, including program/system safety significance, identification of problems, and regulatory activity. Topical audits typically assess related design, maintenance, and testing activities to ensure that the design bases are implemented appropriately and that applicable regulatory requirements are met.

These topical audits often focus on key design basis subjects and have included the following activities: procurement (Refs. 2.13, 2.20, and 2.26); equipment qualification (Ref. 2.23); 10 CFR 50, Appendix R (Fire Protection) (Ref. 2.29); and Generic Letter (GL) 89-10 (Motor-Operated Valves) (Ref. 2.28).

The performance of these three types of audits has been valuable in contributing to design and configuration control for the following reasons: (1) the vertical-slice type audits are beneficial in that they examine multiple aspects of system performance, and address interrelationships with other key systems and programs, including support system dependencies; (2) the scope of these three types of audits includes testing and maintenance activities, and therefore helps verify that design basis information is reflected properly in the appropriate maintenance and testing requirements; (3) these three types of audits include the review of pertinent training information, thereby ensuring that appropriate design and design basis information is conveyed in training lesson plans; (4) the audits include verification of as-built configuration and system restoration and alignment, to ensure that the system physical configuration is in conformance with design basis requirements; (5) these audits review surveillance test results to ensure that components are capable of satisfying their intended performance requirements; (6) the audits address post-modification and post-maintenance testing to ensure that modification and maintenance activities do not impact component design basis functional capability; and (7) finally, the audits provide valuable insights to senior management with respect to making enhancements to design and procedural controls.

The key elements of this system of technical audits are in place today. However, since the most significant safety systems already had been assessed, no additional SSFARs have been performed since the RHR SSFAR in 1993. In lieu of the manpower-intensive SSFARs, smaller, more focused system assessments recently have been performed on an as-needed basis when questions arise as to the functional readiness of a given system. Examples of this type of assessment are the reactor vessel refueling level indication system (RVRLIS) and the reactor coolant pump oil collection system.

For the Unit 2 sixth refueling outage and Units 1 and 2 seventh refueling outages, the "implementation" phase of SSOMIs have been performed in conjunction with comprehensive technical outage audits, designated as Technical Support Outage Assessments (TSOAs) (Refs. 2.31, 2.33, and 2.45). The progression into the TSOA format was the result of two changes made to plant outage audits: (1) audit scope was augmented to include assessments of technical issues not directly related to design changes, and (2) that portion of the assessment that pertained solely to oversight of construction activities was transferred to the Maintenance section of NQS. However, the TSOA continues to evaluate field changes as well as testing activities and results to ensure that the design bases, as assessed during the "design" phase of SSOMIs, continue to be met.

To streamline its audit process and to facilitate its ability to provide timely oversight of ongoing activities, the NQS department recently converted to a system of continuous audits of various plant functions. For example, the NQS Engineering Assessment Group (EAG) currently performs quarterly audits of ongoing engineering activities. The transition from the traditional "batch" audit program to a continuous audit process was made to provide the EAG with the flexibility to respond in a timely fashion to continually changing engineering activities and technical issues. Rather than devoting a single block of time for assessing a particular subject once during an audit period, the engineering activities associated with that subject may be assessed periodically throughout the audit period. This approach is patterned after the NRC resident approach of continuous inspections.

In addition, the inclusion of an "emerging issues" element into the scope of the quarterly audit enables the audit team to provide timely oversight for emergent engineering work. Recently implemented, the overall scope of these audits includes the elements described above, including performance-based assessments of plant systems and design changes that evaluate the control and implementation of the design and licensing bases. Each quarter the specific scope of these audits is developed based on a review of ongoing engineering activities, key technical issues, and significant engineering programs. The review includes consideration of the safety significance to plant operation. For example, the 1996 fourth quarter audit assessed the implementation of the Maintenance Rule as well as the Inservice Testing and System Engineering programs. During the first quarter of 1997, selected design changes for implementation during the Unit 1 eighth refueling outage will be assessed.

Collectively, the scope of the QA audit process in examining safety-related systems has been extensive. Table 2 provides a summary of the selected internal audits, surveillances, and assessments that have focused on design and configuration control along with the specific systems and topical areas that these audits have addressed. The vast majority of these audits and assessments have been performed by the QA organization in accordance with the requirements of its auditing process (OM4.ID13, Ref. 1.108).

The audits and assessments performed are shown as the rows in Table 2, and the safety systems and topical areas as columns. The systems are listed in decreasing order of risk significance, based on current PRA core damage frequency. For each audit or assessment performed, the systems and topical areas that were addressed are marked.

TABLE 2 Key System and Topical Area Audits and Assessments

Audit Subject*:	SYSTEM*: ELEC	SEISMIC	ASW	EDG	FIRE	AFW	RCS	RHR	SSPS	CCW	HVAC	RPS	CVCS	SI	MS	SFP	CONT**	CS**	MFW**	NI**
ASW System Audit			■		■															
CR HVAC System Audit											■									
DG System Audit	■	■		■																
4.16 kV System Audit	■										■									
1R2 SSOMI							■			■					■	■	■			
2R2 SSOMI		■	■				■	■			■	■		■						
Electrical System SSFAR	■	■		■	■						■									
AFW SSFAR	■	■		■		■											■			
Westinghouse Supplier Audit							■					■		■						
1R3 SSOMI	GS				■		■		■	■	■	■					■		■	
CCW SSFAR	■	■								■										
2R3 SSOMI	■												■							
1R4/2R4 SSOMI Design	■							■			■				■		■			
1R4 SSOMI - Installation				■				■			■				■		■			
2R4 SSOMI - Installation				■		■	■	■	■	■				■	■		■	■		■
SI SSFAR	■	■		■										■						
1R5 SSOMI - Design		■	■			■		■			■						■			
1R5 SSOMI - Installation		■	■			■	■	■			■								■	
1R5 Maintenance Quality Assessment							■								■					

TABLE 2 Key System and Topical Area Audits and Assessments (continued)

Audit Subject*:	SYSTEM*: ELEC	SEISMIC	ASW	EDG	FIRE	AFW	RCS	RHR	SSPS	CCW	HVAC	RPS	CVCS	SI	MS	SFP	CONT**	CS**	MFW**	NI**
Comprehensive Procurement Program Audit	■			■				■												
2R5 Maintenance Quality Assessment Air Operated Valves	■						■				■		■		■				■	
2R5 SSOMI	■	■		■	■			■												
ASW Performance-Based Review			■							■										
Environmental Qualification Program Audit							■	■			■				■					
RHR SSFAR	■	■						■												
Westinghouse Support of Response to NRC Generic Letter 89-13 Inspection - CCW Temperature Evaluation			■					■		■	■		■	■						
1R6 SSOMI - Design		■	■			■	■			■	■								■	
1R6 SSOMI - Installation	■		■	■		■	■				■	■			■					
Generic Letter 89-10 Program Audit	■	■	■			■		■			■		■	■			■	■	■	
Post Fire Safe Shutdown					■															
2R6 Technical Support Outage Assessment	■		■	■						■							■	■		
Procurement				■																
1R7 SSOMI - Design	GS	■	■	■									■				■		■	
1R7 Technical Support Outage Assessment	G		■	■			■	■					■		■			■	■	
1996 Annual/Biennial/Triennial Fire Protection					■															
2R7 Technical Support Outage Assessment	■	■		■			■	■		■		■		■	■					
Third Quarter 1996 Audit - NTS Activities	G	■	■	■	■										■	■				
1996 Engineering Self-Assessment				■		■														

TABLE 2 Key System and Topical Area Audits and Assessments (continued)

* KEY:

SSFAR - safety system functional audit and review
SSOMI - safety system outage modification inspection

#R# - unit number, refueling outage number
ELEC - electrical (site except as noted)
S - site electrical (25 kV and lower)
G - grid electrical (230 kV and higher)
ASW - auxiliary saltwater
CR - control room
CS - containment spray
HVAC - heating, ventilation, and air conditioning
AFW - auxiliary feedwater
CCW - component cooling water
RHR - residual heat removal
SEISMIC - seismic qualification and SISIP

RPS - reactor protection
SSPS - solid state protection system
CONT - containment
SFP - spent fuel pool
EDG - emergency diesel generators
RCS - reactor coolant system
NI - nuclear instrumentation
SI - safety injection
CVCS - chemical and volume control system
MS - main steam
MFW - main feedwater
FIRE - fire protection and Appendix R

** CONT, CS, MFW, and NI were not rated with respect to "core damage frequency." Containment and containment spray are important to mitigating a containment release.

(b) Inspection Programs

PG&E performs inspections of quality-related and nonquality-related systems, equipment, and materials at DCPP as a means of ensuring adequacy in performance. These inspections, often referred to as Quality Control inspections, are performed in accordance with established procedures (AD5.ID1, Ref. 1.125), and generally involve direct inspection of items; however, monitoring of the process used to control quality may also occur. In addition, these inspections may occur during or after work activities, or may occur independent of specific activities. These formal inspections are in addition to the routine inspections or checks that are performed by foremen or supervisors in the normal course of overseeing the status of maintenance and modification activities. The identification of adverse conditions also is documented in accordance with procedure (OM7.ID1, Ref. 1.56).

(c) Self-Assessments

The PG&E Engineering department has recently (1994) started performing self-assessments. These self-assessments have, among other things, examined the effectiveness of Engineering staff in understanding, maintaining, and communicating the DCPP design bases. The assessments are performed to evaluate Engineering effectiveness, from a qualitative "how-are-we-doing" perspective and from a results-oriented objective comparison of work products against requirements.

Early self-assessments were conducted with an informal process that permitted qualitative judgments, but they did not provide the documented evidence necessary to demonstrate compliance or problems with procedures, design bases, etc. This informal process made effective response to findings difficult. Consequently, in 1996 the Engineering Self-Assessment Team (ESAT) performed an assessment in accordance with DCPP procedure (OM4.ID12, Ref. 1.100) and NRC Inspection Procedures 37550, "Engineering," and 40500, "Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems."

Systems and activities were selected for review in the ESAT based on safety significance and prior assessment or audit history. The selected systems and activities were rigorously examined. The plant configuration was compared to calculations, drawings, the Final Safety Analysis Report (FSAR) Update, DCMs, and other requirements. Operations and maintenance activities were observed and personnel were interviewed.

Engineering staff responses to previously identified problems were also reviewed. Results, including source documentation, logic, and conclusions, were documented in sub-assessment reports for each aspect of engineering activity examined, and collectively summarized in the ESAT final report. Results requiring action were also documented in the formal problem identification and corrective action process. Forty-four Action Requests (ARs)[9] and five Quality Evaluations (QEs) were initiated.

PG&E has made extensive use of industry peers in its audits, inspections, and self-assessments. This external input has provided a broader perspective and has helped to strengthen existing programs.

(3) External Inspections and Assessments

Inspections and assessments performed by organizations that are external to PG&E also provide for problem identification. These organizations include the NRC and the Western Region Joint Quality Assurance Group (WRJQAG), a group of representatives from the QA departments of several utilities in the western U.S. that performs Joint Utility Management Audits (JUMAs) (Refs. 2.35, 2.36, 2.37, 2.38). Findings from these external inspections and assessments are addressed in a similar manner as internally identified problems. Further discussion on the results of such assessments are provided later in this section.

(4) External Industry Issues and Events

PG&E has a process for assessing industry operating experience (OM4.ID3, Ref. 1.101) that evaluates information from outside sources to prevent similar problems from occurring at DCPP. These outside sources include the NRC, the Institute of Nuclear Power Operations (INPO), and various vendors. Since 1980, industry operating experience information has been reviewed for DCPP as required by procedure OM4.ID3, except GLs and Bulletins issued since early 1994 that require formal response. The GLs and Bulletins are addressed by the Nuclear Safety Assessment and Licensing group as required by procedure (XI1.ID1, Ref. 1.102), "Regulatory Correspondence Processing."

If there is an issue with potential for impact on the DCPP design or licensing bases, the issue is considered a potential problem and an AR is prepared and

[9] The AR is a computer record of a specific action, documented in the Plant Information Management System (PIMS). ARs have been in use since June 1985. QEs are a formal problem classification. ARs and QEs are further explained in the following pages.

processed through resolution in accordance with the problem resolution process governed by OM7 (Ref. 1.55).

(5) Employee Observations

The Problem Identification and Resolution process (Ref. 1.56) is the general process for the identification of problems. Employees who discover a problem (regardless of classification) are responsible for reporting the problem (by initiating an AR or NCR, or by reporting the problem to a supervisor).

In addition, PG&E has an Employee Concerns Program (ECP) (Ref. 1.103) that allows for the anonymous identification of problems. The ECP (and its associated Hotline) serves as an alternative method for reporting concerns when employees desire anonymity or feel the established corrective action program has not resolved their concerns. More recently, PG&E also instituted an Event Trend Record (ETR) system for low-threshold problem reporting, using "gold cards." This system is briefly described in the following discussion.

Problem Significance Classifications

The Problem Identification and Resolution process (Ref. 1.56) provides for different levels of quality problem significance classification. The most significant level is a nonconformance and is addressed in accordance with the NCR process (Ref. 1.57). The next level is a quality problem requiring a QE, and is processed in accordance with the QE process (Ref. 1.107). The third quality problem level is an "A" type AR and is processed as a simple corrective action (Ref. 1.56). Instructions for determining the classification of such problems are provided in procedures (Ref. 1.56). Finally, nonquality problems are processed on ARs, and nonproblem events, issues, and conditions that may be precursors to quality problems may be directly entered into PIMS or documented in the ETR system using "Gold Cards."

