U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF REACTOR INSPECTION AND SAFEGUARDS

Report Nos.:	50-275/91-201 and 50-323/91-201
Docket Nos.:	50-275 and 50-323
License Nos.:	DPR-80 and DPR-82
Licensee:	Pacific Gas and Electric Company 77 Beale Street, Room 1451 San Francisco, California 94106
Facility Name:	Diablo Canyon Nuclear Power Plant, Units 1 and 2
Assessment at:	Avila Beach and San Francisco, California
Assessment Conducted:	March 25 through 29, 1991

Robert L. Pettis Jr. 7/15/91
Robert L. Pettis, Jr., P.E., Team Leader — Date
Vendor Inspection Branch (VIB)

Other Inspectors:
K. Naidu, Senior Reactor Engineer, VIB
L. Campbell, Reactor Engineer, VIB
M. Snodderly, Reactor Engineer, VIB
W. Wagner, Reactor Engineer, RV
A. Fitzgerald, Reactor Engineer Intern, NRR

Approved by: Leif J. Norrholm 7/16/91
Leif J. Norrholm, Chief — Date
Vendor Inspection Branch
Division of Reactor Inspection
and Safeguards
Office of Nuclear Reactor Regulation

TABLE OF CONTENTS

EXECUTIVE SUMMARY

From March 25 through 29, 1991, the Nuclear Regulatory Commission's (NRC's) Vendor Inspection Branch conducted an assessment of Pacific Gas and Electric Company's (PG&E's) activities related to the procurement and dedication of commercial-grade items (CGIs) used in safety-related applications at the Diablo Canyon Nuclear Power Plant (DCNPP), Units 1 and 2. The assessment team reviewed PG&E's procurement program to assess its compliance with the quality assurance (QA) requirements of Appendix B to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50) and to assess the status of PG&E's implementation of the Nuclear Management and Resources Council (NUMARC) initiatives on procurement and commercial-grade dedication.

The NUMARC Board of Directors has approved procurement initiatives as described in NUMARC 90-13, "Nuclear Procurement Program Improvements," which commit licensees to assess their procurement programs and take specific action to strengthen inadequate programs. The first phase of these initiatives addresses dedication of CGIs and was scheduled to be implemented by January 1, 1990. Licensees are to meet the intent of the guidance provided in Electric Power Research Institute (EPRI) Report NP-5652, "Guideline for the Utilization of Commercial Grade Items in Nuclear Safety Related Applications (NCIG-07)," June 1988. The NRC has conditionally endorsed this EPRI guideline in Generic Letter (GL) 89-02, "Actions to Improve the Detection of Counterfeit and Fraudulently Marketed Products," dated March 21, 1989. The second phase of the initiatives provides a comprehensive procurement review and addresses vendor audits, tests and/or inspections, obsolescence, information exchange, and general procurement. Licensees are to review their programs by July 1, 1991, to determine, on the basis of guidance in NUMARC 90-13, if improvements are needed in these areas, and to complete such improvements by July 1, 1992.

The NRC performed its assessment to determine the current status of the activities to improve the procurement program related to the industry initiatives discussed above and NRC requirements. The assessment focused on a review of procedures and representative records, interviews with PG&E's staff, including senior management and DCNPP site personnel; and observations. The NRC assessment team also held meetings with PG&E's corporate and plant management to discuss relevant aspects of commercial-grade dedication and to identify areas requiring additional information. The assessment team's observations were discussed with PG&E representatives and senior management at the exit meeting held March 29, 1991. The assessment team's specific conclusions are summarized below.

- PG&E had made a significant effort to strengthen the commercial-grade dedication program and the overall program description was generally consistent with the dedication philosophy described in EPRI NP-5652. However, the program, including most of the pertinent implementing procedures, did not completely address the issues contained in NRC GL 89-02, which specified certain restrictions or conditions in using EPRI NP-5652 dedication methods to achieve compliance with Appendix B to 10 CFR Part 50. Specifically, PG&E procedures did not address the restrictions in using EPRI Methods 2 and 4. With appropriate modifications to address this issue, the existing program, if properly implemented, should provide adequate controls over the commercial-grade procurement process. PG&E's program for commercial-grade

dedication began in July 1986 and was further revised in August 1988 to incorporate the guidance contained in EPRI NP-5652, 16 months earlier than the commitment date of January 1, 1990.

- The assessment team considered it a weakness that PG&E used replacement part evaluations (RPEs) generated before August 1988 (the date when the guidelines contained in EPRI NP-5652 were incorporated into PG&E's program) to support the basis for dedication of the item. Procedures did not exist to require a review of these RPEs to reflect current industry standards and practices and over 100 RPEs were available for use in safety-related applications. Records indicated that approximately 36 RPEs were used during the period January 1, 1990 to March 25, 1991. The continued use of RPEs developed before August 1988 without review for compliance with the dedication methodology contained in the EPRI guidelines appeared inconsistent with PG&E's commitments to implement these guidelines.

- PG&E's implementation of the NUMARC comprehensive procurement initiative should enable it to meet the July 1, 1991 review date established in NUMARC 90-13. PG&E had completed its review and had developed a draft report containing its recommendations. The final report was scheduled to be issued to PG&E senior management by May 1991.

- PG&E's mechanical and metallurgical testing facilities at San Ramon and the DCNPP site were well equipped and staffed and appeared to be ahead of most licensees. These capabilities provided in-depth, complete, and accurate testing for EPRI Method 1 acceptance activities (special tests and inspections), which PG&E heavily relied on for its commercial-grade dedication program. These capabilities should help to detect and screen the receipt of fraudulent or misrepresented items.

