

1 Inspection and Enforcement of a potential problem in the
2 analysis of piping systems contained in the annulus area of
3 the containment building. In response, the Staff issued
4 Board Notification No. 81-27 and scheduled a series of
5 public meetings with PGandE to discuss the problem and
6 structure a program to resolve it. PGandE meanwhile
7 implemented a design verification program to address
8 discrepancies it had found in the seismic design of the
9 annulus area of the containment.

10 2. PGandE's program has subsequently been
11 expanded into two separate and comprehensive design
12 verification programs; one being performed by a group of
13 independent reviewers and the other being performed
14 internally by the PGandE/Bechtel Project ("Project"). These
15 programs will verify, on an extensive sampling basis, both
16 the seismic and non-seismic design of safety related
17 structures, systems and components for the Diablo Canyon
18 plant.

19 3. The verification program performed by the
20 group of independent reviewers is called the Independent
21 Design Verification Program ("IDVP"). This program is
22 managed and supported by Teledyne Engineering Services
23 Company with R. L. Cloud Associates, R. F. Reedy Inc. and
24 the Stone and Webster Engineering Company performing
25 independent design verification work in their respective
26 areas of responsibility: R. L. Cloud Associates -- seismic,

1 structural and mechanical design; R. F. Reedy -- quality
2 assurance; Stone and Webster -- systems design. The
3 Independent Design Verification Program includes performing
4 independent analyses and reviews, on a sampling basis, to
5 verify the adequacy of the design. Some of the areas in
6 which technical verifications are performed include
7 structures, piping and supports, equipment qualification,
8 electrical raceways and ventilation duct supports, and
9 system design. The verification program, moreover, is
10 designed to be self-expanding if deemed warranted by the
11 IDVP. The program establishes criteria for performance of
12 such additional verifications resulting from either the QA
13 reviews or the sample calculations. Detailed descriptions
14 of the independent program are contained in "Diablo Canyon
15 Nuclear Power Plant - Unit 1, Independent Design
16 Verification Program, Program Management Plan, Phase I,"
17 approved by the NRC in a letter dated April 27, 1982, and
18 Phase II, "Diablo Canyon Nuclear Power Plant - Unit 1,
19 Independent Design Verification Program, Program Management
20 Plan, Phase II," submitted to the NRC on June 18, 1982.
21 These plans are attached to this affidavit.

22 4. The Project internal technical program
23 includes verification work performed by a combined team of
24 PGandE and Bechtel personnel. As a part of the Project
25 internal technical program, URS/Blume has conducted the
26 Blume Internal Review (BIR). The Project work includes

1 reverification of additional samples as well as responding
2 to the findings of the IDVP. The Project internal technical
3 program also includes specialized analysis and qualification
4 work being performed by Westinghouse Electric Corp. and TERA
5 Corp. The technical verifications are being performed in
6 the areas of seismic and non-seismic safety-related
7 structures, systems and components. This program was also
8 approved by the NRC Staff in its April 27, 1982 letter.

9 5. The two verification programs have been
10 established in strict accordance with the November 19, 1981
11 Commission order, and the letter from Mr. Harold Denton, of
12 the same date. All verification efforts, both the Project's
13 and the independent reviewers', are being performed in
14 accordance with the latest approved Quality Assurance
15 programs for the involved companies.

16 6. Over the past 9 months an extensive amount of
17 verification and review work has been performed under the
18 two verification programs. The organizations involved in
19 the verification programs have expended approximately 2,500
20 man-months or in excess of 400,000 man-hours in reviewing
21 structures, systems and components. In this effort,
22 thousands of calculations and analyses have been reviewed.

23 7. The IDVP to date has yielded 172 findings.
24 The vast majority of these findings are not errors, and very
25 few are errors of actual or potential significance. Under
26 the classification system used in the IDVP, all findings are

1 first characterized as an "Open Item." (See attached
2 Glossary.) An Open Item is either a QA or Design Control
3 deficiency, a violation of the verification criteria, or an
4 apparent inconsistency identified in the performance of the
5 work. Each Open Item is ultimately recategorized as an
6 "Error," a "Deviation," or a "Closed Item." Errors are
7 broken down into four categories, with Class A Errors being
8 the most significant and Class D Errors being the least
9 important. When the IDVP effort related to an Open Item is
10 complete, the IDVP issues a completion report. Of the 172
11 IDVP findings to date, completion reports have been issued
12 for eighty-nine (89) items, which have been categorized as
13 follows: only one (1) Class A Error (may require physical
14 modifications or changes in operating procedures), no
15 Class B Errors (resolvable by more realistic calculations or
16 retesting); six (6) Class C Errors (no design criteria or
17 operating limits exceeded); seventeen (17) Deviations
18 (departure from standard procedure which are not mistakes in
19 analysis, design, or construction), and fifty-two (52)
20 Closed Items (neither Errors nor Deviations, with no further
21 IDVP action required). Of the remaining eighty-three IDVP
22 findings for which no completion reports have been issued,
23 the IDVP has identified these findings as follows: five (5)
24 Class A Errors; one (1) Class B Error; fifteen (15) Class C
25 Errors; no Class D Errors; seven (7) Deviations; fifty-four
26 (54) Open Items; and one (1) Closed Item.

1 8. The engineering design process, particularly
2 for seismic design, generally involves a complex combination
3 of engineering judgment, expert opinions, assumptions,
4 modeling techniques, computer analyses and other
5 calculational methodology which is all directed toward
6 developing a reasonable understanding of the performance of
7 structures, systems and components under postulated
8 operating, accident and seismic conditions. Final designs
9 are then developed based on this understanding. The final
10 design considers inherent conservatisms as well as specific
11 margins and "safety" factors applied throughout the
12 engineering process to cover certain changes, discrepancies
13 and unknowns. It is not surprising, then, that an
14 independent verification program would discover differences,
15 discrepancies and even technical disagreements with the
16 original designs. Furthermore, although these kinds of
17 items have been surfacing throughout the verification
18 programs' development thus far, these differences are
19 exaggerated by the "low threshold" of the identification
20 criteria used for the IDVP.

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9. While the overall verification effort has identified a number of Open Items, Deviations, and Errors, in our judgment, the findings thus far in the review of the seismic design for the Diablo Canyon plant would not have caused any system, structure or component to fail to perform its intended safety function.