The extent of evaluation, determination of cause, and corrective action is directly proportional to the significance classification. These classifications are briefly described as follows:

(1) Nonconformance Reports

NCRs represent quality problems that constitute significant conditions adverse to quality. A quality problem is classified as an NCR if it meets one or more criteria explicitly defined in DCPP procedures, including, for instance, a substantial programmatic or implementation breakdown in the QA program, or management direction for significant issues.

The NCR process (Ref. 1.57) contains the most rigorous controls for documentation, formal root cause analysis, reviews and approvals, and verification of corrective action completion. In general, a team of individuals, designated as the Technical Review Group (TRG), is assembled to review the issues and resolve the identified problems. If significant abnormal events require a more immediate or direct response by plant management than is normally afforded by a TRG, an Event Investigation Team (EIT), an Event Response Team (ERT), or an Integrated Problem Response Team (IPRT) (Ref. 1.104) is convened. These teams are assembled to provide management with a complete and timely understanding of a serious problem, and to provide an immediate response to correct or mitigate the consequences of the problem. Management personnel are responsible for chairing these teams and ensuring timely resolution to the problems.

The root cause for NCRs is formally evaluated and documented as a part of the problem resolution process (Ref. 1.105). The evaluation process uses a "Cause and Effect/Barrier Analysis" or an "Event and Causal Factors Charting Analysis," and is aimed at recognizing, understanding, and correcting the factors that caused the problem. However, alternate root cause analysis by a recognized, industry-accepted method may also be used with concurrence of a "Root Cause Advisor." A program designated as the Human Performance Enhancement System (HPES) program also may be used to identify, evaluate and correct the root cause of problems that occurred because of inappropriate action, near misses, or other potential problems (Ref. 1.106).

NCRs can be identified based on findings due to external processes, such as NRC inspections, or internal self-assessment activities, such as QA audits. NCRs can also be identified by DCPP staff during routine plant activities. Where reporting requirements are met, issues identified through NCRs are reported in Licensee Event Reports (LERs). Some recent examples of NCRs that have been reported in this fashion include (1) review pursuant to 10 CFR 50.59 of a procedure change (NCR N0002008, Ref. 5.25); (2) flashing of CCW at containment fan cooler units (NCR N0001977, Ref. 5.26); and (3) adequacy of 230-kV electrical system during outages (NCR N0001911, Ref. 5.27).

(2) Quality Evaluations

Problems at the next lower level of significance are classified as quality problems requiring a QE. The QE process as defined in OM7.ID2 (Ref. 1.107) is used to evaluate and resolve these problems. This classification is used for quality problems when requested by management, when required by other procedures, or for problems that do not require an NCR but do require a root cause analysis.

QEs receive root cause analysis when warranted by their significance (Ref. 1.105).

QEs also are used for the documentation and disposition of audit findings written by NQS internal auditors as a result of implementing the internal audit process (Ref. 1.108). Such a document, called a QE-Audit Finding Report or QE-AFR, is similar to the QE, but contains additional documentation provisions for the audit process.

In addition, a QE is occasionally used for the analysis and resolution of plant reliability issues on components or systems that are not quality-related (Ref. 1.99). When such use occurs, the document is identified as a Balance-of-Plant-QE or BOP-QE.

The QE process provides for the documentation of immediate corrective action, root cause determination, and corrective action to prevent recurrence. QEs are evaluated and resolved by the assigned department. This process provides management oversight of the planning and scheduling, and resolution verification, of quality problems. Root cause analyses are performed in the same manner as described for NCRs. Concurrence with planned corrective actions is provided by NQS.

(3) "A"-Type Action Requests

The next lower tier of quality problems is an "A"-Type AR (Ref. 1.56), which records the problem and allows assignment for resolution. This type of problem does not require root cause analysis. The resolution is documented in the AR in which the problem was reported.

(4) Gold Cards and Event Trend Records

A lower-threshold event reporting method designated as the "Gold Card" was instituted in early 1996. This mechanism is intended to allow identification of the occurrence of low-level, precursor-type issues and to provide for resolution before they become more significant. This mechanism is not to be used in lieu of an AR. The Gold Cards are collected and reviewed by NQS, and ETRs or ARs are initiated as required. Information from Gold Cards is entered into PIMS as an ETR and tracked to assist in the early identification of low-level performance trends or occurrences that might eventually lead to a more serious problem. Events may also be entered directly into the ETR system without the need for a "Gold Card."

General Problem Resolution Process Flow

The key steps in the flow of the problem resolution process are as follows:

(1) Upon identification, problems are normally documented in an AR (Ref. 1.56). An AR can be written by anyone in the organization and must specify the priority. If the problem affects, or could affect, plant equipment, the initiating department notifies the appropriate shift foreman.

(2) Problems transmitted to the shift foreman are reviewed to determine if there are immediate operability or reportability concerns. If the operability status of an item is not immediately known, the shift supervisor can request an evaluation by the appropriate Engineering personnel (Ref. 1.117). If the effect of the problem on equipment operability is not immediately apparent or cannot be immediately determined, a process designated as "Issues Needing Validation to Determine Impact on Operability" (INVDIO) (Ref. 1.118) is used. Specific time frames are allotted for these processes to ensure that the plant will operate safely and meet Technical Specifications (Ref. 1.119) and Equipment Control Guidelines (Ref. 1.114) requirements. The AR is then routed to the organization responsible for problem evaluation/resolution.

(3) The initiating organization ensures that the AR is reviewed and that the shift foreman has been notified if required.

(4) The initiating and/or responsible organization reviews the AR for significant quality problems that constitute a nonconformance.

(5) In addition to the reviews performed by the initiating and receiving organization, the AR is reviewed by other organizations and groups to ensure timely identification and implementation of actions for which they are responsible:

(a) The Daily AR Review Team (DART) reviews ARs that report problems. The reviews are conducted on the next working day following AR initiation. The DART is a cross-discipline group from Operations Services, Maintenance Services, Engineering Services (two members), and NQS. The team reviews new ARs to assess significance, ensure that immediate actions are initiated when required, elevate concerns requiring management attention, and identify adverse trends.

(b) Where needed, Prompt Operability Assessments (POAs) are performed by the Engineering staff. POAs document the rationale for why a degraded plant condition does not impact the ability of equipment to perform its safety function. The POA procedure (OM7.ID12, Ref. 1.117) is activated after an AR is prepared or at any time during problem resolution in accordance with the AR procedure (OM7.ID1, Ref. 1.56), once the shift foreman and shift supervisor are notified of a problem that might have an impact on safety or equipment operability. The POA is normally performed and documented by the end of the operating shift during which it was determined that a POA is necessary, and is required by procedure to be documented no later than 24 hours following the determination that a POA is necessary.

Necessary verification and resolution for POAs is performed using the problem resolution process in accordance with procedures on ARs, QEs, NCRs, and Operability Evaluations (OEs). OEs are formal follow-up evaluations that are performed, as necessary depending on plant conditions and equipment operability issues, to specifically confirm the conclusions of POAs. The conclusion and basis of OEs must be documented and receive review and approval by the Plant Staff Review Committee (PSRC) and plant manager. The OE procedure (OM7.ID8, Ref. 1.109) is written in conformance with GL 91-18 (Ref. 3.19).

(c) Quality problems identified in ARs that involve an NCR or QE are reviewed by the DCPP Regulatory Services group to determine if the problems identified are reportable and then to initiate appropriate reporting actions (Refs. 1.57, 1.107, and 1.110). Operability issues are evaluated for reportability to the NRC in accordance with the requirements of various sections of 10 CFR 50. More specifically, reporting requirements on issues that may be pertinent to design and configuration control are primarily specified in the Technical Specifications (Special Reports related to equipment operability or potential performance degradation), 10 CFR 50.72 (Immediate Notification Requirements), 10 CFR 50.73 (LERs), and 10 CFR 50.9 (Completeness and Accuracy of Information). These requirements include specific provisions for the timing of reports, based on the significance and potential impact of an event. For instance, notification of certain plant events or conditions are required within one hour or four hours of event occurrence, and submittal of LERs is required within 30 days of event occurrence. These and other regulatory reporting requirements (e.g. 10 CFR 21), have been incorporated into the DCPP Technical Specifications as well as administrative procedures (XI1.ID2, Ref. 1.110). Occasionally, PG&E also provides voluntary LERs on events that are not required to be reported, but that may be of interest to the NRC for other reasons.

(6) Actions on ARs, QEs or NCRs are assigned to the department or section that has the responsibility for that particular aspect of the plant. Those individuals selected are required to have the expertise necessary to resolve the problems (Ref. 1.56).

(7) Root cause evaluations (Ref. 1.105) and the development of corrective actions to prevent recurrence are performed for NCRs and usually for QEs. For NCRs, the root cause analysis generally is performed by NQS personnel, and overall NCR resolution is reviewed by the PSRC for concurrence. NQS reviews QEs for concurrence with the resolution.

(8) Independent verification of the completion of corrective actions for NCRs and QE-AFRs is performed by NQS. Independent verification of completion of corrective action is required for QEs and "A" type ARs as well. It is usually performed by individuals who are not directly involved with the problem but are within the department responsible for the resolution of the problem.

(9) As follow-up to determine the effectiveness of corrective actions, the PSRC can request written updates six months after an issue is closed.

(10) Quality problem ARs are collectively reviewed to identify trends in accordance with a Quality Trend Analysis Program (Ref. 1.111). ETRs are created for quality problems and are reviewed to identify the presence of repetitive occurrences and adverse trends.

The processes for problem identification and resolution have been enhanced continually. These enhancements have reinforced the processes in areas of identified weakness based on lessons learned and on feedback from audits and assessments. Some of the more recent enhancements include:

(1) Formation of the DART to review ARs (OM7.ID1, Ref. 1.56) for significance and quality problem determination to ensure immediate actions are initiated as required, to elevate concerns requiring management attention, and to improve the POA process (Ref. 5.31)

(2) Enhancements to the NCR process (OM7.ID3, Ref. 1.57) to improve the monitoring of corrective action effectiveness and the timely resolution of NCRs

(3) Initiation of low-level event or condition trending in ETRs (OM7.ID10, Ref. 1.111)

(4) Enhancement of the QA internal audit process to identify generic implications (Ref. 1.108, OM4.ID13)

Training

NQS personnel who perform audits and assessments participate in Engineering Support Personnel (ESP) training and qualification programs pursuant to INPO requirements (TQ2.ID10, Ref. 1.140). Such training includes participation in ESP orientation, position-specific, and continuing training, as discussed in Section (a), Design and Configuration Control Processes. These personnel also have specific qualification guides that include specified knowledge and task requirements. In addition, NQS personnel who participate in engineering audits and assessments (including SSFARs and SSOMIs) participate in Lead Auditor Training as well as training in "Performance-Based Assessment" techniques. The latter consists of vertical-slice assessment approaches pertinent to performing SSFARs and SSOMIs.

NQS personnel who lead audits are qualified to the requirements of Regulatory Guide 1.144 (which endorses ANSI N45.2.23). Further, NQS personnel meet the qualification requirements of an "independent reviewer" pursuant to Regulatory Guide 1.8 and ANSI 18.1.

Engineering personnel receive training as described in Section (a), Design and Configuration Control Processes. One topic in Engineering Support Training is Problem Identification and Resolution, which discusses roles and responsibilities when a degraded condition is found, and the steps in initiating a POA.

Personnel who participate in the performance or review of root cause analyses receive qualification training in root cause analysis, in accordance with procedure (OM7.ID4, Ref. 1.105).

Overall Effectiveness

The overall performance of the problem identification and resolution processes is routinely assessed in various independent evaluations, including internal audits and assessments and inspections by the NRC. These processes, with particular emphasis on design basis conformance, have been determined to be generally effective through such assessments.

The discussion of performance results is divided into subsections focused on the following areas of performance:

(1) The ability to self-identify problems

(2) The effectiveness of the QA audit and assessment process

(3) The effectiveness of internal self-assessments

(4) The effectiveness of problem resolution processes

(5) Summary of effectiveness evaluations

The Ability to Self-identify Problems

PG&E believes that the problem self-identification process has been effective. Examples of two recent problems identified and addressed through these processes are:

(1) Flashing at the containment fan cooler units (CFCUs)

During the investigative phase to develop a design change to increase the CCW system design temperature, PG&E investigated the resulting change in the fluid conditions exiting the CFCUs for compliance with the design bases. A review of the calculation of record indicated that the proposed increase in design temperature would not cause boiling in the CFCUs. However, during this review, PG&E noted that the vital bus sequential loading of vital equipment during a loss of coolant accident (LOCA) concurrent with a loss of offsite power had not been analyzed.

During this sequence of events, the CFCU fans that were previously operating are deenergized but continue to windmill and to maintain forced convection of post-accident containment atmosphere over the CFCU coils. The CCW pumps also are initially deenergized, stopping the water flow, and restarted after a time delay. When this delay was taken into account, the resultant heat transfer caused the CCW inside the coils to boil off, resulting in a steam void and a subsequent water hammer when the pumps were reenergized. The DCPP design bases do not allow for CCW boiling at the CFCUs. This scenario has become a generic industry issue since neither Westinghouse (the CFCU manufacturer) nor other utilities considered it during the initial design (Ref. 5.26).

(2) Solid state protection system (SSPS)

During the development of the topical DCMs, an open item was identified regarding the scope of structures, systems, and components that are protected from earthquake-caused damage under the Seismically Induced Systems Interaction Program (SISIP). Circuits associated with signals generated at the 12-kV switchgear and main turbine front standard provide direct inputs to the SSPS for reactor trip under certain off-normal conditions. Damage to a combination of these circuits could render the SSPS unable to perform some of its safety-related functions.