- PG&E provided management support and sufficient resources to improve its commercial-grade dedication program. The PG&E staff displayed a great deal of interest in the team's assessment effort, and senior-level site and corporate management were available for consultation during the assessment. PG&E management also participates in the Region V Utilities Engineering Managers Subcommittee on Procurement Engineering and the Joint Utility Task Group.

1 INTRODUCTION

The NRC's Vendor Inspection Branch assessed PG&E's efforts to improve programs for procuring and dedicating CGIs used in safety-related applications. The PG&E program was reviewed to assess its compliance with Appendix B to 10 CFR Part 50 and to assess the status of implementation of the NUMARC procurement initiatives for the DCNPP, Units 1 and 2. The assessment was performed between March 25 and 29, 1991, at the San Francisco, California office of PG&E and the DCNPP site, located at Avila Beach, California. The assessment methodology included observations, discussions with licensee managers and corporate and site personnel, and a review of records and procedures associated with the licensee's procurement and dedication program.

The NRC staff is presently conducting assessments at selected licensees' facilities to review their implementation of improved programs for the dedication of CGIs and to assess the improvements made in the areas covered by the NUMARC comprehensive procurement initiative program. This initiative, approved on June 28, 1990, by the NUMARC Board of Directors, directed licensees to meet the guidance provided in EPRI NP-5652 and to review and strengthen their procurement programs in accordance with specific guidance provided in NUMARC 90-13.

The specific areas reviewed and the team's observations are described in Sections 2 through 4 of this report. The conclusions, strengths and weaknesses are summarized in Section 5 and Section 6 describes the exit meeting. Persons contacted during the assessment are listed in the appendix.

2 COMMERCIAL-GRADE DEDICATION PROGRAM REVIEW

The assessment team reviewed PG&E's programs and related commitments associated with the implementation of the NUMARC initiatives, including the program for procurement and dedication of CGIs used in safety-related applications at the DCNPP. "Dedication" is generally understood to mean the process by which an item, not manufactured and supplied under an approved 10 CFR Part 50 Appendix B QA program, is verified to be suitable for use in a nuclear safety-related application. Because a commercial-grade dedication program consists of activities affecting quality, it must be conducted under an Appendix B QA program. Therefore, PG&E's commercial-grade dedication programs were assessed against Appendix B critiera.

2.1 Procurement Program Development

In July 1986, PG&E's commercial-grade dedication program was initiated with the issuance of Nuclear Engineering Manual Procedure (NEMP) 3.12. This procedure was based on the Atomic Industrial Forum paper entitled "Recommended Practices for Procurement of Replacement/Spare Parts for Nuclear Power Plants," which was issued in March 1986. This procedure outlines the preparation and handling of RPEs which are prepared by PG&E's Nuclear Engineering and Construction Services (NECS) group located in San Francisco, California. NECS also has design responsibility and performs parts classification. The first revision of NEMP 3.12 was issued in March 1987 and added a requirement to evaluate the safety function of the item as well as specifying the critical characteristics for the item to perform its safety function. The RPE forms were also revised to include

more detail in the evaluation process. Revision 2 to PG&E's program was initiated after the issuance in June 1988 of EPRI NP-5652.

Other enhancements included an expanded RPE form and thirteen pages of procedural guidance. PG&E's incorporation of the EPRI guideline occurred over 16 months earlier than the industry commitment date of January 1, 1990.

In September 1989, the third revision to NEMP 3.12 was issued which added the requirement that the original equipment manufacturer concur with changes made by PG&E to the original design, and also added more guidance from lessons learned. Also in September, Sargent & Lundy (S&L), under contract to PG&E, issued a report summarizing its independent review of PG&E's commercial-grade dedication program. The S&L evaluation assessed current parts classification and commercial-grade dedication practices in light of the latest regulatory requirements and industry standards; verified that the program procures items with a high degree of reliability; investigated the cost effectiveness of the program; reviewed programmatic effectiveness; investigated ways to streamline the procurement process; and provided recommendations to improve the technical and economic aspects of the program. S&L proposed various enhancements to the program including simplification of the RPE process, reduction in interface problems between the various groups, and improved the overall reliability of the process. S&L concluded that PG&E's program was technically adequate and appeared to result in the procurement of high-quality replacement items.

In December 1990, PG&E incorporated certain of the S&L recommendations into Revision 4 of NEMP 3.12, including RPE coordinators to improve the interface between NECS and the site and the formation of the RPE Continuous Improvement Task Force. This change should provide a method of interface that may alleviate the difficulties in program implementation that were primarily attributed to a lack of ownership of the commercial-grade dedication program. The program for dedication of CGIs, as described by Revision 4 of NEMP 3.12, consisted primarily of using EPRI Method 1 verification activities (special tests and inspections) to verify critical characteristics. PG&E had extensive onsite testing capability for dedication of CGIs using Method 1 and had additional testing available at its San Ramon facility and through qualified contractors such as Wyle Laboratories. In addition, PG&E occasionally used EPRI Method 3 (source verification), primarily for the dedication of major components, and Method 2 (commercial grade survey) only for a few qualified suppliers. The RPE program is used to evaluate all changes to CGIs, safety-related items, graded QA programs, and critical balance-of-plant items. NECS performed the RPEs at the request of the Procurement Specialist Group (PSG) located onsite. Since Revision 4 of NEMP 3.12, PG&E incorporated further enhancements into its program. In February 1991, the RPE Training Manual was issued and by late April 1991, computer generated RPE forms were issued.