Dated: June 30, 1982

Richard C. Anderson
Richard C. Anderson

Michael R. Tresler
Michael R. Tresler

~~John B. Hoch~~
~~John B. Hoch~~

William H. White
William H. White

Gary H. Moore
Gary H. Moore

Subscribed and sworn to before me this 30th day of June, 1982

Nancy J. Lemaster
Nancy J. Lemaster,

Notary Public in and for the City and County of San Francisco, State of California.
My commission expires April 14, 1986.

1 United States. These assignments included supervision and
2 coordination of design, specification, procurement, and
3 quality control activities.

4 I also served as senior mechanical engineer for
5 various other nuclear power facility projects in the U.S.
6 and abroad, which included work in systems, safety and
7 equipment engineering.

8 I have been an instructor in Bechtel's power plant
9 courses for over 10 years and have given numerous talks and
10 lectures in California on nuclear power and energy issues.

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1 PROFESSIONAL QUALIFICATIONS OF

2 GARY H. MOORE

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6 My name is Gary H. Moore. I am the Unit 1 Project
7 Engineer of the Diablo Canyon Project consisting of the
8 integrated organization of Pacific Gas and Electric Company
9 and Bechtel Power Corporation. I have held this position
10 since January, 1982. I am responsible for the project
11 engineering work related to the design and analysis of
12 Diablo Canyon Power Plant Unit 1. I am a Registered
13 Professional Engineer in Mechanical and Control Systems in
14 the State of California.

15 My educational background is as follows:

16 San Jose State University - BS in Mechanical Engineering,
17 1968

18 San Jose State University - MS in Mechanical Engineering,
19 1969

20 I joined PGandE in 1969 as a Mechanical Engineer
21 in the Mechanical and Nuclear Engineering Department,
22 designing instrumentation and control (I&C) systems for
23 conventional fossil plants.

24 In 1977, I was named a Senior Mechanical Engineer
25 supervising the I&C Group assigned to the Potrero Unit 7
26 Project.

1 In 1979, I was named Supervising Mechanical
2 Engineer, supervising the Mechanical and Nuclear Engineering
3 Department's entire I&C Group, including responsibility for
4 the I&C design of the Diablo Canyon Power Plant.

5 I have completed the following formal training
6 courses:

7 Simulator Training - Westinghouse Nuclear Training Center,

8 Zion, Illinois

9 Westinghouse PWR Information Course

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1 PROFESSIONAL QUALIFICATIONS OF

2 MICHEL R. TRESLER

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5 My name is Michel R. Tresler. From 1981 to the
6 present I have been employed as a Piping Design Coordinator
7 at PGandE. My responsibilities include supervision,
8 coordination, and direction of the piping and pipe support
9 analysis and design for Diablo Canyon Power Plant.

10 From 1980 to 1981 I was employed as a Supervising
11 Project Control Engineer in PGandE's Nuclear Projects
12 Department with responsibility to develop, implement and
13 maintain a project control system for Diablo Canyon Power
14 Plant.

15 From 1964 to 1980 I was employed in various
16 positions as an engineer and superintendent in PGandE's
17 Engineering Department and General Construction Department.
18 During that time, I held the positions of Engineer, Resident
19 Mechanical Engineer, Project Superintendent, and Assistant
20 Station Construction Superintendent. My responsibilities
21 included engineering, analysis, design, field engineering
22 services, and supervision and management activities related
23 to large fossil-fired units and the Diablo Canyon Power
24 Plant. In particular from 1966 to 1970 I prepared startup
25 procedures and supervised startup activities related to
26 fossil and nuclear power plants.

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My educational background includes a BS degree in Mechanical Engineering from the California Polytechnic State University, 1964.

I have completed the following formal training courses:

- a. Westinghouse Reactor Operator Training School, 1969.
- b. Westinghouse Design Lecture Series specific to Diablo Canyon, system and components design, 1971.
- c. Stat-A-Matrix course covering the establishment of a QA program and personnel training, 1973.
- d. Westinghouse PWR Information Course, 1980.
- e. Westinghouse Simulator Training, 1980.

1 I was an assistant professor at Oregon State
2 University where I taught undergraduate and graduate courses
3 in structural mechanics and analysis and computer
4 applications. I performed a special study for Bechtel on
5 soil-structure interaction for the proposed Mendocino
6 nuclear power plant while teaching at Oregon State
7 University.

8 While employed at the Bettis Atomic Power
9 Laboratory, I was a senior engineer working on shock
10 analysis of nuclear reactors aboard submarines and was
11 involved in programs to assess the shock resistance of
12 reactor internals subjected to long-term irradiation damage.

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1 use of wrong analytical method, omission of data, or use of
2 inapplicable data. An Error is classified as one of the
3 following:

4 Class A Error - An Error is considered Class A if
5 design criteria or operating limits of safety related
6 equipment are exceeded as a result, and physical
7 modifications or changes in operating procedures are
8 required.

9 Class B Error - An Error is considered Class B if
10 design criteria or operating limits of safety related
11 equipment are exceeded, but are resolvable by means of more
12 realistic calculations or retesting.

13 Class C Error - An Error is considered Class C if
14 no design criteria or operating limits are exceeded. No
15 physical modifications are required.

16 Class D Error - An Error is considered Class D if
17 safety related equipment is not affected. No physical
18 modifications are required.

19 From the definitions above, only Class A or B
20 Errors result in exceeding a design criterion or operating
21 limit. Consequently, only Class A or B Errors could be of
22 safety significance, but are not necessarily so.

23
24 DEVIATION

25 This is a term used by the IDVP to identify a form
26 of program resolution of an Open Item indicating a departure

1 from standard procedure which is not a mistake in analysis,
2 design or construction. No physical modifications are
3 required, but if any are applied they are subject to
4 verification by the IDVP.

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6 DISCREPANCY AND DEFICIENCY

7 These terms have been used interchangeably in the
8 Hubbard affidavit and Joint Intervenors' Motion with the
9 terms "error" or "serious design error."

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11 IDVP CLOSED ITEMS

12 This is a term used by the IDVP. It is a form of
13 IDVP program resolution of an Open Item which indicates that
14 the reported item is neither an Error nor a Deviation. No
15 further IDVP action is required.