An SISIP walkdown of these circuits was performed to assess their susceptibility to damage from nearby, nonseismically-qualified commodities. During this walkdown, an engineer questioned whether these same circuits might also be subject to other hazards, such as a main steam line break. A second engineer on the walkdown, more familiar with high energy line break (HELB) methodology, recognized the significance of the question. Subsequent reviews revealed HELB vulnerabilities at DCPP that had broader, industry implications, resulting in NRC Information Notice 95-01. An Integrated Problem Response Team was assembled at DCPP to thoroughly investigate this event, determine if other, similar conditions existed, and to recommend appropriate corrective actions. (Ref. 5.64)

PG&E believes that these two problems and other findings that have been documented and resolved as a result of the general problem resolution process indicate that PG&E has been effective in monitoring its own activities and identifying problems.

The Effectiveness of the QA Audit and Assessment Process

The effectiveness of the QA program at DCPP has been evaluated through JUMAs conducted by the WRJQAG. These audits generally are performed on a two-year frequency and serve to evaluate the effectiveness of a licensee's QA program, including problem identification and resolution processes. The most recent JUMA of DCPP occurred in 1995 (Ref. 2.38) and specifically reviewed the effectiveness of NQS audits and assessments of design changes and modifications important to safety. The NQS monitoring and evaluation of the performance of the Engineering organizations were identified as a strength. In this same audit, however, a declining trend in the QA program effectiveness was identified. PG&E considered this decline to be unacceptable, and initiated an NCR to address this issue and implement corrective action to resolve the JUMA concerns (NCR N0001950, Ref. 5.28). The primary reason for the declining trend was that "*aggressive, critical evaluations of plant programs and organizational performance [are] not always displayed.*" PG&E believes that the NCR actions resolve this issue.

It is worth noting, however, that the 1991 JUMA (Ref. 2.36) specifically recognized that the SSFAR and SSOMI reports were excellent, and the 1993 JUMA (Ref. 2.37) identified the SSOMI audit process as a QA strength. The 1989 JUMA noted that PG&E's audit program is implemented through a comprehensive system of well-planned and documented assessments of various activities. In addition, the NRC noted in an inspection on the SSFAR for the CCW system that "*both QA and the responding organizations committed considerable effort and resources to the audit and the resulting product was good*" (Ref. 3.33). Further, the SSOMIs were evaluated by the NRC in routine inspections. For instance, in an inspection report addressing the 1991 SSOMI, the NRC stated that "*the SSOMI was thorough and identified significant deficiencies, for which corrective actions were in progress*" (Ref. 3.5).

The NRC has reviewed the PG&E technical audit program in normal site inspection activities as well as special inspections. Through the program on Systematic Assessment of Licensee Performance

(SALP), the NRC consistently has recognized the depth of PG&E's technical audits and assessments. In particular, PG&E was recognized in 1989 as being "*on the forefront of the development of performance-based inspection activities with the implementation of SSFARs and the audit of their NSSS vendor*" (Ref. 3.41). While the 1989 SALP report also noted a concern with QA program audits of equipment suppliers, the QA audit programs were recognized as producing in-depth technical findings. Further, in the 1991 SALP report, the NRC considered as noteworthy the "*effective performance-based audit programs*" (Ref. 3.40). Although not specific to design audits, the 1992 SALP report noted that audits performed by the QA organization were generally good (Ref. 3.42). The report also noted that audits performed as QA initiatives showed significant technical depth and identified weaknesses in complex technical areas not typically reviewed by QA organizations. The 1994 SALP report characterized the independent NQS assessment of engineering activities as "*noteworthy*" and that it was performed in a "*probing, critical, and well-directed manner*" (Ref. 3.43). The 1996 SALP report observed that "*The audits conducted by the QA organization were supplemented by a department-level self-assessment. This initiative was new to the Diablo Canyon site and brought an improved technical quality to the performance review process and developed a sense of ownership which may promote improvement within the organization*" (Ref. 3.9).

The Effectiveness of Internal Self-Assessments

The effectiveness of PG&E's self-assessment activities was recently noted by the NRC. Again, as observed in the 1996 SALP report, the NRC stated that the department-level self-assessment "*improved technical quality to the performance review process* ...." The NRC also observed in the same report that "*engineering [staff] performed a number of thorough self-assessments, which combined with quality assurance audits were effective in identifying areas in need of improvement. Additionally, oversight groups were observed to be effective. Engineering generally demonstrated a strong safety focus and a positive approach to criticism*" (Ref. 3.9).

PG&E believes that the self-assessment process is a valuable tool to effectively identify problems and to focus attention on those areas in which the design bases could be compromised by routine plant activities.

The Effectiveness of Problem Resolution Processes

(1) QA Assessments

PG&E's QA program routinely conducts internal assessments of the problem identification and resolution processes. The following process characteristics are typically included in these assessments:

(a) Effectiveness of actions taken to resolve repetitive or similar concerns

(b) Identification of equipment and program trends

(c) Timeliness of corrective action implementation

(d) Consequence of untimely corrective action implementation

(e) Threshold at which problems are identified and addressed

(f) Adequacy of cause analysis

(g) Grouping of lower-level problems for review of generic or other concerns

The objective of internal audits typically is to assess the effectiveness of the corrective action program in resolving deficiencies, concerns, or problems that affect or potentially affect safety. Effectiveness is evaluated thorough the repetitiveness of equipment or program concerns, and through the identification and resolution of precursors to quality problems.

The results of the internal audits generally have confirmed that these processes are functioning properly. For instance, one QA audit report observed that, with some noted exceptions, there was "*evidence of quality problems being resolved in a timely manner, of corrective actions still being implemented long after quality problem closure, and areas where repeat problems were not recurring*" (Audit 960570014, p. 26, Ref. 2.46). Similarly, other QA audits observed that, with few exceptions, the "*NPG corrective action program was implemented effectively*" (Audits 95018I, p. 2; Ref. 2.43; and 94035I, p. 2, Ref. 2.44).

However, some significant exceptions had also been noted relating to corrective actions; the exceptions typically involved implementation of the corrective action process, such as "*effectiveness of some immediate corrective actions in preventing recurrence; ... timeliness of addressing ... findings; ... effectiveness of some corrective actions in preventing repeat problems ...*" (Audit 960570014, p. 26, Ref. 2.46). PG&E considers findings such as these to be useful in that they contribute to strengthening the problem resolution program.

(2) Self-Assessments

The results of a recent self-assessment concluded that the Engineering department had effective processes and generally had implemented them well, providing design and engineering services that conform to the design bases, and that "*Engineering was very effective at resolving most problems in a comprehensive manner.*" Structures, systems and components were found to meet their key design bases and functional requirements. However, there were a number of areas in which discrepancies and problems were identified that required correction. PG&E determined that these problems, while not individually significant, could cause degradation of configuration management controls if uncorrected (Ref. 5.21).

As a result of these self-assessment conclusions and past experience (Ref. 5.20), management established a formal full time team, the Issue Closure Team (ICT), to respond to the findings of the ESAT. A number of process enhancements and corrective actions were completed by this team. Examples included establishment of configuration management "Process Owners," training on licensing and design bases, and workload management and prioritization improvements. In addition, performance indicators were identified to monitor long-term performance and to ensure that problem resolution activities continue to be effective (Ref. 5.22).

(3) External Assessments

The NRC's observations of PG&E's problem identification and resolution processes have not always been favorable. However, PG&E believes that these concerns have been relatively few and that they have not involved significant programmatic deficiencies. For instance, the NRC review of root cause analysis (RCA) implementation expressed concern that not all NCRs included a systematic evaluation of root cause, and observed that "*there is no dedicated group of personnel with overall responsibility for the RCA program*" (Ref. 3.34).

Other NRC concerns indicated that "*while the initiation of corrective actions was effective, no person or group within the licensee's organization was responsible for driving the closure or resolution of action items*" (Ref. 3.35) or that "*the licensee's operability evaluations for deficiencies identified in the implementation of RG 1.97 was found to be weak in some areas*" (Ref. 3.36). PG&E believes that the necessary actions have been implemented to address these concerns. For example, as discussed earlier, currently the determination of cause for NCRs is formally evaluated and documented as a part of the problem resolution process. The NRC also stated more recently in Inspection Report 96-13 that PG&E "*had implemented an effective corrective action program, which encouraged identification and resolution of problems. ... [PG&E's] corrective action process, procedures and documents were acceptable to identify, process, track and conduct root cause analysis of problems and equipment deficiencies.*" Further, the NRC noted that PG&E's "*operating experience feedback program was functioning effectively, with procedures that were excellent in forwarding events to appropriate plant personnel*" and that the "*self-assessment process was effective.*" (Ref. 3.12)

Summary of the Problem Identification and Resolution Process

PG&E recognizes that internal and external assessments have identified weaknesses with these processes. Over the past few years, these weaknesses have included lower-threshold problems, trending of lower-level problems, timeliness of resolution (which had been more of a concern for lower level problems), the effectiveness of corrective actions to prevent problem recurrence, and the timely identification of operability issues. PG&E believes that it has responded and is continuing to respond well to process issues that are identified so that it can improve these processes. PG&E also believes that the historical record of these processes, and the problems that have been identified and resolved through these processes, together demonstrate that there is a proactive attitude to search for problems and a strong commitment to safety at DCPP.

Overall, PG&E believes that its problem resolution processes have functioned and continue to function well. This conclusion was recently validated in NRC Inspection Report 96-13 (Ref. 3.12) with the finding, "*in general, that [PG&E's] corrective action program was well structured, provided an effective process for identifying, resolving and preventing plant problems, and was properly implemented.*"

Summary Conclusions

PG&E has found its problem identification and resolution processes to be sound, effective, and well-structured. The processes, particularly the QA audit process, have been effective in identifying problems in design and configuration management. Recent improvements in the corrective action process have strengthened the critical programmatic reviews. The self-assessment evaluations implemented through these processes have provided valuable checks on the viability of the existing programs for design and configuration control, and have given additional confidence that operation and maintenance of DCPP are in conformance with its design bases.

While issues with the problem identification and resolution process periodically occur, PG&E has addressed them and used them to continue to improve the existing program. Overall, PG&E believes that its problem identification and resolution processes have been effective in identifying and correcting design basis and configuration control problems.

(e) OVERALL EFFECTIVENESS OF PROCESSES AND PROGRAMS FOR CONFIGURATION MANAGEMENT

This section provides PG&E's response to the following NRC request:

> (e) *The overall effectiveness of your [PG&E's] current processes and programs in concluding that the configuration of your [PG&E's] plant(s) is consistent with the design bases*

PG&E's response to items (a) through (d) above provides a step-by-step description and assessment of the effectiveness of the engineering design and configuration control processes that have been in place at DCPP since plant licensing, including those that implement 10 CFR 50.59, 10 CFR 50.71(e), and Appendix B to 10 CFR 50. In addition, there has been a comprehensive discussion of PG&E's problem identification and resolution processes, including actions to determine the extent of problems and actions to prevent recurrence. PG&E's response to the NRC question on the Design Basis Review and Documentation Program (in the following section), delineates how the DCPP design bases were redocumented between 1989 and 1994 with a more detailed and specific baseline. How that program resulted in enhancing DCPP's processes and programs for controlling design changes and ensuring that the plant is operated within its design bases is also described. PG&E believes that these processes have contained the appropriate requirements, checks, and balances to provide the necessary assurance that the plant complies with and will continue to remain within its design bases as defined in 10 CFR 50.2. The remainder of this section discusses the basis for this conclusion.

The reviews conducted in preparation of this response have included analyses of numerous audits, assessments, and inspections that evaluated the results of the pertinent processes since 1987, and in some cases, before 1987. Included in these reviews were Design Criteria Memoranda (DCMs), design change and other key configuration control processes, as well as PG&E's process for making changes to operations, maintenance, and testing procedures. PG&E also has performed reviews of several safety-related plant systems and programs, including the emergency diesel generators, the auxiliary feedwater system, and the fire protection program. This effort also included reviews of selected QA audits and inspections as well as assessments by outside organizations, such as the NRC and the Western Region Joint Quality Assurance Group.

(e) Overall Effectiveness of Processes and Programs

Over the operating life of the plant, dozens of audits and surveillance reviews of plant systems have been performed by the Quality Assurance (QA) organization. Figure 4 shows the extent of these audits, which included five extensive Safety System Functional Audit and Reviews (SSFARs) and 13 Safety System Outage Modification Inspections (SSOMIs), and many routine system and process audits. Figure 5 shows that numerous NRC inspection activities reviewed the same systems and topics. Figure 4 audits often involved in-depth reviews by multiple personnel. Figure 5 represents the number of individual reviews or inspection activities relating to a particular system as identified in NRC inspection reports. While the two sets of numbers are not directly comparable, they do indicate that there has been significant scrutiny of most key systems, both internally and externally.