From the period January 7 through February 27, 1991, PG&E performed an internal audit of the procurement program, using both PG&E staff and consultants. The audit resulted in 66 findings and identified a lack of responsibility for the overall procurement program as the major problem.

2.2 Procedures Review

The following nuclear plant administrative procedures (NPAPs) and nuclear engineering maintenance procedures (NEMPs) represent the licensee's current program for procurement and dedication of CGIs:

- NPAP D-530/NPG-5.2, "NPG Procurement Program Overview," provided an overview and the responsibilities of the Nuclear Power Generation (NPG) procurement program. The Vice President NPG was responsible for establishing the procedures that govern the development, implementation, and management review of the procurement program. The program overview includes commercial-grade dedication in NPAP D-540/NPG-5.14.

- NPAP D-532/NPG-5.4, "Initiating Procurement of Material and Job Estimate Program," addressed procurement activities by initiating a material request (MR) through the plant information management system (PIMS) or manually. NECS-Engineering initiated procurement of material by issuing an engineering material memorandum that included engineering and QC requirements to the PSG for incorporation into the site procurement program.

- NPAP D-533/NPG-5.5, "Processing of Procurement Documents," described the requirements for processing, reviewing, and approving all PIMS-generated MRs.

- NPAP D-534/NPG-5.6, "Classification of Items and Services for Procurement," established the requirements and guidance for evaluations and safety classification of the items, including spare parts.

- NPAP D-535/NPG-5.7, "Procurement Document Requirements," provided the requirements and guidance to ensure that appropriate technical and quality requirements are included in the procurement specifications. Section 4.6 required that CGIs be dedicated for safety-related applications in accordance with the requirements of 10 CFR Part 21 and NPAP D-540/NPG-5.14, which included completion of PG&E Form 69-10666 which provided the receipt inspection instructions for commercial-grade procurement.

- NPAP D-540/NPG-5.14, "Commercial-Grade Dedication Activities," provided the instructions and responsibilities for ensuring that CGIs meet the procurement requirements specified by NECS-Engineering. This procedure was applicable to the site dedication activities conducted through the implementation of EPRI NP-5652 Method 1, during or after receipt of a CGI, to verify selected critical characteristics.

- NEMP 3.12, "Spare and Replacement Parts Evaluation," described the process for NECS-Engineering to evaluate spare and replacement parts for safety-related use, including identification of the critical characteristics and a partial list of potential critical characteristics and their application as referenced in the EPRI guideline.

2.3 Program Interfaces

Commercial-grade dedication performed at the DCNPP is the responsibility of the PSG. Whenever a new or replacement part (not an identical item) is required to be dedicated as a CGI, PSG will initiate a request to NECS for an RPE. The RPE is an engineering evaluation package which identifies the critical characteristics that must be verified by PSG for determining the acceptance of a new or replacement part. PSG creates standard clauses (SCs), a module within the PIMS purchasing system, based on the critical characteristics specified in the RPE. PIMS is a computerized system/program containing numerous modules such as purchasing and also contains a module on the inventory parts catalog (IPC) which is a database of parts records uniquely identified by a stock code. The IPC contains the normal SCs for procurement receipt inspection such as SC 4500 "Receipt Inspection Instructions - General."

For commercial-grade dedication, PSG creates additional SCs as necessary to verify the critical characteristics specified in the RPE. These SCs are not printed out until a proper prefix is assigned to the SC number. For example, when the prefix "Q" is assigned to SC 4500 the computer will print out the technical requirements of the SC on the inspection report for QC inspection. Likewise, a prefix of "B" will cause the SC to be printed out on the MR. The SCs and the associated prefix are listed under the "Classification Data" of the IPC which PIMS is programmed to transfer onto the MR. This data is also transferred onto the purchase order (PO). The MRs and POs are processed in accordance with NPAP D-533 "Processing of Procurement Documents." If critical characteristics are required to be verified during installation, the prefix "W" is assigned to the SC and PIMS will print out the technical requirements on the maintenance work order which is processed in accordance with APC-40S3 "Use of the PIMS Corrective Maintenance Work Order Module." The CGI when dedicated by QA Receiving goes to inventory or, when dedicated through the work order process, is installed in the plant.

2.4 Replacement Part Evaluation Process

The NRC assessment team reviewed PG&E's program for the preparation of RPE packages. Such packages consist of various forms and documentation used for determining the acceptance of a CGI. An RPE is also required for any item which is used in a safety-related application and purchased from a supplier who will not accept 10 CFR Part 21. NECS has the overall design responsibility for the DCNPP including the reclassification of an item should it differ from the classification of its parent component, and responsibility for preparation of the RPE. The procedure that controls part classification and preparation of the RPE is NECS 3.12, "Spare and Replacement Part Evaluation," Revision 4, dated December 14, 1990. An RPE may be requested by various groups at the plant, but most are requested by the PSG. The requestor initiaties a request and forwards it to the appropriate NECS discipline which assigns an evaluator who is responsible for completing all technical evaluations and coordinating any additional evaluations such as environmental qualification (EQ), seismic, and those required under 10 CFR 50.59. Once the evaluation is completed, it is reviewed by the project quality engineer, the NECS group supervisor, the RPE coordinator and the project engineer. Following completion of the reviews and placement in the correspondence control system, distribution of the RPE package is made and a copy of the approved RPE is sent to the site for processing. The principal elements of the RPE process are as follows:

(1) General information and parent component information such as item description, system and parent QA classification, and EQ and seismic categories.

(2) Original and new or replacement item data such as manufacturer, supplier, part number, technical and quality requirements, applicable specifications, drawings, and 10 CFR Part 21 reportability information.