16
17 IDVP COMPLETION REPORT

18 This report is used by the independent reviewers
19 to indicate that the IDVP effort related to an IDVP Open
20 Item is complete.

1 Construction, I was the Station Construction Superintendent
2 at PGandE's San Francisco General Offices, and was assigned
3 direct supervision of all construction activities, including
4 supervision of construction contracts for Diablo Canyon from
5 its inception. A summary of my experience and responsibilities
6 is contained in Attachment A.

7 2. I have carefully read the affidavit of Mr.
8 Richard B. Hubbard dated May 24, 1982 filed with Joint
9 Intervenors' Motion dated June 8, 1982. I will address my
10 comments specifically to Mr. Hubbard's allegations of an
11 inferred "breakdown" of quality assurance and quality
12 control in the construction and installation of equipment
13 and apparatus at Diablo Canyon. As I will comment
14 hereinafter, PGandE had in place a comprehensive and
15 vigorous on-site construction quality assurance/quality
16 control program. This program was subjected to numerous
17 internal and NRC (AEC) audits during construction activity
18 at Diablo Canyon. No such "breakdown" occurred.

19 3. There were three types of on-site procedures
20 and instructions that were developed and applied at Diablo
21 Canyon to provide the requisite direction for these actions
22 and activities necessary to assure design and quality
23 requirements being in conformity with the Quality Assurance
24 Program. They consist of:

- 25 a. Quality control procedures to establish the
26 control, direction and methods for acceptance of

1 physical work performed by PGandE personnel and as
2 required by the Senior Site Representative to
3 control project activities affecting quality.

4 b. Preoperational and startup test procedures to
5 assure that systems and components meet design
6 requirements. To the extent feasible, test
7 procedures incorporate approved plant operating
8 procedures and provide for testing of items under
9 simulated operating conditions.

10 c. Field instructions developed by the Resident
11 Engineers (Civil, Electrical, Mechanical, and
12 Start-up) to provide the Project Superintendent
13 with supervisory support for the on-site
14 activities through Resident Engineers, Field
15 Engineers and Field Inspectors. With respect to
16 quality control, the responsibilities of the
17 Resident Engineers include: (1) preparation of
18 quality control plans for site-related activities,
19 (2) direction of quality control activities, (3)
20 review and approval of field contractors'
21 individual quality assurance procedures, (4)
22 supervision of Field Engineers and Inspectors, (5)
23 review of site-related quality assurance
24 procedures, and (6) preoperational testing and
25 startup.

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1 4. PGandE has always recognized the importance
2 of supervisory surveillance and inspection during construc-
3 tion activity. Even prior to the promulgation of 10 C.F.R.
4 Part 50, Appendix B and the formalization of quality
5 assurance requirements, PGandE had procedures for cleaning
6 and flushing; shipping, receiving, storage and handling;
7 housekeeping; dimensional checking and quality testing in
8 place at Diablo Canyon.

9 5. The first on-site Quality Control Engineer
10 was appointed in June 1969. This position has been
11 continuously maintained by a succession of engineers since
12 that first appointment. The purpose of the on-site Quality
13 Control Engineer was to assist the Project Superintendent
14 and resident engineers in implementing the quality program,
15 provide guidance to the contractors quality groups, and
16 inspect and audit for compliance to PGandE quality program.
17 This inspection/audit was conducted in addition to and
18 supplemental to the quality control inspections and audits.
19 The on-site quality engineer has remained independent of
20 direct responsibility for the scheduling, cost, or
21 performance of construction.

22 6. Quality Control Procedures and Departmental
23 Instructions were developed at Diablo Canyon as early as
24 October 1969 to implement the requirements of the PSAR and
25 proposed 10 C.F.R. Part 50, Appendix B and PGandE's PSAR.

26 ///

1 7. For the construction and installation of the
2 building, equipment, and apparatus at Diablo Canyon, PGandE
3 required that each contractor performing work at Diablo
4 Canyon have a quality assurance program qualified to PGandE,
5 industry, and Nuclear Regulatory Commission (Atomic Energy
6 Commission) quality assurance requirements. The contractor
7 and any sub-tier contractor or supplier providing a service
8 or material to be installed at Diablo Canyon adhered to
9 these procedures in the performance of work at the site or
10 any other location affecting materials or products
11 ultimately destined for Diablo Canyon. These programs were
12 reviewed, approved, and audited by PGandE. (See
13 Attachments 1, 2, 3 and 4 for illustrative examples.)

14 8. Quality procedures, work practices, personnel
15 qualifications, forms, etc., prepared by contractors were
16 submitted to PGandE General Construction, Quality Assurance,
17 and other departments for review and approval. The same
18 rigid experience requirements established for Company field
19 engineers and inspectors were also required of contractors.

20 9. Quality control at the Diablo Canyon site was
21 a multi-tiered operation. As a requirement of all bid
22 specifications, each contractor was required to prepare and
23 staff a site quality assurance/quality control organization
24 adequate to inspect the quality of work performed. PGandE
25 field engineers and inspectors reinspected this work for
26 compliance with the applicable design documents and

1 specifications. The General Construction quality control
2 on-site group was then directly involved in the verification
3 of the adequacy and effectiveness of the contractors'
4 quality assurance program and the Company's following
5 inspections. Finally, Corporate on-site quality assurance
6 engineers verified the adequacy and effectiveness of the
7 entire process.

8 10. The complementing ratio of Company field
9 engineers and inspectors overseeing the contractors' work
10 varied from a maximum of 18 workers to 1 inspector to a
11 minimum of 8 workers to 1 inspector, and averaged 13.5
12 workers to 1 inspector.

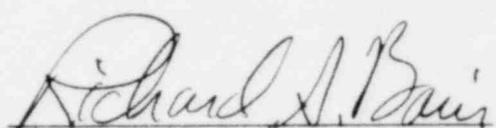
13 11. The first construction QC audit was conducted
14 on February 11, 1970, and from that date there have been 707
15 such audits. In every instance any discrepant condition was
16 corrected. In every instance of a contractor QA/QC
17 identified discrepancy a Company discrepancy report was also
18 filed to be certain that the condition was properly
19 processed. This duality of documentation established a
20 double-check for satisfactory resolution of the discrepancy

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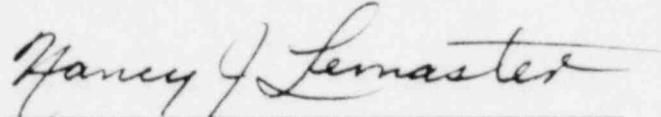
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1 in accordance with quality assurance/quality control
2 procedure, engineering design and specification.