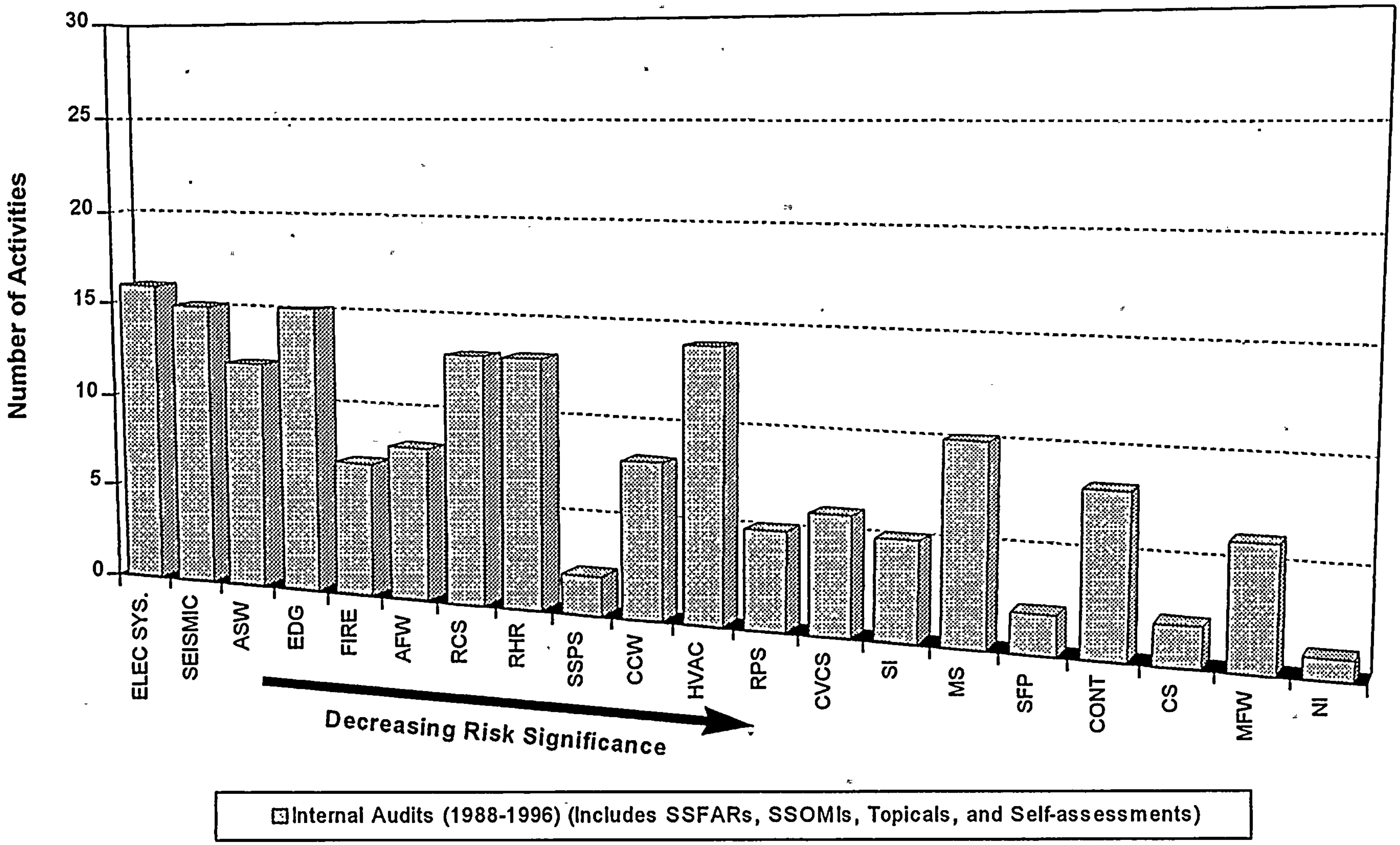
For example, as discussed in Section (d), Processes for Problem Identification and Resolution, the Engineering Self-Assessment Team "*found that engineering is generally effective, and programmatic controls meet regulatory standards.*" The Joint Utility Management Audits (JUMAs) also noted that the PG&E audit program has been implemented through a comprehensive system of well-planned and documented assessments of various activities, and that the SSFARs and SSOMIs particularly were performed in an excellent manner. While several JUMA findings also were critical of PG&E's corrective action programs, PG&E has taken significant steps to address those findings.

The effectiveness of PG&E's processes and programs for ensuring design and configuration control during operation at DCPP can also be assessed through a review of Licensee Event Reports (LERs) and NRC inspection findings. Since 1987, the number of LERs involving design basis issues has remained low, typically on the order of one or two a year for each unit. In the majority of cases, design basis issues were identified primarily as a result of PG&E's processes and programs, and none of these events would have precluded a structure or system from performing its intended safety function.

A review of NRC inspection reports since 1987 has reflected similar results. A majority of NRC inspection reports indicates that the design control and design change processes appeared to be well-maintained and effective. The NRC also frequently observed that the knowledge of engineering personnel appeared noteworthy and that the consistency between design documentation and the physical plant configuration appeared to be generally well maintained. In those instances in which the NRC observed that plant configuration did not agree with design documentation, there was no significant impact to the safe operation of the plant.

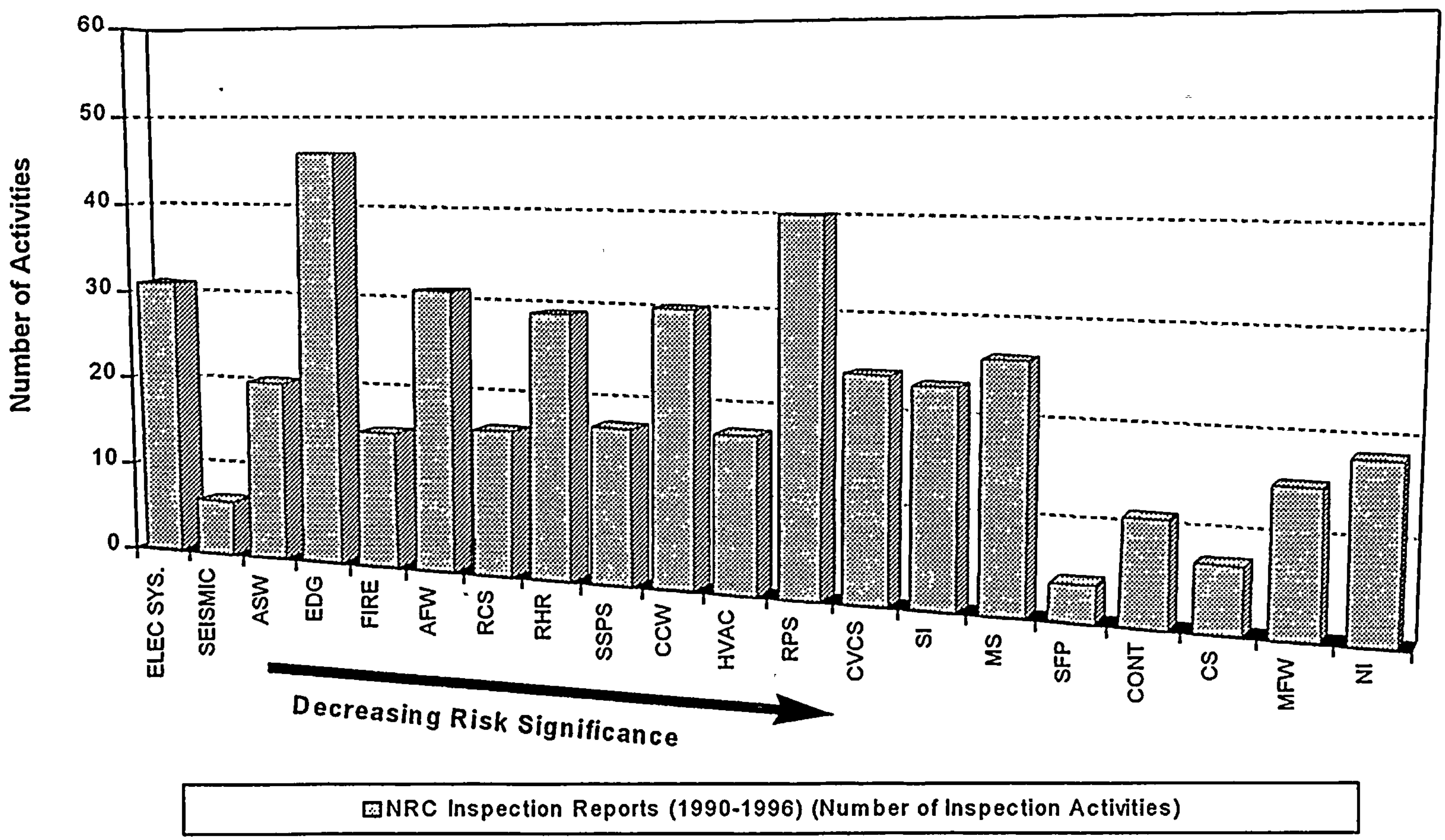
In summary, while configuration inconsistencies have been identified, PG&E believes that they would not have prevented the safe operation of the plant had they remained undetected. Based on these observations, PG&E believes that its processes and programs have been effective in ensuring design and configuration control during operation.

Figure 4: Internal Audits



NOTE: Legend for systems is given on page 98.

Figure 5: NRC Inspection Report Activities



NOTE: Legend for systems is given on page 98.

(e) Overall Effectiveness of Processes and Programs

PG&E management recognizes that configuration control is and will continue to be a critical element in the maintenance and operation of DCPP. To that end, PG&E has continuously and voluntarily pursued actions beyond those required by the NRC to ensure that design bases are maintained during operation of the plant. PG&E actions in this regard have included major plant improvement projects that have been implemented over the past 11 years since commercial operation. Both the design and the design bases of the plant, as relevant to these major projects, were reviewed as a part of the design change process in implementing the plant modifications. Thus, these plant improvements have provided an additional mechanism for verifying conformance with the design bases. These projects include: (1) replacement of the 4-kV breakers; (2) replacement of the plant vital batteries; (3) replacement of the plant process computer; (4) removal of the boron injection tank; (5) elimination of the reactor coolant loop resistance temperature detector bypass; (6) replacement of the diesel fuel oil tank and improvement to the diesel fuel oil transfer system; (7) conversion to VANTAGE-5 nuclear fuel; (8) installation of new steamline break protection logic; (9) installation of the digital feedwater control system; (10) installation of the Eagle 21 process protection system; and (11) installation of a sixth emergency diesel generator.

Since PG&E acted as its own architect/engineer for DCPP's original design and construction, PG&E engineers and designers performed the majority of balance-of-plant design and much of the NSSS detailed design. PG&E has retained this responsibility throughout DCPP's history (in conjunction with Bechtel during the 1982 - 1985 period). This active participation has provided PG&E with a strong knowledge of how the plant meets the design bases, not only from an operating perspective, but also from a design engineering perspective. In addition, PG&E has managed the work of contractors and vendors and worked in close partnership with its key vendors (e.g., Westinghouse, by maintaining Westinghouse personnel at both DCPP and in the San Francisco PG&E engineering facilities; coordinating and sharing ongoing engineering, design and analytical work; and sharing design basis information electronically). This continued interaction between PG&E and Westinghouse personnel has produced a more complete and thorough knowledge of the plant design bases.

PG&E also has participated in numerous industry efforts to enhance plant performance in general, and to improve design and configuration control practices in particular. For instance, in response to NRC and industry concerns, PG&E established the system engineering program in the late 1980s to ensure timely and thorough engineering support for plant activities. In addition, while the Long Term Seismic Program (LTSP) was required as an operating license condition, PG&E pursued development of its Probabilistic Risk Assessment (PRA) program, not only as a part of, but subsequent to, the completion of the LTSP. Thus, PG&E was among the first licensees to use PRA in addressing plant safety and performance issues, including the NRC's requirements on IPE programs.

Further, PG&E participated aggressively with Westinghouse on Improved Standard Technical Specifications efforts, and DCPP was a lead plant in Region V (now Region IV) on Design Basis

Reconstitution. These additional efforts reflect that PG&E management is committed to ensuring that the plant continues to conform to its design bases.

In assessing the overall effectiveness of its processes and programs for configuration control, PG&E recognizes that qualified, committed plant personnel are vital to successful plant performance and that enhancements to the facility and a dedicated and well-trained plant staff are necessary to ensure the plant will continue to conform to its design bases. PG&E's philosophy has been to obtain and retain excellent personnel and to continuously develop their skills and experience.

As noted previously, in addition to operating and maintaining the plant since construction, PG&E has performed much of the DCPP design and construction internally, providing a challenging and rewarding environment for the nuclear power organization and a pool of knowledgeable design basis expertise. PG&E and its personnel excellence are demonstrated by its leadership positions in industry committees and standards groups, and by its identification of generic issues.

In addition to obtaining and retaining excellent personnel, PG&E supports their continued improvement through participation in industry activities, specific technical education and training, and an extensive DCPP training program. PG&E believes that the results of this focus on personnel have been reflected in DCPP's excellent operating record.

For the reasons discussed above, PG&E is confident that the DCPP design bases have been properly incorporated into plant design and are readily accessible through existing documentation and that these design basis requirements have been properly translated into operating, maintenance, and testing procedures. DCPP's system, structure, and component configuration and performance have been and are consistent with DCPP design bases. PG&E also believes that the DCPP design and configuration control processes have the required attributes to maintain design basis consistency. While problems have been and will continue to be found, they have been corrected through PG&E's processes for problem identification and resolution. Further, these identified problems have been used to make improvements to the processes. Accordingly, PG&E is confident that the current processes and programs provide reasonable assurance that the configuration of DCPP is consistent with the design bases.

(f) DESIGN BASIS REVIEW AND DOCUMENTATION PROGRAM

This section provides PG&E's response to the following NRC request:

> In responding to items (a) through (e), indicate whether PG&E has "*undertaken any design review or reconstitution programs, and if not, a rationale for not implementing such a program*"

Introduction

PG&E has previously implemented and currently maintains a design basis documentation program[10] that ensures that the design bases have been translated into, and have been properly maintained in the design, maintenance, testing and operation of Diablo Canyon. PG&E's confidence in the effectiveness of this program is based on the following factors:

(1) From 1989 to 1994, PG&E implemented a DCM program to provide enhanced documentation and verification of the design bases

(2) As a part of the enhanced DCM program, PG&E reviewed a number of Maintenance, Testing, and Operations procedures to ensure that they accurately reflected the design bases

In support of the basis for this conclusion, PG&E will discuss the development of the enhanced DCM program and the reviews that have been undertaken to ensure that it currently supports compliance with the design bases. PG&E will then discuss the DCM enhancement process, the verification of transfer of design bases, and the revision process for DCMs. In the following

[10] While PG&E initiated its Configuration Management Program (CMP) prior to NRC and NUMARC 90-12 (Ref. 5.29) guidance, PG&E believes its Design Criteria Memorandum enhancements and other CMP activities met the intent of NUMARC 90-12, and the NRC's policy on design bases reconstitution (57FR35455; August 10, 1992). These activities are often referred to as "Design Bases Reconstitutions." However, it should be recognized that while PG&E's program provided new, controlled primary source documents that collected and improved the design bases descriptions and consistency, and some new or "reconstituted" calculations, PG&E did not, in general, reperform calculations or analyses, because prior activities (as discussed in the Background and History paragraphs of the Introduction) had provided adequate confidence in the calculations.

discussion, note that PG&E designates its documents "Design Criteria Memoranda," whereas the rest of the industry typically uses the term "Design Basis Documents."