(3) New or replacement item safety classification such as the item's parent component safety function and its safety function including failure modes and effects.

(4) New or replacement item technical evaluation to compare the differences and similarities between the replaced item and its replacement, including determining if the replacement item is identical, like-for-like, or equivalent to the item being replaced. Equivalent replacement items are processed in accordance with design control measures consistent with the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. NECS used the following definitions to determine if an item is identical, like-for-like, or equivalent.

- o Identical Item - An exact duplicate of the original item with identical quality assurance and quality control, technical, and documentation requirements, purchased from the original supplier, except NUREG-0588, Category II qualified EQ equipment. Items which have part/model number differences due only to administrative changes, or items purchased from the original supplier or manufacturer, whose company name has changed (e.g., due to purchase by another company) may be considered as identical items.

- o Like-for-Like Item - An item which would qualify as an identical item (as defined herein), except for minor administrative differences such as the following:

  1. Identical items purchased from an alternate supplier.

  2. Identical items purchased from the original supplier who no longer accepts 10 CFR 21 or 10 CFR 50 Appendix B responsibilities (e.g., the item is no longer advertised as a basic component, and must now be dedicated as a commercial-grade item).

  Like-for-like items involve no physical change in weight, configuration, or material from the original item.

- o Equivalent Item - A replacement item not identical to the original that must be evaluated for equivalency to assure that the original function will be maintained.

- o Equivalency Evaluation - A technical evaluation performed to confirm that an alternative item, not identical to the original item, will satisfactorily perform its intended function once in service.

(6) Identification of critical characteristics which are critical for satisfactory performance and include considerations such as performance, design basis, EQ, and seismic requirements for the parent component.

(7) Determination and selection of EPRI acceptance methods 1 through 4.

The RPE process also included documented reviews for seismic and EQ, design reviews, safety evaluation screening, configuration control and limitations, and supplier required documentation. The RPE process also provides administrative controls for revisions or making minor changes (MCs) which are non-technical to a completed RPE. The RPE program is well defined and contains the essential elements for controlling the safety classification of a part and for identifying critical characteristics and the method used to verify those characteristics.

The assessment team concluded that if properly implemented, NEMP 3.12, Revision 4, should provide adequate controls to ensure that CGIs will perform their intended safety function. Although indirectly related to the RPE process, the assessment team noted that PG&E's engineering participation in EPRI and Joint Utility Task and Working Groups, such as the Region V Engineering Manager Subcommittee on Procurement Engineering, and formalized engineering participation in supplier performance based audits, were program strengths. However, certain areas within the RPE process require improvement as discussed below.

(1) Attachment C to NEMP 3.12, Revision 4, did not address the issue of performing commercial-grade surveys for both the distributor of the item as well as the manufacturer when procuring a CGI from a distributor. Also, Section 4.1.4 of NECS Procedure NE 7.1 did not address the issue that a supplier must have a documented program for controlling a CGI's critical characteristic if EPRI Method 2 is selected.

(2) Presently there are no requirements for NECS to perform periodic reviews of existing RPEs (both generic and specific) that were prepared prior to Revision 4 of NEMP 3.12 and prior to NECS incorporating detailed guidance from EPRI NP-5652 for identification and verification of critical characteristics.

(3) As written, Section 4.4.10 of NEMP 3.12, Revision 4, does not define the purpose of the RPE Reviewer's signature. Discussions with engineering personnel noted that this signature was that of the independent design verifier as required by Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, and by American National Standards Institute (ANSI) N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants," as endorsed by NRC Regulatory Guide (RG), 1.64, "Quality Assurance Requirements for the Design of Nuclear Power Plants," Revision 2, dated June 1976. ANSI N45.2.11, Section 6.3, requires that the method used to perform the independent design verification needs to be identified and documented. However, NEMP 3.12, Revision 4, does not require that the methods used by the RPE reviewer to perform the independent design verification be identified and documented when no design change notice (DCN) is issued with the RPE. Also, Section 3.7 was unclear with respect to identifying when a field change transmittal can be used rather than a DCN for controlling changes to engineering documents such as drawings, specifications, and vendor manuals.

(4) NEMP 3.12, Revision 4, permits the use of MCs to the RPE to correct obviously inaccurate information such as typographical errors or to provide clarification. Discussion with DCNPP site and NECS personnel indicates

that this method also was being used to permit one-time deviations from the RPE-identified acceptance criteria for verifying a critical characteristic. As written, NECS 3.12 did not address the use of MCs and did not provide proper controls and requirements for MCs to the RPE when used to authorize minor deviations to the acceptance criteria specified for a critical characteristic. NEMP 3.12 does not permit MCs to be used to authorize any deviations or changes to technical requirements.

The assessment team observed that although the RPE failure modes and effects analysis specified in NECS 3.12 are consistent with the guidance provided in EPRI NP-5652, in that the item's failure effects are applied to the parent component and related parent system components, the team questioned whether the effects on non-parent surrounding items due to the failure of the replacement item should also be considered when the part being evaluated is not an EQ item under the requirements of 10 CFR 50.49. This is further discussed in Section 2.6 of the assessment report.

2.5 Receipt Inspection

NPAP D-540, "Commercial Grade Dedication Activities," provided instructions for the dedication of CGIs used in safety-related applications. It stated that receipt inspection shall be performed in accordance with NPAP D-537, "Receipt of Materials," which appeared to adequately address the applicable sections of ANSI N45.2.2, "Packaging, Shipping, Receiving, Storage and Handling of Items For Nuclear Power Plants."