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4 Dated: July 1, 1982

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6 
7 Richard S. Bain
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10 Subscribed and sworn to before
11 me this 1st day of July, 1982

12 
13 Nancy J. Lemaster,
14 Notary Public in and for the
15 City and County of San Francisco,
16 State of California.
17 My commission expires April 14, 1986.

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1 of Diablo Canyon Power Plant with its inception in 1966. My
2 responsibilities included also the the planning and
3 supervision of construction work related to the Humboldt Bay
4 Power Plant and other planned nuclear power stations.

5 I am a member of the American Society of
6 Mechanical Engineers Committee on Nuclear Quality Assurance
7 and have been involved in the preparation of ANSI N45
8 industry nuclear codes and standards.

9 My educational background includes a BS in
10 Industrial Engineering from Stanford University in 1947.

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PACIFIC GAS AND ELECTRIC COMPANY

SUPPLEMENTARY SPECIFICATION
FOR
MANUFACTURER'S QUALITY CONTROL
SYSTEMS REQUIREMENTS

1.0 SCOPE

This Supplementary Specification establishes requirements for the manufacturer's systems for control of quality during manufacture, including inspection plans. Should this Supplementary Specification conflict with the Specific Conditions, the latter shall govern. Items required to comply with certain codes or standards by the Specific Conditions may have additional requirements such as found in Paragraph N-832 of Section III, Nuclear Vessels, ASME Boiler and Pressure Vessel Code.

2.0 SYSTEM REQUIREMENTS

The manufacturer shall establish and maintain a system for the control of quality during the order that shall assure that all supplies and services, including subcontracted items, meet all drawing and order requirements.

2.1 Drawings and Changes: The manufacturer's system shall provide procedures which will assure that the latest applicable drawings, specifications, and instructions required by the contract or purchase order as well as authorized changes thereto are used for manufacture, inspection, and testing.

2.2 Description of Procedures: The manufacturer shall maintain a written description of procedures for control of quality and inspection showing in detail the implementation of the quality requirements of the contract or purchase order and the requirements of this Supplementary Specification. In addition, the procedures shall include (but not be limited to) quality control measures governing:

2.21 Qualification of processes, equipment, personnel, and laboratories.

2.22 Receiving inspection.

2.23 Certification of material used and final product.

2.24 Quality audits.

April 1968

BAIN Attachment 1

2.3 Management Review: The manufacturer's quality system shall provide for the identification and evaluation of significant or recurring discrepancies and for alerting the manufacturer's cognizant management to the need for corrective action. Corrective action shall be reviewed by the manufacturer for effectiveness and the need for further action.

3.0 PROCESS PROCEDURES

The manufacturer shall operate under a controlled manufacturing system such as process sheets, shop procedures, travelers, etc. Special controlled processes such as welding, heat treating, nondestructive testing, and inspection techniques shall be a part of and included in the system.

3.1 Procedure Revisions: There may be a need to revise or eliminate a previously approved inspection procedure. When this occurs, the change to (or elimination of) inspection procedures shall require Purchaser's approval.

3.2 Inspection Plans: Inspection planning for this order shall be completed in writing by the manufacturer, covering subcontracted work as well as his own, to the following minimum requirements:

3.21 All inspection operations through shipment shall be listed and referenced to the manufacturer's/subcontractor's manufacturing procedures. This Inspection Check List shall be submitted to Purchaser for approval in advance of fabrication.

3.22 Characteristics specified by the order and its referenced drawings and specifications shall appear on the check lists under the appropriate inspection operation. Space shall be provided for a notation of the document number and revision to which the inspection was made and for the inspector's signature or stamp. Each characteristic so listed shall be inspected (using approved procedures wherever these are required) and the result recorded.

3.23 When a combined manufacturing and inspection plan meets the requirements above, a separate check list of special format is not required.

4.0 NONCONFORMING COMPONENTS OR MATERIAL

All nonconforming material and components shall be kept identified and recorded to prevent intermingling with conforming material. Material or components that fail to meet acceptance standards shall be disposed of as follows:

4.1 Components or material that do not meet specifications may be submitted for possible acceptance in accordance with the purchase order.

4.2 The manufacturer shall be responsible for establishing and controlling repair procedures. He shall obtain written approval from Purchaser of any repair procedure which utilizes operations not performed in the normal manufacturing process. Each repair shall be recorded.

4.3 When the manufacturer elects to scrap the defective material or component, adequate records shall be maintained to verify that the rejected material or component has not been used.

5.0 QUALITY CONTROL RECORDS

5.1 The manufacturer shall maintain a complete file of all records for material and items manufactured. This shall include chemical and physical properties of materials, inspection, test, and analysis data taken before, during, and after manufacture as required, the manufacturing and inspection procedures, specifications, and drawings used. The records shall include all closely related data such as qualifications of personnel, procedures, and equipment, and data on nonconforming material.

5.2 Purchaser shall be provided access to records on special request as needed for engineering studies. However, copies of all data specifically requested in Purchaser's specification or purchase order shall be submitted to Purchaser as required. The manufacturer shall maintain a record file for a minimum of 5 years after order completion, after which time he shall either request disposition instructions from Purchaser or continue to maintain the records.

6.0 CONTROL AND IDENTIFICATION OF MATERIAL

The manufacturer shall maintain a system of material control adequate to assure identity of all material used and that it meets the applicable specifications, prior to start of manufacturing operation. Identification of all material shall be maintained throughout all operations by heat number (or any other suitable means traceable to the heat number) and recorded on inspection data records for each component.

8.2 Where applicable, the manufacturer's control charts and other statistical data shall be made available for inspection to Purchaser and shall be maintained as a record substantiating the acceptability of the components or material.

9.0 HANDLING AND STORAGE

9.1 The quality program shall require the use of handling procedures and equipment inspection with a monitoring program established to prevent handling damage to the product. The equipment inspections shall include any load bearing devices (hooks, shafts, slings, etc.) the failure of which could result in product damage.