Development of the Enhanced DCM

In 1987, based on the industry's move toward performance-based audits, PG&E began its own program of SSFARs and SSOMIs. After reviewing the results of these technical audits and NRC inspections, as well as the configuration management deficiencies identified at other plants, PG&E management formed a Configuration Management Task Force (Ref. PG&E letters to NRC, DCL-88-236 and DCL-89-099, Refs. 5.1, 5.2). The Configuration Management Task Force compared PG&E's configuration management practices with others in the industry. The task force concluded that although the DCPP design bases were retrievable and could be effectively used in the design process, the design bases were not in the format recommended by the industry. In addition, although the design bases were available and adequate for use by engineering staff, documentation was not easily accessible or understood by plant personnel. As a result of the task force review and recommendations, PG&E implemented a Configuration Management Program (CMP).

To address the design basis format concerns, PG&E implemented a DCM enhancement program as part of the CMP. As a result of this program, the original DCMs were revised into a new format that provided a more complete compilation of the various design bases. In addition, references to the sources of the design basis information were clarified.

Prior to this effort, DCMs had existed for some systems, structures and topical areas. However, these documents were in an abbreviated format that did not facilitate an understanding of the design bases. The enhanced DCM effort intended to make the information easily accessible, while at the same time provide a better understanding of where and how that information was determined. The enhanced DCMs were developed by a task force led by Engineering, with review and comment provided by other plant disciplines and groups.

The DCM enhancement effort started in 1989 and continued through 1994, when the program was officially declared complete. The original program was aggressive and identified the preparation of a total of 111 enhanced DCMs. The scope was later reduced to 89 enhanced DCMs, based on the remaining items being nonsafety-related and an evaluation of the expected benefit in relation to the required effort. The 89 DCMs that were written included all safety-related and important-to-safety systems, structures and topics. Various nonsafety-related systems, structures, and topics that had the potential to challenge safety-related systems, structures and components, were also included, as were others that PG&E management considered to be of particular importance. Lists of the enhanced DCMs for both safety-related and nonsafety-related systems, structures, and topics are provided below:

DCMs for Safety-Related Systems and Topics

DCM NUMBER	TITLE
DCM S-3B	Auxiliary Feedwater System
DCM S-7	Reactor Coolant System
DCM S-8	Chemical and Volume Control System
DCM S-9	Safety Injection System
DCM S-10	Residual Heat Removal System
DCM S-12	Containment Spray System
DCM S-13	Spent Fuel Pool Cooling System
DCM S-14	Component Cooling Water System
DCM S-16	Makeup Water System
DCM S-17B	Auxiliary Saltwater System
DCM S-18	Fire Protection System
DCM S-21	Diesel Engine System
DCM S-23A	Containment HVAC System
DCM S-23B	Main Auxiliary Building Heating and Ventilating System
DCM S-23C	Miscellaneous Auxiliary Building HVAC Systems
DCM S-23D	Fuel Handling Building Heating and Ventilation System
DCM S-23E	Turbine Building HVAC System
DCM S-23F	Control Room HVAC System
DCM S-23G	Intake Structure Ventilation System
DCM S-25B	Backup Air/Nitrogen Supply Systems
DCM S-37	Nuclear Instrumentation System
DCM S-38A	Plant Protection System
DCM S-39	Radiation Monitoring System
DCM S-42A	Fuel Handling System
DCM S-42B	Fuel Handling Cranes and Storage Racks
DCM S-63	4160 Volt System
DCM S-64	480 Volt Electrical System
DCM S-65	120 Volt Alternating Current System
DCM S-67	125V/250V Volt Direct Current System
DCM T-1A	Containment Structure - Exterior
DCM T-1B	Containment Structure - Interior
DCM T-1C	Containment Structure - Annulus
DCM T-1D	Containment Structure - Liner
DCM T-1E	Containment Pipeway Structure
DCM T-1F	Containment Plant Vent
DCM T-2	Auxiliary Building

DCM NUMBER	TITLE
DCM T-3	Structural Design of the Fuel Handling Building Steel Superstructure
DCM T-6	Seismic Analysis of Class 1 Structures
DCM T-7	Structural Design of Design Class I HVAC Ducts and Duct Supports
DCM T-8	Structural Design of Electrical Raceways and Class 1E Supports
DCM T-9	Wind, Tornado and Tsunami
DCM T-10	Seismic Qualification of Equipment
DCM T-11	Control of Heavy Loads
DCM T-12	Pipe Break (HELB/MELB) Flooding and Missiles
DCM T-13	Appendix R Fire Protection
DCM T-14	Seismically Induced System Interaction
DCM T-15	Radiation Protection
DCM T-16	Containment Function
DCM T-18	Electrical System Protection
DCM T-19	Electrical Separation and Isolation
DCM T-20	Environmental Qualification
DCM T-22	Electrical Cable, Termination and Raceway
DCM T-23	Miscellaneous Electrical Devices
DCM T-24	Design Criteria for DCPP Instrumentation and Controls
DCM T-25	Pipe Stress Analysis
DCM T-26	Pipe Support Analysis
DCM T-28	Design Class I Outdoor Water Storage Tanks
DCM T-29	Pipe Rupture Restraints
DCM T-31	Safety-Related Masonry Walls
DCM T-32	Containment Coatings (Class 1)
DCM T-33	Remote Shutdown Criteria
DCM T-38	Criteria for the Design of Instrument Tubing and Supports
DCM T-42	Station Blackout

DCMs for Nonsafety-Related Systems and Topics

DCM NUMBER	TITLE
DCM S-2A	Condensate System
DCM S-2B	Condensate Polishing System
DCM S-3A	Main Feedwater System
DCM S-3C	Main Feedwater and Steam Dump Control System
DCM S-4	Turbine Steam Supply System
DCM S-11	Nuclear Steam Supply Sample System
DCM S-19	Liquid Radwaste System
DCM S-24	Gaseous Radwaste System
DCM S-25A	Compressed Air System
DCM S-38B	ATWS Mitigation System Actuation Circuitry (AMSAC)
DCM S-43A	Plant Process Computer
DCM S-43B	Annunciator System
DCM S-52	Emergency Response Facility Data System
DCM S-61A	Main Generator and 25 kV System
DCM S-61B	500 kV and 230 kV Systems
DCM S-62	12 kV System
DCM S-68	Lighting, Heat Trace and Cathodic Protection Systems
DCM S-78	Solid Radwaste System
DCM S-98	Penetration Seals
DCM T-4	Structural Design of the Turbine Building
DCM T-5	Structural Design of the Intake Structure
DCM T-17	Long Term Cooling Water
DCM T-21	Grounding
DCM T-36	Secondary Chemistry Sampling System and the Secondary Process Control Room
DCM T-39	Maintenance Shop Expansion
DCM T-40	Toxics and Explosive Materials

The DCM Enhancement Process

In addition to the format and editorial changes, PG&E's DCM enhancement activities included the review of associated license requirements: commitments, codes and standards; correspondence with the NSSS and other key suppliers; and analyses and calculations. This process specifically included a review of the FSAR Update and the Technical Specifications to ensure compatibility between these documents and the design bases.

As a part of the DCM enhancement process, missing information and information needed to improve the understanding of the design bases were identified as open items. The open items were documented and addressed through PG&E's problem resolution process. Each open item was evaluated for its safety significance and, if determined to be significant, was promptly addressed. In addition, open items that met the requirements of 10 CFR 50.72 and 50.73 were reported to the NRC.

Open items that were considered to be safety-significant were required to be addressed prior to issuance of the associated DCM. Only those open items judged to be nonsafety-significant were allowed to be carried as an open item in the DCMs. Through this process, approximately 1,300 open items were identified in the initial issue of the enhanced DCMs. The exact number of original open items is not available because they were not tracked directly as a part of the DCM process. The number of significant open items also was not tracked. However, the number of open items that resulted in the identification of quality problems was relatively low. PG&E has addressed and closed the vast majority of the original open items; approximately 130 low priority items remain to be closed.

Verification of Transfer of Design Bases

To verify the accurate transfer of the design bases to the maintenance, testing, and operation procedures, and to ensure that the DCMs met the requirements of the end users, various groups including Operations, Maintenance, and System Engineering, were requested to review the DCMs. These reviews were specifically targeted toward ensuring the incorporation of the design bases, and their verification, into the various maintenance, surveillance, and operating procedures and programs. These activities are described in Section (b), Design Basis Translation to Operating, Maintenance, and Testing Procedures.

In addition, to ensure that Operations personnel were properly trained in the current configuration and design basis requirements, the enhanced DCMs were reviewed by the Training department and training materials were modified as required to reflect the design bases.

To further validate the quality and accuracy of the enhanced DCMs, various DCMs were reviewed as a part of PG&E's audit program and the NRC's inspection program. The DCMs were found to be of substantial value as a single, concise source of design basis information. In addition, the SSFARs that were conducted included assessments of completeness and accuracy of the DCMs. Each of the SSFARs noted minor discrepancies in the DCMs. However, overall the DCMs were determined to be complete and accurate.

Revision Process for the DCMs

To ensure that future changes to the plant are appropriately controlled, the revision process for DCMs is proceduralized and contains the same controls as the design change process. Each DCM has an owner, who is responsible for coordinating changes to the DCM. DCM revisions must be tracked in PIMS. Each revision must be reviewed pursuant to the LBIE procedure and, if required, a 10 CFR 50.59 review must be performed. If a 10 CFR 50.59 review is required, the revision can only proceed as a design change package requiring full coordination. For DCM revisions, coordination is required with NPG groups affected, including Engineering, Construction, Maintenance, Testing and Operations.

In addition, revisions to design documents or to maintenance, testing or operating procedures require review of the associated DCMs. This requirement also is proceduralized.

The 1996 Engineering Self-Assessment Team found a number of DCMs that were not readily usable, because of numerous pending changes. As a result, the process was enhanced to make better use of PG&E's Electronic Document Management System (EDMS), as described below, and the DCMs were updated before the end of 1996 to incorporate pending changes.

To ensure easy access to the current version and pending revisions to DCMs, these documents now are provided and controlled in EDMS. This computerized system provides a mechanism for the review of past and potential future revisions. This electronic system has been developed with security measures to allow access to users for viewing and copying the DCMs, but does not allow unauthorized revision or manipulation. Authorized and approved revisions are incorporated promptly to ensure that a user is viewing the current version.

Summary Conclusions

The DCM enhancement program has increased the overall knowledge of the design bases of the plant, has confirmed compliance with DCPP's design bases and has provided design basis information in a format that can be effectively accessed and used by NPG personnel. Thus the program has helped ensure that compliance with the design bases is maintained in DCPP design, maintenance, testing and operation. This program provides for ongoing updates and maintenance of the DCMs. This program, along with the various design change vehicles and commitment tracking systems, also ensures that the design bases, and changes to the design bases, are well-documented and controlled, and communicated to the appropriate personnel and reflected in the appropriate documents.

CONCLUSIONS AND FUTURE ACTIONS

As discussed above, PG&E believes that it began DCPP operation with a solid design basis foundation, rebaselined its design bases following initial licensing, and further improved its design control processes and documentation during the Configuration Management Program. PG&E has maintained control over its design bases through effective processes for design changes, procedure changes, FSAR changes, and 10 CFR 50.59 safety evaluations. Numerous internal audits and self-assessments have been performed and provide added assurance that the design change and configuration management processes have been effective. When problems were identified, they have been effectively addressed by the problem resolution process. Collectively, the problems found have been few. Some have been significant but none have resulted in a system being incapable of performing its intended safety function. PG&E therefore believes that there is reasonable assurance that DCPP currently conforms to its design bases and that the processes are in place to ensure that it will continue to do so in the future.

Notwithstanding this conclusion, PG&E believes that it can achieve a higher level of certainty and performance in ensuring that DCPP continues to conform with its design and licensing bases by taking some additional actions to improve its programs.

Enhanced Configuration Management Training

PG&E plans to implement further training in areas of configuration management, 10 CFR 50.59 evaluations, and FSAR Update processes. This training will be provided to the Engineering organization and to appropriate members of the Operations and Maintenance organizations. PG&E believes that this training will improve the consistency of operation within the design bases and bring its 10 CFR 50.59 evaluations into alignment with current NRC expectations.

Bases Enhancement

PG&E plans to perform some additional review of the FSAR Update and DCMs as follows.

Final Safety Analysis Report Update

PG&E performed a review of the FSAR Update against the design and operation of the plant in early 1996, and identified a number of inconsistent or inaccurate statements. Most of these were rectified in the November 1996 revision of the FSAR Update, and PG&E has committed to submit a supplemental FSAR Update in April 1997 to correct the remainder. This supplement will be in addition to the routine revisions required by 10 CFR 50.71(e).