The PSG is responsible for incorporating detailed verification activities to be performed at receipt or at installation in the receiving inspection instruction (RII), receiving document review (RDR) and/or PIMS generated standard clauses. PG&E management stated that a concerted effort was being made to avoid verification activities at installation which are based on NECS-Engineering requirements. The QC department performs these verification activites in accordance with Procedure 10.1, "Receipt Inspection Activities," which directs receipt inspection personnel to the PO file which contains the RII, RDR, and PIMS generated standard clauses. The QC department uses the materials facility testing laboratory to perform many types of receipt testing and failure analyses as prescribed in the RII. Some of the capabilities of the materials facility include optical emission spectrometry, X-ray fluorescence, chemical spot testing, infrared analysis, equotip and type A and D durometer testing.

DCNPP also had access to PG&E's testing facility in San Ramon, California, which had the added capabilities of a 55,000-pound servo hydraulic testing machine, a 3000-pound impact testing machine, a scanning electron microscope, and carbon and sulfur analyzers. Material that was nonconforming to the receipt inspection requirements was immediately placed on hold and registered in the inspection data base via the vendor performance tracking mechanism of PIMS. This information was used by procurement QA auditors in preparation for annual evaluations and audits of vendors. It was noted that QC receipt inspection personnel did not have the ability to perform electrical verification activities and relied on the electrical maintenance department to perform testing on circuit breakers, resistors, and fuses. QC performed receipt inspection for all requirements except testing and then notified the materials facility supervisor to initiate an action request to track the item and establish details for testing.

The item was tested and returned to QC along with the test results. The QC manager stated that the department was developing an electrical test laboratory that will be staffed by QC personnel and governed by QC procedures. This capability would strengthen the receipt inspection process for electrical items by increasing QC oversight and making the department responsible for all receipt inspection activities.

2.6 Parts Classification System

The NRC assessment team reviewed PG&E's program used to identify the safety classification for new and replacement items at the DCNPP. The two primary procedures used to support the replacement item safety classification process were NEMP 3.1, "Classification of Structures, Systems, and Components," Revision 6, dated January 31, 1990, and NEMP 3.12, "Spare and Replacement Part Evaluation," Revision 4, dated December 14, 1990. Attachment A, "New or Replacement Item Safety Classification," of NEMP 3.12, was the form included in the RPE to document the basis for an item being classified as either safety-related or not safety-related. The NECS discipline engineer, assigned the responsibility for completing the RPE, first identifies the safety function of the parent component by reviewing the approved DCNPP Component, System, and Structure Classification List (referred to as the "Q-List"). Then, the parent component's active or passive function is determined using engineering and design criteria, drawings, vendor documents, EPRI NP-6406, "Guidelines for the Technical Evaluation of Replacement Items in Nuclear Power Plants (NCIG-11)," the updated safety analysis report, and Plant Technical Specifications. After determining the function of the parent component, the specific function of the item, including the failure modes and effects, is evaluated. The failure effects analysis is based on data obtained from contacting the vendor, reviewing vendor documents, published literature, plant equipment history data, nuclear power reliability data system (NPRDS) data, and system engineering inputs. The postulated credible failure modes of the item were evaluated to determine if these failures would prevent the parent, or associated system components, from performing their safety-related function. If the answer was no, the justification was documented and included in the RPE. On the basis of the evaluations and analysis performed, the engineer classifies the item as safety-related or not safety-related. The assessment team noted that the parts classification process was well defined and contained the essential elements for determining the safety classification of an item. The requirements for documenting the analysis and evaluation and, especially, the basis for not classifying an item as safety-related was procedurally well defined.

Procedure NEMP 3.12, Revision 4, required that the engineer determine if any of the postulated credible failure modes of the item would prevent the parent component or associated components from performing their safety-related function. NEMP 3.12 incorporated the guidance specified in EPRI NP-5652, however it did not consider the effects on the surrounding components, nor did it identify the failure effects that surrounding components may have on the parent component if the replacement item fails. The failure of other components may not cause the parent component to malfunction, but it may introduce failure modes resulting from failure of the surrounding components. For the most part, these items and their failure effects were of a mechanical nature and not subject to the environmental requirements of 10 CFR 50.49.

The NRC assessment team reviewed generic RPE M-1133, "Lubricants for EQ Equipment," Revision 1, including MC-1. The safety classification determined that the effects of postulated failures of the lubricants could prevent the parent component or associated components from performing their intended safety-related functions; however, PG&E had not classified the lubricants as safety-related due to the fact that their endurance in harsh environments assured proper lubrication of the parent component. As a result, the critical characteristics were not verified to the same extent had the lubricants been classified safety-related. The assessment team expressed concern over PG&E's basis for the classification of EQ lubricants.

2.7 Procurement Package Review

The NRC assessment team reviewed the following RPEs to determine program implementation adequacy:

(1) RPE P-6971 evaluated valve parts for FCV-1510, FCV-1250 and FCV-1540 associated with a 6-inch feedwater bypass control valve manufactured by Fisher Controls International (Fisher). Fisher is on PG&E's Quality Suppliers List (QSL) for supplying safety-related butterfly and control valves to the requirements of the American Society of Mechanical Engineers code. Licensee personnel stated that Fisher bought valve parts under their (Fisher's) commercial-grade procurement program which PG&E audited and found to be satisfactory. However, PG&E was not satisfied with the critical characteristics specified by Fisher's program for verification of CGIs dedicated for safety-related applications. Since Fisher refused to supply valve parts as safety-related with 10 CFR Part 21 requirements imposed, PG&E procured the valve parts as commercial-grade and performed the dedication on site. Two critical characteristics specified for verification were material chemistry using an alloy analyzer, and material hardness using a specified minimum Rockwell-C hardness value. A valve seat retainer failed the X-ray and hardness acceptance test and PG&E rejected the item at receipt inspection. This was indicative of a successful dedication program and also supported PG&E's decision not to accept parts under Fisher's commercial-grade program. However, no upper acceptance limit was specified for the material hardness value for the valve plug or seat ring. Establishment of an upper acceptance limit would be prudent.