9.2 The manufacturer shall provide adequate work and inspection instructions for storage, preservation, packaging, and shipping to protect the products and/or supplies from damage, loss deterioration, degradation, or substitution of product or supplies. Any special handling instructions during shipping and storage shall be prominently displayed on the shipping package.

SPECIFICATION
FOR

FURNISH AND ERECT
CONTAINMENT STRUCTURE LINER
FOR
UNIT 1
DIABLO CANYON SITE
FOR THE

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

Department of Engineering

Comprising

- Specific Conditions
- Appendix
- Form of Proposal
- Insurance Questionnaire

APPROVED BY

- J. J. McCann/ATL(NLT/DBN)
- B. W. Shackelford/RVB(EPW/SP)
- D. V. Kelly/JOS(WJL)

DATE February 25, 1969

<p>BIDDER — SIGN HERE TO INDICATE THIS HAS BEEN USED IN PREPARING PROPOSAL</p>	
FIRM	<u>Pittsburgh - Des Moines Steel Co</u>
BY	<u>E. Kelly</u>
DATE	<u>5-13-69</u>

SECTION 18

QUALITY ASSURANCE

1.0 DEFINITIONS

1.1 Quality assurance comprises all those planned and systematic programs necessary to establish confidence that a material, component, or system will perform satisfactorily in service.

1.2 Quality control comprises those quality assurance actions which provide a means to control the quality of the material, component, or system to predetermined requirements.

1.3 Product includes material, components, devices, equipment, systems, structures, services, and other items furnished by Contractor under other sections of this Specification. Product may consist of individual items, assemblies of items, or items in any state of fabrication.

2.0 SCOPE

2.1 Quality assurance requirements shall apply to all activities affecting the quality of products that are important to nuclear safety and to the prevention of accidents or to the mitigation of their consequences. All products provided under this Specification shall be considered as within the above category unless specifically exempted in writing.

2.2 Activities subject to quality assurance requirements include designing, purchasing, fabricating, handling, shipping, storing, maintaining, constructing, inspecting, testing, repairing, modifying, and documenting.

2.3 Contractor is responsible for performance of all quality assurance activities necessary to assure that products furnished by him are complete and in accordance with design and specification.

2.4 Contractor shall submit with his proposal a description of his proposed quality assurance program (bid Item 500). Not later than May 20, 1969, Contractor shall prepare in detail and submit to Specification No. 8831 Contractor for submittal to Constructor for approval eighteen copies of his quality assurance program which shall define the program and designate the qualifications, functions, and number of personnel necessary to assure compliance with the Specification. The program and methods used to implement these requirements shall be developed by Contractor based on the outline provided in Paragraph 3.0 of this Section. Contractor shall revise all or any portion of the quality assurance program where, in Company's judgment, it does not satisfy requirements. Such corrections shall be made prior to start of work.

2.5 Contractor shall be fully accountable for scheduling his work so as to permit adequate time for compliance with the quality assurance requirements of this Specification.

3.0 QUALITY ASSURANCE REQUIREMENTS

3.1 Organization: Contractor's quality assurance organization shall have clearly defined responsibility and authority for implementation of a comprehensive quality assurance program. Contractor shall require his suppliers and subcontractors to establish adequate quality assurance organizations. Quality assurance personnel shall be independent of manufacturing, fabrication, and construction forces and shall not perform functions other than those of quality assurance. Quality assurance personnel shall have sufficient and well defined responsibility, authority, and organizational freedom to identify and evaluate quality problems and to require implementation of approved solutions. Contractor shall provide with his detailed quality assurance program as required in Paragraph 2.4 a description of his suppliers' and subcontractors' quality assurance organizations. The descriptions shall include the duties, responsibilities, numbers, and basic qualifications of key personnel to be assigned to these activities. The above shall include a chart indicating responsibility and lines of authority between Contractor, Contractor's construction supervision, suppliers and subcontractors, and quality assurance personnel.

3.2 Procedures and Plans: Contractor shall review the requirements of the Specification and prepare written procedures and plans for the following:

3.21 Proposed sequence of shop and field fabrication and construction activities in detail and including and identifying those operations specifically related to quality.

3.22 Monitoring, inspecting, testing, and control of shop and field fabrication processes, test equipment, fixtures, tooling, and personnel skills required to assure the product quality.

3.23 All nonfabrication work affecting quality, including but not limited to designing, detailing, purchasing, handling, inspecting, testing, and shipping.

3.3 Approval of Procedures: Procedures shall be submitted to Contractor for approval prior to initiation of the work. Work shall not proceed until written approval of the corresponding procedure has been obtained.

3.4 Hold Points: Company may indicate mandatory inspection hold points which shall require witnessing or inspecting by Company. Work shall not proceed beyond these hold points prior to such witnessing or inspection.

3.5 Records: Contractor shall prepare, use, and maintain adequate records to attest to and document the quality of the product. Such a set of records shall include, as a minimum, material analyses, design checks, inspections, tests, workmanship, and procedures; qualifications of equipment, procedures, and shop, field, and technical personnel; and nonconformances and subsequent corrective actions. Inspection and test records shall indicate the nature of observations and type of nonconformances found. Records of work performance shall indicate acceptability of the work and/or material or necessary corrective action in cases of nonconformances. All records and documents must be preserved for ultimate use by Company for a minimum of ten years. Until such time as they may be transferred to Company, the records and documents shall be available for inspection and review by Company and regulatory agencies at any time. Contractor shall submit his record procedure to Constructor for review and approval prior to beginning fabrication or installation activity. Contractor's procedure shall include a system for identifying the inspection status of products. This may be accomplished by stamps, tickets, or tags.

3.6 Corrective Action: The quality assurance program shall provide a system for prompt detection, identification, and correction of conditions having an adverse affect on quality. Any factor of Contractor's operations which has had or could reasonably be expected to have an adverse effect on product quality shall be identified and corrected. The program shall require effective use of all data regarding defects which will not be limited to product items, but shall include methods, processes, and facilities. All conditions adverse to quality shall be documented and brought to the attention of Constructor and Contractor's supervision and management for analysis, evaluation, and prompt corrective action.