A follow-up review of the FSAR Update will be performed to further clarify details and enhance accuracy. The follow-up review will include topical areas of the FSAR Update along the lines of that initiated by the Operations department in December 1996. Other topical areas being considered include Maintenance and Testing. The follow-up review will focus on statements in the FSAR Update to ensure that the licensing bases are accurately reflected consistent with the design bases. Some effort will also be focused on how to clearly identify that information in the FSAR Update that is truly important for clarity of use and update. The results of this review will be incorporated into the next scheduled revision of the FSAR Update as required by 10 CFR 50.71(e). PG&E will provide a separate letter to the NRC detailing its FSAR review effort. This effort will be completed in time for PG&E's next formal FSAR Update, currently scheduled for August 1998.

PG&E also plans to implement the NEI Industry Licensing Basis initiative, and will use the results of the effort to identify the extent of the follow-up review discussed above. The NEI initiative was adopted by some licensees in late 1996 as an approach to address licensing basis issues in plant operation. In implementing the initiative, PG&E will:

(1) Conduct an assessment of the programs currently in use at DCPP to ensure that the plant is operated in conformance with its licensing bases using NEI 96-05, "Guidelines for Assessing Programs for Maintaining the Licensing Basis," or other approaches that provide an equivalent scope of review

(2) Assess the accuracy of the FSAR Update descriptions for two safety-related systems and two nonsafety-related systems at DCPP determined to be risk-significant pursuant to the NRC's Maintenance Rule

(3) Ensure that identified nonconforming or degraded conditions at DCPP are captured on a tracking system and resolved in a timely manner

PG&E plans to begin implementing the NEI initiative in mid-1997, and expects to complete this activity by the end of 1997.

Design Criteria Memoranda Review

In conjunction with the FSAR Update reviews and the NEI initiative, PG&E will also conduct some additional reviews of the DCPP operation, testing, and maintenance procedures for consistency with appropriate DCMs. As mentioned in Section (b), Design Basis Translation to Operating, Maintenance, and Testing Procedures, this will include the DCM reviews of maintenance and testing procedures that are scheduled to be completed during the first half of 1997. PG&E will also perform some additional reviews of DCMs for their consistency with operating procedures. PG&E will complete the reviews in the context of current plant practices to confirm that they are consistent with the design bases. The scope and schedule of this effort will be dependent on initial findings during the review process.

QA Audits and Assessments

PG&E believes that "vertical-slice" assessments, such as SSFARs and SSOMIs, are an effective means of assessing design basis control programs. The SSOMIs and SSFARs have been effective in identifying problem areas and, PG&E believes, have resulted in significant improvements to the processes for design basis conformance. PG&E will continue to perform SSOMIs for outages. PG&E plans to perform additional assessments as part of its NEI initiative implementation previously described, and will use the results of these assessments to decide whether future full-scale SSFARs or other vertical-slice assessments are needed.

APPENDIX A - REFERENCES

1. Program Directives and Interdepartmental Administrative Procedures

1.1	AD1	Administrative Controls Program
1.2	AD1.ID1	Format, Content, and Style of Procedures
1.3	AD1.ID2	Review Level "A" Procedure Review, Approval and Notification of Changes
1.4	AD1.ID3	Review Level "B" Procedure Review, Approval and Notification of Changes
1.5	AD1.ID7	Editorial Corrections and On-The-Spot Changes
1.6	AD3	Document Control
1.7	AD3.ID2	Distribution, Control, and Use of Design Drawings, Field Drawings and Operating Valve Identification Diagrams
1.8		Not used
1.9	AD5	Inspections
1.10	AD7	Work Planning and Management
1.11		Not used
1.12	AD9	Procurement Control
1.13	AD10	Records
1.14		Not used
1.15	AD13	Test Control
1.16	CF1	Configuration Management
1.17	CF2	Computer Hardware, Software, and Database Control
1.18	CF2.ID7	Component Database Program - Change Process
1.19	CF3	Design Control
1.20	CF3.ID2	Design Criteria Memoranda
1.21	CF3.ID3	Environmental Qualification Program
1.22	CF3.ID4	Design Calculations
1.23	CF3.ID5	Drawing Preparation and Approval
1.24	CF3.ID6	Field Correction Transmittal Processing
1.25	CF3.ID8	Maintenance Modification Package Development
1.26	CF3.ID9	Design Change Package Development
1.27	CF3.ID10	Maintenance Modification Action Requests
1.28	CF3.ID11	Seismic Configuration Control Program
1.29	CF3.ID12	Graded Quality Program for Reg. Guide 1.97 Category 2 and 3 Instrumentation
1.30	CF3.ID13	Replacement or New Part Evaluation (RPE)
1.31	CF3.ID15	Development and Independent Verification of Calculations or Computer Programs
1.32	CF3.ID16	Specifications
1.33	CF3.ID17	Design Documents Prepared by External Contractors

Appendices

1.34	CF4	Modification Control
1.35	CF4.ID1	Design Change Requests and Design Change Vehicles
1.36	CF4.ID3	Design Change Package Implementation
1.37	CF4.ID4	Field Change Process
1.38	CF4.ID7	Temporary Modifications - Plant Jumpers and M&TE
1.39	CF4.ID8	Temporary Attachments
1.40		Not used
1.41	CF5	Materials Control
1.42	CF6	Setpoint Control
1.43	CF6.ID2	Setpoint Change Control Program
1.44	CF7	Control and Use of Supplier Information
1.45	CF7.ID1	Control and Distribution of Vendor Manuals Important to Plant Safety and Reliability
1.46	CY1	Chemistry/Radiochemistry
1.47		Not used
1.48	MA1	Maintenance
1.49	MA1.ID7	Control of Plant Floor Loading
1.50	MA1.ID8	Control of Temporary Rigging from Plant Equipment, Piping and Structural Members
1.51	MA1.ID11	Rigging and Load Handling
1.52	MA1.ID14	Plant Crane Operating Restrictions
1.53	OM4	Nuclear Oversight Program
1.54	OM5	Quality Assurance Program
1.55	OM7	Problem Resolution
1.56	OM7.ID1	Problem Identification and Resolution - Action Requests
1.57	OM7.ID3	Nonconformance Report (NCR) and Technical Review Group (TRG)
1.58		Not used
1.59		Not used
1.60	OM12	Shift Turnover
1.61	OP1	Operations Management
1.62	OP2	Tagging Programs
1.63	RP1	Radiation Protection
1.64		Not used
1.65	RP1.ID2	Use and Control of Temporary Radiation Shielding
1.66		Not used
1.67	TQ1	Personnel Training and Qualification
1.68	TQ1.ID10	Procedure Sponsor, Reviewer, and Approver Qualifications
1.69	TQ2	Accredited Training Programs
1.70		Not used
1.71	TS2	Procurement of Nuclear Fuel and Related Goods and Services
1.72	TS3	Safety Analyses and Licensing Basis Impact Evaluations
1.73	TS3.ID1	Coordination of Safety-Related Analytical Work Performed by Vendors
1.74	TS3.ID2	Licensing Basis Impact Evaluations
1.75	TS5	Engineering Support Functions

1.76		Not used
1.77	XI3	Licensing Basis Documents
1.78	XI3.ID1	Technical Specification Change Process
1.79	XI3.ID2	DCPP Final Safety Analysis Report (FSAR) Update Revision and Maintenance
1.80	XI4	Commitment Tracking and Control
1.81	XI4.ID2	Commitment Change Process
1.82		Not used
1.83		Not used
1.84	AD13.ID1	Conduct of Plant and Equipment Tests
1.85	AD13.DC1	Control of the Surveillance Testing Program
1.86	AD13.ID2	Post Modification Testing
1.87	AD13.ID4	Post Maintenance Testing
1.88	AD13.ID5	Inservice Testing Program
1.89	TS5.ID1	System Engineering Program
1.90	AD5.ID2	Inservice Inspection Program
1.91	AD9.ID11	Supplier Audits and Surveys
1.92	CF7.ID2	Distribution of 10 CFR 21 Notifications Received from Outside Entities
1.93		Not used
1.94	AD9.ID7	Receipt Inspection and Acceptance Testing
1.95	AD4.ID8	Identification and Resolution of Loose, Missing or Damaged Fasteners
1.96	AD4.ID2	Plant Leakage Evaluation
1.97	MA2.ID2	Performance Monitoring Equipment Calibration and Usage Control
1.98	OP1.ID1	Readiness for Restart Program
1.99	OM4.ID11	Balance of Plant Reliability Program
1.100	OM4.ID12	Performance-Based Self-Evaluations
1.101	OM4.ID3	Assessment of Industry Operating Experience
1.102	XI1.ID1	Regulatory Correspondence Processing
1.103	OM3.ID3	Employee Concerns Program (Quality Hotline)
1.104	OM7.ID7	Integrated Problem Response Team
1.105	OM7.ID4	Root Cause Analysis
1.106	OM7.ID9	Human Performance Enhancement System (HPES)
1.107	OM7.ID2	Quality Evaluations
1.108	OM4.ID13	Internal Auditing
1.109	OM7.ID8	Operability Evaluation
1.110	XI1.ID2	Regulatory Reporting Requirements and Reporting Process
1.111	OM7.ID10	Quality Trend Analysis Program
1.112	CF3.NE1	Classification of Structures, Systems, and Components
1.113	AD7.DC5	Control Doors Important to Safety
1.114	OP1.DC16	Equipment Control Guidelines
1.115	M-1	Fire Hazards Appendix R Evaluations (FHAREs) - Engineering, Mechanical Implementing Procedure
1.116		Not used
1.117	OM7.ID12	Prompt Operability Assessment

1.118	OM7.ID5	Issues Needing Validation to Determine Impact on Operability (INVDIO)
1.119	OP1.DC17	Technical Specifications
1.120		Not used
1.121	CF7.ID3	Processing of Information Provided by Suppliers
1.122	AD9.ID1	Procurement of Items and Related Services
1.123	OP2.ID1	Clearances and Administrative Tag-Outs
1.124	OP2.ID2	DCPP Tagging Requirements
1.125	AD5.ID1	Independent Inspection Program
1.126	TQ2.ID4	Training Program Implementation
1.127	AD1.DC1	DCPP Procedures
1.128	OP1.DC12	Conduct of Routine Operations
1.129		Not used
1.130	OM4.ID2	Plant Staff Review Committee (PSRC)
1.131	AD4.ID3	SISIP Review of Housekeeping Activities
1.132	OP1.DC3	Nuclear Operator Routine Plant Equipment Inspections
1.133	OP1.DC10	General Authorities and Responsibilities of Operating Shift Personnel
1.134		Not used
1.135	CF6.ID1	Setpoint Control Program
1.136	AD7.ID1	Use of PIMS Work Order Module
1.137	AD7.ID5	Scaffold Material Structures
1.138	AD2.ID1	Procedure Use and Adherence
1.139	TS2.ID1	Nuclear Fuel Fabrication and Analysis Services
1.140	TQ2.ID10	Engineering Support Personnel Training Program
1.141	MA1.ID1	Program Plan for Compliance with Generic Letter 89-10 (MOV Surveillance and Testing)
1.142	PRC-10	Preoperational and Startup Testing Procedure (04/24/73)
1.143	XI3.ID3	Technical Specifications Interpretation
1.144	OP1.DC31	Dissemination of Operations Information
1.145	CF7.ID4	Processing of Supplier Engineering Documents
1.146	AD8.DC55	Outage Safety Scheduling

2. Audits and Self-Assessments

2.1 Audit 86259T, ASW System Audit (10/14/87)
2.2 Audit 87153T, Control Room Ventilation System Audit (10/26/87)
2.3 Audit 87247T, Diesel Generator System Audit (02/19/88)
2.4 Audit 88803T, 4160 kV System Audit (03/31/88)
2.5 1R2 SSOMI Surveillance (08/08/88)
2.6 2R2 SSOMI Surveillance (04/12/89)
2.7 Audit 89800T, Electrical System SSFAR (05/31/89)
2.8 Audit 89808T, AFW SSFAR, Safety System Functional Audit and Review (11/17/89)
2.9 1R3 SSOMI Surveillance (03/14/90)
2.10 Audit 90811T, CCW SSFAR, Safety System Functional Audit and Review (11/02/90)

2.11 2R3 SSOMI Surveillance (12/12/90)
2.12 Audit 90830T, 1R4/2R4, SSOMI, Design Assessment (01/18/91)
2.13 Audit 91001I, Comprehensive Procurement Audit (03/22/91)
2.14 Audit 91007I, 1R4 SSOMI, Installation (05/10/91)
2.15 Audit 91028I, 2R4 SSOMI, Installation (11/26/91)
2.16 Audit 92001I, SSFAR Safety Injection (SI), Safety System Functional Audit and Review (05/15/92)
2.17 Audit 92028I, 1R5 Design SSOMI (08/13/92)
2.18 Audit 92036I, 1R5 SSOMI, Installation (12/18/92)
2.19 Not used
2.20 Audit 93001I, Comprehensive Procurement Program (04/20/93)
2.21 Not used
2.22 Audit 93006I, 2R5 SSOMI (06/04/93)
2.23 Audit 93014I, Environmental Qualification (07/28/93)
2.24 Audit 93015I, SSFAR RHR, Safety System Functional Audit & Review (11/05/93)
2.25 Audit 93047I, 1R6 SSOMI, Design Assessment (02/11/94)
2.26 Audit 95012I, Procurement Audit (05/26/95)
2.27 Audit 94015I, 1R6 SSOMI, Installation Assessment (07/15/94)
2.28 Audit 94016I, GL 89-10 Program Audit (07/15/94)
2.29 Audit 94023I, Post Fire Safe Shutdown (08/31/94)
2.30 Audit 95014I, 1R7 Safety System Outage Modification Inspection; 1R7 SSOMI, Design Assessment (10/16/95)
2.31 Audit 95032I, 1R7 Technical Support Outage Assessment (01/09/96)
2.32 Not used
2.33 Audit 960890033, 2R7 Technical Support Outage Assessment (TSOA) (06/28/96)
2.34 Not used
2.35 Joint Utility Management Audit 11/06/89 - 11/10/89
2.36 Joint Utility Management Audit 10/21/91 - 10/25/91
2.37 Joint Utility Management Audit 11/01/93 - 11/08/93
2.38 Joint Utility Management Audit 11/28/95 - 12/05/95
2.39 Surveillance QP&A-93-0031, Generic Letter 89-13, Service Water System Performance (07/28/93)
2.40 PG&E Engineering Self-Assessment, dated 03/28/96
2.41 Not used
2.42 Not used
2.43 Audit 95018I, Corrective Action Audit (8/21/95)
2.44 Audit 94035I, Corrective Action Audit (1/20/95)
2.45 2R6 Technical Support Outage Assessment (TSOA) (12/20/94)
2.46 Audit 960570014, Corrective Action Audit (05/17/96)
2.47 Not used
2.48 QA Audit 962700005, 4th Quarter, 1996 Operations