(2) RPE N-6878 for a Union Pump Cylinder Head Extension for Positive Displacement Pump. The RPE identified critical characteristics to be verified by QC during receipt inspection as contained in Standard Clause 8894 N-6878.

(3) RPE E-6690 for various size fuses and fuse holders manufactured by Bussman Fuse Incorporated for use in the sixth emergency diesel generator (EDG).

(4) RPE E-6487, Revision 2, for multipole control relays and spare contacts manufactured by the Cutler-Hammer Company for use in the sixth EDG.

(5) RPE E-6800 for various items related to the sixth EDG excitation system purchased from the Woodward Governor Company which included a 0.5 ohm resistor (Part #9903-004-A); an EG-A-type control assembly suitable for 120 volts ac power supply (WGC Part #9903-003-B); and a motor-operated potentiometer (Part #9903-106-C).

(6) RPE J-6917 evaluated 1151-type level transmitters (LTs) manufactured by Rosemount Incorporated that were required to replace existing Drexelbrook LTs that monitored the level of the boric acid tank in the chemical and volume control system. The LTs were qualified by analysis.

(7) RPE P-6471 evaluated a disc nut pin and washer for an 8-inch swing check valve installed in the residual heat removal system. The evaluation stated that the washer was not safety-related because its only function was to prevent premature wear at the arm/nut joint. The pin was classified as safety-related because it was a locking device to keep the nut in place that attaches the disc to the swing arm. The RPE identified part number, configuration and material as the critical characteristics. The part number was verified at receipt inspection and the material was verified by an X-ray fluorescence test. Configuration was to be verified by visually comparing the replacement pin with the existing pin, which was held in place by a tack-weld. It was noted that the pin had never been installed.

All items in the RPEs reviewed satisfied the definition of a CGI as stated in EPRI NP-5652 and each package was prepared in accordance with NPAP D-540. The RPEs, including their revisions, were prepared in accordance with the requirements of NEMP 3.12, Revision 4. All necessary engineering approvals had been obtained for the revisions and MCs to the RPEs, and some of the components were requisitioned in response to DCNs. Additionally, all applicable line items were checked off to provide relevant information; the safety classification of each item was discussed; the technical evaluations provided in the RPEs appeared acceptable, and the critical characteristics identified were verified either by inspections, tests, or both. Seismic tests were required to be performed on a sample of representative size to determine if the components were acceptable. After determining that all the other components in the lot were homogeneous, by comparing them for similarity, the other components in the lot were considered qualified.

The assessment team concluded that the MRs for these RPEs had been prepared in compliance with NPAP D-533, Revision 4, May 12, 1989, and that the POs reflected the requirements specified in the MRs. The inspection reports contained in the RPE packages verified that the vendor complied with the documentation requirements and that the components met the physical properties established and the electrical maintenance personnel performed electrical tests when specified. Work orders documented instructions for the maintenance personnel to install the components and, where appropriate, the maintenance personnel verified the critical characteristics during post-installation testing. The RPEs demonstrated that the engineering staff participated in the procurement and product acceptance process; adequate criteria were specified to perform effective receipt inspection or to perform testing during installation; and activities were conducted to dedicate CGIs through engineering-based programs. The PG&E receipt inspection program to detect, report, and disposition fraudulent products appeared adequate. Receiving and procurement personnel were adequately trained on the detection of fradulent products per NRC GL 89-02, NRC Information Notice (IN) 89-70, and the relevant EPRI documents.

2.8 Commercial-Grade Survey Process

The Procurement Quality Assurance (PQA) senior QA supervisors were responsible for approving the methods for commercial-grade surveys of suppliers and for assigning PQA lead auditors to perform the surveys. Procedure PQA-WI-18.9 "Commercial-Grade Supplier Surveys," dated March 22, 1991, controls this process. Requests for commercial-grade surveys were submitted, typically by NECS to PQA, via an evaluation request form which provides information about the critical characteristics, parts, and scope of the survey. The designated survey team leader (STL) coordinated with the requesting organization to determine the composition of the team and appropriate timeframe for performing the survey and obtained applicable PO or supplier contract documents to determine the basis for planning the survey. A survey plan and checklist matrix was developed for each item to be surveyed, including the identification of critical characteristics and the applicable 10 CFR Part 50 Appendix B criteria. The survey checklist, according to Procedure PQA-WI-18.9, was based primarily on identifying quality elements from a standard supplier quality program checklist. These quality elements were programmatic elements and were not item/characteristic specific as required by EPRI NP-5652. Conducting a commercial-grade survey includes a pre-survey conference, facility walkthrough, a survey of the quality elements chosen, documenting the survey results, engineering interface, and the survey exit meeting. The STL prepared a survey report consisting of the survey plan, checklist matrix, and a summary of strengths and weaknesses. Although not specific at this time to the commercial-grade survey process, PQA has a very good program for screening and using third-party audits, such as joint licensee audits and other audits conducted on behalf of PG&E. According to PQA management, approximately 85 to 90 percent of third-party audits reviewed were rejected in their entirety or in part. Weaknesses were identified in the review of the following procedures:

- Procedure PQA-WI-18.9, Section 7.0, and Attachment C, "Commercial Grade Survey Checklist Matrix," did not provide requirements for identifying the method that the survey team should use to confirm that the selected critical characteristics are controlled and properly documented. Section 7 of the procedure implied that the survey team will review the quality elements chosen to determine if the methods and controls employed by the supplier are adequate. The only requirement in the procedure that implied that critical characteristics of an item must be confirmed was on Page 5 of 7 which stated, "As in an audit, objective evidence shall be reviewed and in-process activities witnessed." Quality assurance program implementation audits performed to meet Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50 and the guidance provided in NRC RG 1.144, Revision 1, including ANSI Standard N45.2.12-1977, are generally not a substitute for using EPRI Method 2. EPRI NP-5652 addresses commercial-grade surveys of a distributor, however, NRC GL 89-02 takes exception and specifies a survey of not only the distributor but also the manufacturer of a CGI.

- Procedure QAP-7.C, "Control of Purchased Material, Equipment, and Services," dated January 2, 1990, identified the applicability of EPRI NP-5652, but did not address completely the issues contained in NRC GL 89-02, nor did NEMP 3.12 and NEMP 7.1 address these issues.

- Section 2.2.3 and Attachment C of NEMP 3.12, Revision 4, addressed the use of Addendum 2 to the QSL for identifying and controlling commercial-grade surveys that can be utilized for EPRI Method 2. However, Procedure PQA-WI-6.1, "Qualified Supplier List," dated November 10, 1990, did not provide prescriptive requirements for the identification and controls applicable for placing commercial-grade suppliers on Addendum 2 of the QSL.

2.9 Fraud Detection

Receipt inspection Procedure QCP-10.1 Section 5.6, addressed the identification of substandard/fraudulent items and provided guidelines to the QC materials inspector emphasizing the detection of substandard, fraudulent, or misrepresented items. The guidelines provided the QC inspector with numerous examples of common characteristics of misrepresented vendor products that might be cause for further investigation and also provided a list of components and products in Appendix 7.3 that may be vulnerable to misrepresentation. Suspected fraudulent items were placed on hold until an investigation or evaluation was completed. If there was evidence of fraud, the matter was turned over to the Director of Procurement for further action. Materials Services Department Policy No. 9, dated March 20, 1990, addressed misrepresented vendor products and the need to reduce the likelihood of using counterfeit or fraudulent products as referenced in NRC IN 89-70 and GL 89-02. The policy called for PSG to be immediately contacted to confirm and subsequently issue an action request. Records on the "Misrepresented Vendor Products" training session showed that approximately 73 individuals involved in procurement and receiving activities took the course.

The training session handouts included NRC IN 89-70, GL 89-02, and various EPRI guidelines that provided useful information to help identify items that may be substandard, misrepresented, or supplied with fradulent documentation.

3 PROCUREMENT TRAINING REVIEW

MSD and NECS personnel were involved in the review, evaluation, and implementation of the RPEs. MSD consisted of several onsite groups, including the PSG, PSG/QC, Computer Maintenance (for IPC and PIMS), expediting personnel, warehouse personnel, and buyers who participated in processing and implementing the RPEs. A typical training record listed the date and subject of the training, the names of individuals who attended, their social security numbers, and the instructor. Subjects included guidance to identify and prevent the use of fraudulent items; implementation of NEMP 3.12, Revision 4; and various plant administrative procedures. MSD was establishing a formal training program similar to the one developed by NECS. MSD expected the program to indicate the minimum training requirements of each individual and include a status list to indicate the subjects completed. This list should aid management in scheduling individuals to receive training in a timely manner to complete the established requirements.

NECS had prepared a "Spare and Replacement Parts Evaluation Training Manual" to describe the process necessary to evaluate spare and replacement parts, new items used for modifications, and new designs for the DCNPP, as described in NEMP 3.12. The assessment team selected the names of several engineers who had either prepared or approved RPEs and verified through computer training records available onsite that these individuals had received training in NEMP 3.12,

Revision 4. Training records for NECS personnel were located at PG&E's corporate office in San Francisco. A NECS representative stated that the engineers also were trained to use the NPRDS to obtain relevant information on previous equipment failures and to use NPAP D-11, "Equipment Restricted From Nuclear Safety Application," to select reliable components and prevent the inadvertent use of components with a history of problems. The training program encompassed additional subjects including implementing other NEMPs that reflected the DCNPP QA program outlined in Chapter 17 of the Final Safety Analysis Report and PG&E's corporate policies. PG&E also contracted with Bechtel Power Corporation to prepare certain RPEs; however, only under NECS' review and approval.

4 NUMARC COMPREHENSIVE PROCUREMENT INITIATIVE IMPLEMENTATION

NUMARC 90-13, "Nuclear Procurement Program Improvements," approved by the NUMARC Board of Directors on June 28, 1990 requested licensees to assess their procurement programs and take specific action to strengthen inadequate programs. The comprehensive procurement initiative called for licensees to complete their review by July 1, 1991, and to complete implementation by July 1, 1992. These guidelines were summarized in the enclosure to a Commission Paper, "NUMARC Initiatives on Procurement" (SECY 90-304), dated August 24, 1990. As of the assessment, PG&E had completed its review and assessment of the initiative and a draft report summarizing the results and recommendations for improvements was scheduled to be submitted to PG&E senior management by May 15, 1991. In September 1990, PG&E established a task force to assess the practices used to qualify items to 10 CFR Part 50, Appendix B criteria and compare them with those of the comprehensive procurement initiative requirements and to identify resources, equipment, and procedures to achieve implementation. PG&E's significant progress in this area should enable it to meet the July 1, 1991, review date. An overview of the results contained in the task force's draft report follows.