3.7 Specification, Drawing, Documentation, and Change Control: Contractor shall prepare, maintain, and use a procedure for assuring that specifications, drawings, procedures, instructions, authorized changes, and other documentation, which deal with activities affecting quality, are current, adequate, and available for use in fabrication, construction, inspection, and testing. The procedure shall stipulate that obsolete documentation be removed from point of use.

3.8 Measuring and Testing Equipment: Contractor shall prepare, maintain, and use a procedure for the maintenance and periodic calibration of measuring and testing equipment used to determine product conformance. All measuring and testing equipment shall be calibrated against certified measurement standards which have known valid relationships to national standards.

3.9 In Process and Final Inspection: Contractor's quality assurance program shall assure that work is accomplished under controlled conditions which include documented work instructions and test procedures, adequate equipment, and any special environments that may be required. Inspection personnel shall be qualified in their specific area of responsibility and knowledge. Documented work instructions shall include criteria for acceptable and unacceptable conditions including workmanship. Physical examination,

measurements, and/or tests shall be performed as required during product processing at appropriate points so as to assure quality of the end product. Contractor shall maintain close coordination with Company to facilitate inspection or witnessing of tests by Company.

3.10 Product Control: All products subject to quality control requirements which have been approved for use shall be identified and segregated to assure that only these products are used in the work.

3.11 Nonconforming Products: Contractor's quality assurance program shall require that products which fail to meet requirements are identified and segregated and removed from work site or from areas designated for approved material.

3.12 Handling and Storage: Contractor's quality assurance program shall provide and use adequate procedures to assure that all necessary measures are taken to prevent damage or deterioration of products during handling or storage.

3.13 Special Protection, Packing, and Packaging: Contractor's quality assurance program shall provide and use adequate procedures to assure that products requiring special protection, packing, or packaging shall be given appropriate consideration and treatment.

3.14 Cleanliness: Contractor's quality assurance program shall provide adequate procedures to assure that products are provided and maintained in an appropriate state of cleanliness.

3.15 Audit: A procedure for a system of audits shall be established and used to assure compliance with all aspects of the quality assurance program and to determine its effectiveness. Audits shall be made on a planned periodic basis. Contractor shall include as a requirement of his purchase orders and subcontracts a statement essentially as follows: "Contractor and/or Company shall have the right to conduct quality assurance audits and inspections at any time during production and testing as may be deemed necessary."

4.0 CONTROL OF WORK

4.1 Company will perform a continuing audit of Contractor's quality assurance program. This is in addition to the audit by Contractor described in Paragraph 3.13.

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Quality Assurance
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4.2 Company will stop or reject work which, in his opinion, is below specified quality standards. Work shall not be resumed until acceptable corrective measures are adopted by Contractor. Exercise of this authority shall be by written directive describing the work in question and reason for its suspension.



PACIFIC GAS AND ELECTRIC COMPANY
 SAN FRANCISCO, CALIFORNIA
 DEPARTMENT OF ENGINEERING

ACCOUNTING DATA						
JOB ORDER			LOC. DIV.	ACCOUNT	ACTIVITY ITEM	LOCATION AND/OR ITEM
PRE	NUMBER	SUR				
GM	167027		18	Various	Various	40
	169972					

SPECIFICATION NO. 8752

Project File Number 30.70

SPECIFICATION
 FOR

INSTALLATION
OF THE
NUCLEAR STEAM SUPPLY SYSTEMS
FOR
UNITS 1 AND 2 - DIABLO CANYON SITE

COMPRISING

Specific Conditions
 General Conditions
 Proposal Form
 Insurance Questionnaire
 Appendix

APPROVED BY

J. J. McCann (ATL) (EDC/MPH)
 D. V. Kelly (HJG/RML/AGW/NLZ)
 T. A. Betterworth (JWC/DN)
 R. V. Bettinger (EPW/VJG)
 W. J. Lindblad
 G. V. Richards

DATE May 3, 1972

BIDDER-SIGN HERE TO INDICATE THIS
 HAS BEEN USED IN PREPARING PROPOSAL
 FIRM _____
 BY [Signature]
 DATE _____

SPECIFIC CONDITIONS

SECTION 1

GENERAL

1.0 SCOPE OF WORK

1.1 General: This Specification covers the installation of the nuclear steam supply systems at Company's Units 1 and 2 - Diablo Canyon Site. The nuclear steam supply systems are Westinghouse Electric Corporation four-loop pressurized water reactors. The material, equipment, and components to be installed are Company furnished and comprise a major portion of the primary or reactor coolant system. The items to be installed for Unit 1 are itemized and described in Section 2 of this Specification, and the accompanying drawings show and locate the Unit 1 system and equipment. Unit 2 will be similar, except opposite hand. Contractor shall provide all labor, supervision, inspection, material, supplies, equipment, tools, and facilities required to complete the installation of the items furnished. All work performed under this Specification shall be to the satisfaction of the Constructor, but this shall not be construed as to relieve Contractor of the responsibility to complete and guarantee the work as specified.

1.2 Heavy Equipment Handling: Company has contracted with others for receiving, transporting, storing, and lifting the heavy equipment and components to be installed under this Specification. Refer to Section 2 for the heavy items which will be handled by others. Contractor will not have to handle these items, except as noted in Section 2.

1.3 Installation Procedures: Contractor shall prepare detailed written installation and erection procedures and instructions for all work to be performed under this Specification. Company and the nuclear steam supply system supplier, Westinghouse, will provide the technical data and information necessary to develop these instructions. Refer to Section 3 for installation procedure requirements.

1.4 Quality Assurance: Work activities affecting structures, systems, equipment and components, that are essential to the nuclear safety of the plant and to the prevention of accidents or to the mitigation of their consequences shall be performed and documented by a quality assurance program. All the structures, systems, equipment and components for the Diablo Canyon Site that require quality assurance measures are categorized as "Design Class I." With a few exceptions, the material, equipment, and components installed under this Specification are Design Class I, and are specifically noted as such in the descriptions of Section 2. Contractor shall implement a quality assurance program for all work performed and material supplied for Design Class I items. Refer to Section 4 for Contractor's Quality Assurance Program requirements.

SECTION 4

CONTRACTOR'S QUALITY ASSURANCE PROGRAM

1.0 GENERAL

1.1 This Section establishes the requirements for Contractor's quality assurance program for the control of quality of material supplied and work performed under this Specification.