Appendices

3. Regulatory Documents

3.1 Not used
3.2 Units 1 and 2 Diablo Canyon Power Plant Final Safety Analysis Report Update.
3.3 Units 1 and 2 Diablo Canyon Power Plant Technical Specifications.
3.4 NUREG - 0675, "Safety Evaluation Report Related to the Operation of Diablo Canyon Nuclear Power Plant, Units 1 and 2," prepared by the U.S. Atomic Energy Commission, dated October 16, 1974, with Supplements.
3.5 NRC Inspection Report 50-275/91-11 and 50-323/91-11
3.6 NRC Inspection Report 50-275/93-32 and 50-323/93-32
3.7 NRC Inspection Report 50-275/91-07 and 50-323/91-07
3.8 NRC Inspection Report 50-275/92-22 and 50-323/92-22
3.9 NRC Inspection Report 50-275/96-99 and 50-323/96-99
3.10 Not used
3.11 NRC Inspection Report 50-275/91-10 and 50-323/91-10
3.12 NRC Inspection Report 50-275/96-13 and 50-323/96-13
3.13 Not used
3.14 NRC Inspection Report 50-275/96-16 and 50-323/96-16
3.15 NRC Inspection Report 50-275/88-15 and 50-323/88-14
3.16 NRC Inspection Report 50-275/92-30 and 50-323/92-30
3.17 NRC Inspection Report 50-275/92-31 and 50-323/92-31
3.18 Not used
3.19 NRC Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability"
3.20 NRC Inspection Report 50-275/90-13 and 50-323/90-13
3.21 NRC Inspection Report 50-275/93-16 and 50-323/93-16
3.22 NRC Inspection Report 50-275/94-29 and 50-323/94-29
3.23 NRC Inspection Report 50-275/96-02 and 50-323/96-02
3.24 NRC Inspection Report 50-275/96-21 and 50-323/96-21
3.25 NRC Inspection Report 50-275/93-26 and 50-323/93-26
3.26 NRC Inspection Report 50-275/90-30 and 50-323/90-30
3.27 NRC Inspection Report 50-275/94-24 and 50-323/94-24
3.28 NRC Inspection Report 50-275/96-09 and 50-323/96-09
3.29 NRC Inspection Report 50-275/94-08 and 50-323/94-08
3.30 NRC Inspection Report 50-275/93-34 and 50-323/93-34
3.31 NRC Inspection Report 50-275/94-28 and 50-323/94-28
3.32 Not used
3.33 NRC Inspection Report 50-275/90-23 and 50-323/90-23
3.34 NRC Inspection Report 50-275/90-18 and 50-323/90-18
3.35 NRC Inspection Report 50-275/90-01 and 50-323/90-01
3.36 NRC Inspection Report 50-275/91-40 and 50-323/91-40
3.37 NRC Inspection Report 50-275/96-12 and 50-323/96-12
3.38 NRC Inspection Report 50-275/93-24 and 50-323/93-24

3.39 Amendment No. 117 to Facility Operating License No. DPR-80 and Amendment No. 115 to Facility Operating License No. DPR-82, for Diablo Canyon Power Plant, Units 1 and 2
3.40 NRC Inspection Report 50-275/91-19 and 50-323/91-19
3.41 NRC Inspection Report 50-275/89-32 and 50-323/89-32
3.42 NRC Inspection Report 50-275/92-34 and 50-323/92-34
3.43 NRC Inspection Report 50-275/94-99 and 50-323/94-99
3.44 NRC Inspection Report 50-275/94-03 and 50-323/94-03
3.45 NRC Inspection Report 50-275/95-06 and 50-323/95-06
3.46 NRC Inspection Report 50-275/96-20 and 50-323/96-20
3.47 NRC Inspection Report 50-275/93-11 and 50-323/93-11
3.48 NRC Inspection Report 50-275/93-14 and 50-323/93-14
3.49 NRC.Inspection Report 50-275/96-06 and 50-323/96-06

4. <u>Special Programs</u>

4.1 Not used
4.2 "Independent Design Verification Program - Diablo Canyon Nuclear Power Plant - Unit 1," prepared by Teledyne Engineering Services, Dated October 10, 1983.
4.3 "Phase II Final Report - Design Verification Program - Diablo Canyon Power Plant," prepared by PG&E, issued 1982.
4.4 Exhibit 1024, Testimony of Darrell G. Eisenhut on the NRC's View of the Design Verification Program
4.5 Design Change Process Initiative Project (DCPIP)

5. <u>Correspondence and Miscellaneous Documentation</u>

5.1 PG&E Letter No. DCL-88-236, "Reply to Notice of Violation in NRC Inspection Report Nos. 50-275/88-15 and 50-323/88-14," October 5, 1988
5.2 PG&E Letter No. DCL-89-099, "Enhancements to PG&E's Configuration Management Program," April 19, 1989
5.3 PG&E Letter No. DCL 90-027, "Response to Generic Letter 89-13," January 26, 1990
5.4 PG&E Letter No. DCL 91-286, "Supplemental Response to Generic Letter 89-13," November 25, 1991
5.5 PG&E Letter No. DCL 94-262, "Closure Response to NRC Generic Letter 89-10," November 28, 1994
5.6 Not used
5.7 Not used
5.8 Not used
5.9 PG&E Letter DCL-89-10 (04/20/89), "Reply to NRC Inspection Report 89-01"
5.10 PG&E Internal Correspondence, Chron # 132610
5.11 PG&E Internal Correspondence, Chron # 146444
5.12 Not used
5.13 Not used

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5.14 PG&E Action Request AR A0131260, "Conduct a Configuration Management Program"
5.15 PG&E Action Request AR A0311537, "Operating Procedure Reviews not Completed as Scheduled"
5.16 NCR DC0-89-TN-081, "FSAR/Plant Procedure Review"
5.17 NCR DC0-91-EN-N005, "Post-Accident Monitoring"
5.18 Operability Evaluation OE 91-13, "Operability of Non-Conforming Regulatory Guide 1.97 Post-Accident Monitoring Instrumentation"
5.19 Not used
5.20 NCR N0001951, "Corrective Action Program Effectiveness"
5.21 PG&E Letter No. DCL 96-084, "DCPP Engineering Self-Assessment Final Report," 03/28/96
5.22 PG&E Letter No. DCL 96-190, "Final Report of the Issue Closure Team, DCPP Units 1 and 2," 09/17/96
5.23 Nuclear Safety Analysis Center Report NSAC-125, "Guidelines for 10 CFR 50.29 Safety Evaluations," June 1989
5.24 NCR DC0-92-EN-N010, "Control Circuit Voltage Drop"
5.25 NCR N0002008, "Improvements to the 50.59 Evaluation Process"
5.26 NCR N0001977, "Flashing at the CFCUs"
5.27 NCR N0001911, "230 kV System Inoperable Due to Morro Bay Line Outage"
5.28 NCR N0001950, "JUMA Audit Finding on NQS Performance"
5.29 NUMARC 90-12, Design Basis Program Guidelines (06/29/90)
5.30 Not used
5.31 Charter, Daily AR Review Team (DART)
5.32 NCR DC0-90-TN-N060, "Containment Fan Cooler Flow"
5.33 AR A0394406, "Evaluate STP P-AFW-11 Maximum Turbine Speed vs. SGTR Analysis"
5.34 AR A0395097, "Investigate Recirculation Delta P Criteria Contained in "A" Test"
5.35 QE Q0011838, "Design Basis STP Acceptance Criteria Revised Without DCP/DCN"
5.36 PG&E Letter DCL-90-204 (08/13/90), "Reply to Notice of Violation in NRC Inspection Report 90-13"
5.37 PG&E Letter DCL 91-207 (08/19/91), "Reply to Notice of Violation in NRC Inspection Report 91-07"
5.38 PG&E Letter DCL 92-233 (10/22/92), "Reply to Notice of Violation in NRC Inspection Report 92-22"
5.39 PG&E Letter DCL 93-214 (08/30/93), "Reply to Notice of Violation in NRC Inspection Report 93-16"
5.40 PG&E Letter DCL 95-008 (01/17/95), "Reply to Notice of Violation in NRC Inspection Report 94-29"
5.41 PG&E Letter DCL 96-104 (05/10/96), "Reply to Notice of Violation in NRC Inspection Report 96-02"
5.42 PG&E Letter DCL 93-267 (11/24/93), "Reply to Notice of Violation in NRC Inspection Report 93-24"
5.43 PG&E Letter DCL 96-161 (07/19/96), "Reply to Notice of Violation in NRC Inspection Report 96-09"

5.44 PG&E Letter DCL 91-072 (04/01/91), "Reply to Notice of Deviation in Inspection Report 90-30"
5.45 NCR DC0-92-NS-N007, "ECCS Issues"
5.46 NCR DC0-94-EN-N018, "CCW/Throttling to CCP Coolers"
5.47 NCR N0001784, "Issues Related to NRC Audit of ASW System"
5.48 QE Q0010785, "Failure to Request POA - Degraded Blowout Panels"
5.49 AR A0357141, "AFW Pump 2-1 Does not Meet the Full Flow Acceptance Criteria"
5.50 QE Q0011880, "Usability of the PIMS Component Database
5.51 NCR N0001735, "CCW Heat Exchanger Tube Fretting/Corrosion"
5.52 PG&E letter DCL 94-277 (12/09/94), "Reply to Notice of Violation in NRC Inspection Report 94-28"
5.53 PG&E letter DCL 94-174 (08/05/94), "Reply to Notice of Violation in NRC Inspection Report 94-08"
5.54 PG&E letter DCL 96-167 (08/09/96), "Reply to Notices of Violation and Notice of Deviation in NRC Inspection Report 96-12"
5.55 AR A0350965, "Breaker PY-1118 Found Open on NRC Walkdown"
5.56 NCR DC1-91-EN-N016, "Check Valve RHR-1-8742B"
5.57 PG&E letter DCL 94-026 (02/04/94), "Reply to Notice of Violation in NRC Inspection Report 93-32"
5.58 Not used
5.59 Not used
5.60 Not used
5.61 Not used
5.62 Not used
5.63 NCR N0002003, "EOP E-1.3 Cold Leg Recirculation Transfer Time"
5.64 NCR N0001884, "HELB Interaction with SSPS"
5.65 DCPP Q-List

APPENDIX B - PROGRAM DIRECTIVES RELATED TO DESIGN BASES AND CONFIGURATION CONTROL

Program Directive	Description of Role
AD1- Administrative Controls Program (Ref. 1.1)	• Establishes the hierarchy and provides for the control of procedures, as well as establishing the requirement for departments to prepare IDAPs and DLAPs to address certain topics
AD3- Document Control (Ref. 1.6)	• Addresses the proper control of documents that define the design, communicate design basis requirements, and control activities that can affect physical compliance with design basis requirements
AD5- Inspections (Ref. 1.9)	• Provides for installation, surveillance and Quality Control inspections to verify compliance of structures, systems, and components to design basis requirements identified in design output documents
AD7- Work Planning & Management (Ref. 1.10)	• Provides for the integrated control of work activities affecting structures, systems, and components to include consideration of design bases in plant evolutions and during plant work
AD9- Procurement Control (Ref. 1.12)	• Provides for proper procurement of materials, parts, components and services consistent with design basis requirements
AD10- Records (Ref. 1.13)	• Provides for the retention, control, processing, and storage of records relating to configuration
AD13- Test Control (Ref. 1.15)	• Provides for the definition and control of safety- and quality-related tests that confirm performance consistent with the design bases
CF1- Configuration Management (Ref. 1.16)	• Provides the global view of configuration management
CF2- Computer Hardware, Software, & Database Control (Ref. 1.17)	• Provides for controlling computer hardware, software, and databases consistent with the design bases
CF3- Design Control (Ref. 1.19)	• Addresses the establishment, maintenance, and documentation of design basis requirements, the incorporation of these requirements in design output documents, and the communication of this information to all NPG organizations performing activities that must comply with these requirements. This process controls changes to design bases, preparation of design changes in accordance with design bases, and provides testing requirements and acceptance criteria to demonstrate compliance with design basis requirements.