4.1 Performance-Based Supplier Audits

The task force identified a major strength in that DCNPP was generally in compliance with the guidelines contained in EPRI NP-6630, "Guidelines for Performance-Based Supplier Audits (NCIG-16)," which had been used at DCNPP since 1990 and will be increased in the future. However, the task force identifed a need to revise procedures to require formal upfront coordination and decision on acceptance methods for each procurement; formal approval and transmittal of NECS engineering input for performance-based supplier audit (PBSA) planning; enhanced documentation of material classification by the materials department; and the incorporation of performance-based techniques into the supplier audit and training program. Revised procedures would increase the number of RPEs, source verifications, and receipt inspections using testing.

4.2 Tests and Inspections

The task force identified a strength in that DCNPP's practices in this area were in compliance with EPRI NP-6629, "Guideline for the Procurement and Receipt of Items for Nuclear Power Plants (NCIG-15)," but recommended that the plant's receipt inspection and testing capability be enhanced to minimize the need for post-installation testing, especially the testing of electrical items.

4.3 Obsolete Items and Information Exchange

The task force noted that practices employed at the plant were in compliance with recommendations contained in NUMARC 90-13 and that a technical evaluation to justify an alternative replacement would be the first choice over purchasing the item from the surplus market, also referenced in NEMP 3.12. However, better utilization of QA information under the Institute for Nuclear Power Operations nuclear network program was needed and shared and joint utility member audit participation should be improved.

5 CONCLUSIONS

The licensee had made a significant effort to upgrade its commercial-grade dedication program since initial incorporation of the EPRI guidelines in August 1988; however, needs for improvement were identified in a number of areas. Of most significance were the present use of RPEs generated prior to August 1988, the date on which PG&Es program incorporated the guidance contained in EPRI NP-5652. PG&E had no formal documented system in place to require a review of the RPEs to reflect current industry standards and practice and their use today may not be consistent with PG&E's commitment to implement the EPRI guidelines.

The assessment team found strengths in areas such as training and industry involvement; overall program consistency with the dedication philosophy described in EPRI NP-5652; employing an independent consultant in 1989 to review and make recommendations within PG&E's procurement and commercial-grade dedication program; PG&E's establishment in May 1990 of a formal task force to review the RPE process, and PG&E's extensive mechanical and metallurgical onsite testing capabilities to perform EPRI Method 1 acceptance activities. Also PG&E's achievements in the area of the review and implementation of the NUMARC comprehensive procurement initiatives was excellent, and the quality, experience level, attitude and dedication of its personnel was evident.

6 EXIT MEETING

On March 29, 1991, the assessment team conducted an exit meeting with members of the PG&E staff and management at the DCNPP site. A brief exit meeting also was conducted on March 27, 1991, at PG&E's office in San Francisco, California. Persons contacted during the assessment are listed in the appendix to this report. During the exit meeting, the team summarized the scope of the assessment and the observations. Throughout the assessment, the team met with PG&E management and their staff to discuss concerns. The licensee did not identify any information as proprietary.

APPENDIX

PERSONS CONTACTED

Pacific Gas and Electric Company

* J. Townsend, Vice President and Plant Manager, DCNPP
* W. Fujimoto, Vice President, Nuclear Technical Services
* M. Tresler, Project Engineer, Nuclear Engineering and Construction Services (NECS)
* D. Taggart, Director, Quality Procurement and Audit
* J. Young, Director, Quality Assurance (QA)
* B. Griffin, Manager, Maintenance Services
* M. O'Connell, Engineer, Regulatory Compliance
* T. Grebel, Supervisor, Regulatory Compliance
* G. Tidrick, Engineering Group Supervisor, NECS
* D. Aaron, Director Procurement Support
* R. Harris, Supervisor, Materials Services
* S. Ortore, Manager, Materials Services
* E. Kahler, Spare Parts Coordinator, NECS
* W. Barkhoff, Manager, Quality Control (QC)
* J. Sopp, QC Specialist
* P. Lang, Senior QC Engineer
* J. Griffin, Senior Engineer, Regulatory Compliance
  J. Sexton, Manager, QA
* C. Hartz, QA Engineer
  J. Shoulders, Project Engineer, NECS
  R. Anderson, Manager, NECS
  H. Thailer, Engineering Group Supervisor, NECS
  W. Hayes, Engineer, NECS
  C. Cotton, Engineer, NECS
  M. Chan, QA Engineer
  P. Chan, Senior QA Supervisor
  M. Freund, Senior QA Supervisor
  K. Daval, Piping Group Leader, NECS
  M. Jacobson, Project Quality Engineer, NECS
  T. Fetterman, Engineer, NECS
  D. Tateosian, Supervising Engineer, NECS
  M. Dobrzensky, Senior QA Supervisor

Nuclear Regulatory Commission

*U. Potapovs, Acting Chief, Vendor Inspection Branch, NRR
*R. Wilson, Reactor Engineer, NRR
*D. Kirsch, Chief, Reactor Safety Branch, RV
*K. Johnston, Resident Inspector, DCNPP
*R. Pettis, Team Leader, NRR
*L. Campbell, Reactor Engineer, NRR
*W. Wagner, Reactor Engineer, RV
*A. Fitzgerald, Reactor Engineer Intern, NRR
*K. Naidu, Senior Reactor Engineer, NRR
*M. Snodderly, Reactor Engineer, NRR

NUMARC

*A. Marion

Winston & Strawn

*P. Robinson

*Attended Exit Meeting at the DCNPP Site