1.2 Contractor's quality assurance program shall apply to all material supplied for and work performed on Design Class I structures, systems, and components, including equipment and accessories. Design Class I items are identified in other sections of this Specification.

1.3 Contractor's quality assurance program shall include the following activities: preparing drawings, purchasing, fabricating, receiving, handling, shipping, storing, maintaining, installing, erecting, assembling, constructing, inspecting, testing, repairing, modifying, recording, documenting, and auditing.

1.4 Contractor shall schedule his work to permit adequate time for implementation of the quality assurance program.

1.5 Contractor shall assure that his suppliers and subcontractors conform to all requirements of the quality assurance program.

2.0 DEFINITIONS

2.1 Quality assurance comprises all those planned and systematic actions necessary to establish confidence that the equipment and systems will perform satisfactorily in service.

2.2 Quality control comprises those quality assurance activities related to the physical characteristics of a material or work which provides a means to determine and control the quality of the material supplied and work performed to predetermined requirements.

2.3 Material includes components, devices, equipment, systems, structures, and other items furnished by Contractor to complete the requirements of this Specification. Material may consist of individual items, assemblies of items, or items in any state of fabrication.

2.4 Work includes all activities by Contractor to complete the requirements of this Specification.

3.0 SUBMITTALS

3.1 Bidder shall submit with his proposal a brief description of his proposed quality assurance program, including details or samples of his: (1) quality assurance organization, (2) quality assurance procedures manual, and (3) quality assurance inspection and test plans

3.2 Within 30 days following the award of contract, Contractor shall submit to Constructor for approval six copies of (1) his quality assurance organization description, designating qualifications, responsibilities, and numbers of personnel, in accordance with Paragraph 4.2 of this Section; and (2) his quality assurance procedures manual, including all the procedures necessary to assure compliance with the requirements of Paragraph 4.3 of this Section. Contractor shall revise all or any portion of his quality assurance organization and quality assurance manual where, in Company's judgment, they are not satisfactory. When Company approves of Contractor's quality assurance organization and quality assurance procedure manual, nineteen copies of the approved organization and manual shall be submitted to Constructor. Contractor's quality assurance organization and quality assurance procedures manual shall be approved prior to the start of any work.

3.3 At least 21 calendar days prior to the start of work on any Design Class I structure, system, or component, including equipment and accessories, Contractor shall prepare and submit to Constructor for approval six copies of a specific inspection and test plan for that work. This plan shall be in accordance with the requirements of Paragraph 4.4 of this Section. Contractor shall revise all or any part of the plan where, in Company's judgment, it is not satisfactory. When Company approves the inspection and test plan, nineteen copies of the approved inspection and test plan shall be submitted to the Constructor, and it shall be used for documenting and recording all inspections and tests performed on that Design Class I item. Inspection and test plans shall be approved prior to the start of any work on Design Class I items. Upon completion of the installation and upon Company acceptance of the equipment, nineteen copies of the completed inspection and test plan shall be forwarded to Constructor.

4.0 QUALITY ASSURANCE PROGRAM REQUIREMENTS

4.1 Quality Assurance Program:

4.11 Contractor's quality assurance program shall consist of a quality assurance organization, a quality assurance procedures manual, and quality assurance inspection and test plans in accordance with the following paragraphs.

4.2 Organization:

4.21 Contractor's quality assurance organization shall have clearly defined responsibility and authority for implementation of a comprehensive quality assurance program. The organization shall require quality control personnel: (1) to have sufficient and well defined responsibility, authority, qualifications, and organizational freedom to identify and evaluate quality problems and, when necessary, to require implementation of approved corrective actions, and (2) to be generally independent of procurement, manufacturing, fabrication, scheduling, and construction forces.

4.22 Contractor shall require his suppliers and subcontractors to establish adequate quality assurance organizations. Contractor shall provide with his detailed quality assurance program submittal (as required in Paragraph 3.2 of this Section) a description of his suppliers' and subcontractors' quality assurance organizations, including qualifications, responsibilities, and numbers of personnel, and a chart indicating responsibilities and lines of authority between Contractor, Contractor's construction supervision, suppliers and subcontractors, and quality control personnel.

4.3 Procedures Manual: Contractor's quality assurance procedures manual shall detail the methods used by Contractor to control the quality of material supplied and work performed under this Specification. Contractor shall conduct his work in accordance with the procedures therein. The manual shall include the following procedures as a minimum:

4.31 Design Control: Contractor developed designs for structures, systems, and components shall be reviewed for completeness, design adequacy, material compatibility, code conformance, currentness, and other similar items. Reviews of design adequacy shall consist of checking the design with alternate or simplified calculation methods, by performance of a testing program which is approved by Company, or by conducting a complete design review. Control measures for design changes shall be commensurate with those applied to the original design.

4.32 Document Control: Contractor shall assure that specifications, drawings, procedures, instructions, inspection and test plans, and any other quality related documents, as well as authorized changes, used in work performed under this Specification are current, properly completed, approved by authorized personnel, and distributed for use. The procedure shall assure that obsolete documentation be removed from use.

4.33 Material and Work Procurement Control: Contractor shall assure that all material and work furnished by suppliers or subcontractors under this Specification conform to the applicable requirements of the procurement documents such as drawings, specifications, and codes. Contractor procurement control includes evaluation and selection of qualified suppliers and subcontractors, the transmission of applicable design and quality requirements to suppliers and subcontractors, the assurance that supplier and subcontractor quality assurance programs are consistent with this Specification, and source inspection by Contractor at the supplier or subcontractor. This procedure shall not include Company furnished material until delivered to Contractor.

4.34 Receipt Inspection of Material: Contractor shall inspect to the extent necessary all material delivered into his custody to assure conformance to specifications, drawings, purchase orders, and other technical requirements. Receipt inspection may vary as to amount and type depending on the item and supplier. Company furnished material need only be inspected for completeness and damage during handling if Company specifically identifies and exempts the equipment in writing.

4.35 Identification, Control, and Status of Material: Contractor shall develop measures to maintain identity and traceability of material to assure that prescribed inspections and tests have been performed, to identify nonconforming material, and to prevent the use of incorrect or defective material. Suitable means of marking or recording material, such as stamps, tags, labels, or routing cards shall be employed. Contractor shall submit his proposed method of identification marking for approval.