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Program Directive	Description of Role
CF4- Modification Control (Ref. 1.34)	• Addresses the identification, evaluation, and implementation of physical and paper changes in a manner that preserves physical configuration of the plant in compliance with design basis requirements. This includes the proper interface with other PDs to ensure the timely update of plant and design basis documents and information systems consistent with configuration changes.
CF5- Materials Control (Ref. 1.41)	• Provides for the identification, proper handling, and issuance of materials, parts and components
CF6- Setpoint Control (Ref. 1.42)	• Provides specific guidance for control of setpoints consistent with design bases
CF7- Control and Use of Supplier Information (Ref. 1.44)	• Provides for control of supplier information to ensure equipment and other vendor information is appropriately considered in design, maintenance, and operation
CY1- Chemistry/ Radiochemistry (Ref. 1.46)	• Addresses control of plant system chemistry/radiochemistry conditions in compliance with design basis requirements
MA1- Maintenance (Ref. 1.48)	• Provides for preventive and corrective maintenance on plant equipment to retain design basis capability with time
OM4- Nuclear Oversight Program (Ref. 1.53)	• Provides for oversight, assessment, and verification activities including Quality Assurance audits and assessments, Plant Staff Review Committee, and Nuclear Safety Oversight Committee
OM5- QA Program (Ref. 1.54)	• Provides for the Quality Assurance program that meets the requirements of 10 CFR 50, Appendix B
OM7- Problem Resolution (Ref. 1.55)	• Addresses equipment Operability Evaluations for the consideration of design basis requirements in the performance of operability determinations
OM12- Shift Turnover (1.60)	• Addresses the effective transfer of knowledge of the as-is operational configuration of the plant to the relieving watch
OP1- Operations Management (Ref. 1.61)	• Provides controls, responsibilities, and policies for safe operation of the plant consistent with the design bases
OP2- Tagging Programs (Ref. 1.62)	• Provides for clearances and tagging of plant equipment to maintain operational configuration consistent with the design bases
TQ1- Personnel Training & Qualification (Ref. 1.67)	• Provides for training and qualification of personnel working in nuclear activities including training on design bases for selected personnel
TQ2- Accredited Training Programs (Ref. 1.69)	• Provides for training accredited by the National Academy for Nuclear Training

Appendix B - Program Directives

Program Directive	Description of Role
TS2- Procurement of Nuclear Fuel & Related Goods & Services (Ref. 1.71)	• Provides for fabrication controls of nuclear fuel and related analytical services, including design and fabrication within the design basis
TS3- Safety Analyses and Licensing Basis Impact Evaluations (Ref. 1.72)	• Addresses the development and maintenance of plant safety analyses as part of the plant design bases and the appropriate evaluation of changes to the plant equipment or its operation to preserve compliance with design basis requirements and regulatory approved programs (e.g., environmental, fire, emergency, and security plans)
TS5- Engineering Support Functions (Ref. 1.75)	• Provides for the system engineering program that coordinates the interface between design and plant operation, including interpretation of and support related to design bases
XI3- Licensing Basis Documents (Ref. 1.77)	• Provides for control and maintenance of licensing basis documents including the Technical Specifications and the FSAR Update (10 CFR 50.71 (e)). It requires incorporation of design basis changes and related information
XI4- Commitment Tracking & Control (Ref. 1.80)	• Provides for management and coordination of commitments to regulatory agencies, including specific one-time commitments relative to the design bases

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APPENDIX C - DEFINITIONS

Definitions of key terms that are used in this response are provided below. These are provided for clarification of meanings that may be unique to PG&E or DCPP.

Action Request (AR), Action Evaluation (AE) - An AR is the documentation, by way of the computerized Plant Information Management System (PIMS), through which all NPG personnel identify and track the majority of DCPP activities, including reporting of problems, requesting action, implementing changes, and tracking resolution of problems. An AE is a part of the process in implementing an AR. More specifically, an AE is a request for assistance, by way of PIMS, in the resolution of an AR by an organization participating in the resolution of the AR. There may be more than one AE for an AR.

Component Database (CDB) - The database subsystem in PIMS used to track plant operating and maintenance and certain design data for DCPP equipment at a component level. The CDB also provides information to control and direct activities involving component maintenance.

Configuration Management - An integrated process that identifies existing plant licensing and design requirements and details of the implementation of those requirements, and controls changes to ensure that the plant is configured, maintained, operated, and managed in a manner that is consistent with the design bases and licensing commitments. The configuration management process also ensures that design documents, such as calculations, drawings, procedures, etc., actually reflect the physical installations and operating conditions at DCPP.

Design Basis - That information which identifies the specific functions to be performed by a structure, system, or component of a facility, and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be (1) restraints derived from generally accepted "state of the art" practices for achieving functional goals, or (2) requirements derived from analysis (based on calculation and/or experiments) of the effects of a postulated accident for which a structure, system, or component must meet its functional goals. [from 10 CFR 50.2]

Implicit in this definition is documentation of the reason why a function must be performed and why a specific value or range of values is necessary as a controlling parameter. Analysis and calculation inputs and outputs that are required to demonstrate compliance to a functional requirement are considered as design bases.

In its October 9, 1996, letter, the NRC stated, "*The design bases of a facility, as so defined, is a subset of the licensing basis and is contained in the Final Safety Analysis*

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Report. Information developed to implement the design bases is contained in other documents, some of which are docketed and some of which are retained by the licensee."

Design Change - Any (1) modification to plant structures, systems, or components that may or may not be described in approved Design Criteria Memoranda, specifications, drawings, or supplier documents that alter or could affect various attributes of plant design; (2) new or revised design constraints on operating and maintenance practices, or (3) revision to approved requirements of Design Output Documents (including those prepared by architect/engineers or consultants), design classification, installation specifications, supplier drawings, or engineering specified setpoints and device settings.

Design Change Evaluation (DCE) - That portion of the Design Change Package (DCP) that includes the technical review of the design change. The DCE identifies the design bases and design inputs applicable to the design change and contains a technical review used to determine the full effect of the design change.

Design Change Notice (DCN) - That portion of the DCP, that includes the installation and testing requirements and operating constraints for the Design Change Package, the design drawings list, and sketches. There may be more than one DCN included in a DCP.

Design Change Package (DCP) - A vehicle used to transmit design change projects that cannot be processed using a Maintenance Modification. A DCP is comprised of a DCE and one or more DCNs.

Design Change Vehicle - A document that communicates the specific details of a design change (e.g., Design Change Package, Replacement Part Evaluation, etc.).

Design Criteria Memorandum (DCM) - A document used to identify design bases and other design inputs for a given system or structure. (Other facilities refer to these documents as Design Basis Documents or similar titles.)

Design Output Documents - Drawings, specifications, and other documents defining technical requirements of structures, systems and components.

Equipment Control Guideline (ECG) - These documents provide administrative controls and operability requirements for selected equipment that is not addressed by Technical Specifications (TS). ECGs are developed when controls are required by regulatory commitments or when plant management determines that it is prudent to control equipment to maximize its availability. TS that have been relocated to licensee-controlled documents are generally transferred to ECGs. Similar to TS, ECGs provide operability requirements, action statements, and surveillance requirements.

Appendix C - Definitions

Field Change (FC) - The document used to request and approve minor changes to the design requirements of a Design Change Notice or Design Change Package that are within the original scope and intent of the design change document.

Jumper - A temporary modification typically referring to an electrical jumper, lifted electrical lead, mechanical bypass, or bypass of a safety function.

Licensing Basis, Current Licensing Basis (CLB) - The set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect. The CLB includes the regulations contained in 10 CFR parts 2, 19, 20, 21, 30, 40, 50, 51, 54, 55, 70, 72, 73, 100, and appendices thereto; orders; license conditions; exemptions; and Technical Specifications. It also includes the plant specific design basis information defined in 10 CFR 50.2 as documented in the most recent Final Safety Analysis Report as required by 10 CFR 50.71, and the licensee's commitments remaining in effect that were made in docketed licensing correspondence such as licensee responses to NRC bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluation reports or licensee event reports. [from 10 CFR 54.3]

In its October 9, 1996, letter, the NRC stated, "*The licensing basis for a plant originally consists of that set of information upon which the Commission, in issuing an initial operating license, based its comprehensive determination that the design, construction, and proposed operation of the facility satisfied the Commission's requirements and provided reasonable assurance of adequate protection to public health and safety and common defense and security. The licensing basis evolves and is modified throughout a plant's licensing term as a result of the Commission's continuing regulatory activities, as well as the activities of the licensee.*"

Licensing Basis Impact Evaluation (LBIE) - The review of the effects of a plant change (including but not limited to design changes), test, or experiment (CTE) on the licensing basis for DCPP, which documents (1) whether the CTE may proceed without prior NRC approval, and (2) the bases for reaching the above conclusion as required by regulations, the operating license and plant procedures. The LBIE process implements the requirements of 10 CFR 50.59, along with additional considerations in evaluating the significance of a CTE.

Maintenance Modification - A category of design change that is maintenance in nature (e.g., documentation, restorative, or operational maintenance).

Maintenance Modification Package (MMP) - A design change vehicle used for Maintenance Modifications that are recurring, affect the physical configuration of the plant, and maintain a structure, system, or component. Once issued, MMPs are never closed and become design output documents.

Nonconformance Report (NCR) - A quality problem that constitutes a significant condition adverse to quality. To be classified as a nonconformance, a quality problem must satisfy one or more criteria explicitly defined in DCPP procedures, including, for instance, a substantial programmatic or implementation breakdown in the Quality Assurance Program; an issue identified at the request of plant management; etc.

Plant Information Management System (PIMS) - A computerized administrative system used by DCPP personnel to generate, track, and show status of resolution of plant-related activities, problems or actions, including design changes, action requests, maintenance, surveillance or other testing activities, training, dosimetry, plant component data, drawings, nonconformance reports, quality evaluations, commitments to the NRC, and other actions in plant operation.

Procedure Commitment Database (PCD)- The database subsystem used in the Plant Information Management System to track regulatory commitments that are implemented through DCPP procedures. A PCD commitment is a program commitment for which a step in a procedure or an entire procedure is necessary to ensure proper, consistent, and continual implementation.

Q-List - A controlled document that contains the listing and classification of DCPP structures, systems, and components according to design, quality, and code class requirements.

Quality Evaluation (QE) - A QE is a PIMS mechanism for processing a quality or balance-of-plant (BOP) problem. The QE mechanism contains provisions for documenting the problem, immediate corrective action, the cause of the problem, and corrective actions to prevent recurrence.

Replacement Part Evaluation (RPE) - An evaluation for determining the acceptability of a new or replacement part. This evaluation identifies critical characteristics necessary to ensure that the part supports the design basis functionality and any verification activities required to ensure that equivalent replacement parts meet those characteristics and are acceptable for use. RPEs may be part-specific, component-specific, or generic.

Supplier - Any individual or organization that furnishes items or services in compliance with a procurement document. The term supplier includes vendor, seller, contractor, subcontractor, fabricator, consultant, and subtier levels.

Temporary Modification - A modification to plant structures, systems, or components for a limited period of time after which the structure, system, or component is returned to its original configuration.

APPENDIX D - LIST OF ACRONYMS

Acronym	Terms
ACRS	Advisory Committee on Reactor Safeguards
ASLAB	Atomic Safety and Licensing Appeal Board
ASLB	Atomic Safety and Licensing Board
AE	Action Evaluation
ALARA	As Low As Reasonably Achievable
ANSI	American Nuclear Standards Institute
AR	Action Request
ASME	American Society of Mechanical Engineers
CDB	Component Database
CFR	Code of Federal Regulations
CLB	Current Licensing Basis
CMP	Configuration Management (Enhancement) Program
DART	Daily Action Request Review Team
DCE	Design Change Evaluation
DCM	Design Criteria Memorandum
DCN	Design Change Notice
DCP	Design Change Package
DCPIP	Design Change Process Initiative Project
DCPP	Diablo Canyon Power Plant
DBD	Design Basis Documentation
DLAP	Departmental Level Administrative Procedure
EAG	Engineering Assessment Group
EDSFI	Electrical Distribution System Functional Inspection
EIT	Event Investigation Team
EPRI	Electric Power Research Institute

Appendices

Appendix D - List of Acronyms

Acronym	Terms
ERT	Event Response Team
ESAT	Engineering Self-Assessment Team
FC	Field Change
FSAR	Final Safety Analysis Report
IDAP	Interdepartmental Administrative Procedure
IDVP	Independent Design Verification Program
INPO	Institute of Nuclear Power Operations
IPRT	Integrated Problem Response Team
IRP	Internal Review Program
JUMA	Joint Utility Management Audit
LBIE	Licensing Basis Impact Evaluation
LER	Licensee Event Report
LTSP	Long Term Seismic Program
MMP	Maintenance Modification Package
MOV	Motor-Operated Valve
NCR	Nonconformance Report
NPG	Nuclear Power Generation
NQS	Nuclear Quality Services
NRC	Nuclear Regulatory Commission
NSOC	Nuclear Safety Oversight Committee
NSSS	Nuclear Steam Supply System
OTSC	On The Spot Change
PCD	Procedure Commitment Database
PD	Program Directive
PIMS	Plant Information Management System
POA	Prompt Operability Assessment
PRA	Probabilistic Risk Assessment
PSAR	Preliminary Safety Analysis Report

Appendix D - List of Acronyms

Acronym	Terms
PSRC	Plant Staff Review Committee
QA	Quality Assurance
QE	Quality Evaluation
RG	Regulatory Guide
RPE	Replacement Part Evaluation
SISIP	Seismically Induced System Interaction Program
SMR	Surveillance and Maintenance Requirements
SRO	Senior Reactor Operator
SSER	Supplemental Safety Evaluation Report
SSFAR	Safety System Functional Audit and Review
SSOMI	Safety System Outage Modification Inspection
STP	Surveillance Test Procedure
TRG	Technical Review Group
TS	Technical Specifications
TSOA	Technical Support Outage Assessment
USQ	Unreviewed Safety Question
WOG	Westinghouse Owners Group
WRJQAG	Western Region Joint Quality Assurance Group

APPENDIX E - INDEX

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