4.36 Handling, Storage, Packaging, Shipping, and Preservation of Material: Contractor shall assure that all necessary measures are taken to prevent damage, loss, or deterioration of material during handling, storage, packaging, shipping, receiving, preserving, installing, erecting, and maintaining until acceptance by Contractor. Material requiring special protection, preserving, or packaging shall be given appropriate consideration and treatment. This will include, when necessary, the establishment and periodic verification of protective environments, such as inert gas, moisture content, and temperature levels.

4.37 Nonconforming Material Control: Contractor shall assure that material which fails to meet requirements of this Specification are identified, segregated, and then removed from areas designated for approval material. Nonconforming items shall be reviewed, accepted, rejected, repaired, or reworked in accordance with procedures requiring designer review. If Company furnished material is nonconforming, Contractor shall notify Constructor. If Contractor proposes to use any material which does not meet the requirements of this Specification, a written report shall be prepared for Engineer's approval. Company will furnish Contractor with instructions for submitting nonconforming material reports.

4.38 Qualification of Processes and Personnel: Contractor shall assure that special processes, such as welding, heat treating, and nondestructive testing, are controlled in accordance with applicable codes, standards, specifications, etc. Special processes shall be accomplished by qualified personnel using qualified procedures.

4.39 Calibration of Measurement and Test Equipment: Contractor shall assure the maintenance and periodic calibration of measuring and testing equipment used. All measuring and testing equipment shall be calibrated against certified measurement standards which have known valid correlation to national standards.

4.310 Corrective Action: Contractor shall assure that all conditions which adversely affect quality and tend to cause failures, malfunctions, deficiencies, deviations, defective items, and nonconformances are promptly identified, reported, and corrected to preclude repetition. Contractor shall maintain records on all conditions which adversely affect quality. These records shall indicate each condition, the cause of the condition, and the corrective action taken. A copy of these records shall be forwarded to both the Constructor and the Contractor's supervision and management for analysis, evaluation, and review.

4.311 Records: Contractor shall use, collect, and maintain records and data essential to document the quality of material supplied and work performed under this Specification. Records are considered one of the principal forms of objective evidence of quality, and procedures shall assure that records are complete and reliable. Records collected shall include, as a minimum, the following: drawings, specifications, purchase orders, work orders, inspection reports, test reports, work performance records, work procedures, qualification records for procedures, equipment and personnel, nonconformance reports, corrective action records, and audit records. Inspection and test reports shall indicate the nature of observations or test, the acceptable limits of observations or tests, the results, the type of nonconformances observed, and the identity and signature of the observing personnel. Work performance records shall indicate acceptability of the work and/or material or necessary corrective action in cases of nonconformances. All records shall be collected and filed in one hour rated fireproof cabinets at one location at suppliers' and subcontractors' shops or at the work site. All records shall be preserved by Contractor for use by Company for ten years. If Company has not requested custody of the records and documents before the end of the ten-year period, Contractor shall request disposition instructions from Company. Until such time as they may be transferred to Company, the records and documents shall be available for inspection and review by Company and regulatory agencies. Upon request, duplicate copies of records and documents for specific items shall be provided promptly by Contractor to Constructor.

4.312 Audits: Contractor shall establish a system of audits to assure compliance with all aspects of the quality assurance program and to determine its effectiveness. Audits shall be made on a planned periodic basis. Follow-up action, including reaudits, shall be taken where necessary. Audit results shall be documented and forwarded to Constructor for review.

4.4 Inspection and Test Plans: Contractor's quality assurance inspection and test plans shall identify the specific inspection and test requirements for the construction, erection, and installation of structures, systems, equipment, and components under this Specification. Contractor shall review the drawings, specifications, purchase orders, codes, manufacturers' instruction manuals, and other documents pertaining to structures, systems, equipment, and components under this Specification and prepare written inspection and test plans. The inspection and test plans will establish the initial, in-process, and final inspections and tests that are performed to assure quality. Inspection and test plans shall include receipt inspection, storage inspection, dimension inspections, visual inspection, cleanliness inspections, fit-up inspections, weld inspections, nondestructive tests, materials tests, electrical circuit continuity tests, hydrostatic tests, operating tests, or any other inspections and tests required by this Specification. The plans shall be in accordance with the following:

4.41 Plans shall be specific for structures, systems, equipment, and components, as specified in other sections of this Specification.

4.42 Plans shall follow the sequence of construction activities, from the receipt of material, components, or equipment to the completion of work.

4.43 Plans shall itemize inspection and test points, indicating in the sequence of construction activities when the inspection or test point occurs.

4.44 Plans shall itemize characteristics to be inspected or tested at each inspection and test point.

4.45 Plans shall describe or reference acceptance criteria for each inspection and test point.

4.46 Plans shall designate inspection and test results to be recorded, data to be collected, and the identity and signature of the observing personnel. Plans shall be filled out and completed as work is performed and progresses.

4.47 Plans shall indicate inspection hold points for Company's witnessing and review of the inspection or test, as required by other sections of this Specification. Work shall not proceed beyond these points without Company approval.

4.48 Plans shall list the records, forms, or documentation used and collected at each point. Sample forms shall accompany the plans. In approving the plan, Company will designate the specific forms to be retained by Contractor and those to be submitted to Company.

4.49 Plan changes shall be approved by Company.

4.410 Upon Company acceptance of structures, equipment, systems, or components, nineteen copies of the completed inspection and test plan shall be forwarded to Constructor. The original shall be retained by Contractor in accordance with Paragraph 4.311 of this Section.

5.0 COMPANY INSPECTION AND AUDITS

5.1 Company will perform a continuing audit of Contractor's quality assurance program. This is in addition to the audits performed by Contractor.

5.2 Company will reject material and/or stop work which in its opinion is below specified quality levels or not in accordance with Contractor's quality assurance program as approved. Work shall not be resumed until acceptable corrective measures are adopted by Contractor. Contractor will be notified by written directive describing the work in question and reason for its suspension.

5.3 Company will perform off-site shop inspection on Contractor and his subcontractors and suppliers. Subcontracts and purchase orders shall include the following statement:

"All work on this contract/order is subject to inspection and test by PG&E at all times (including the period of performance) and places; and as a minimum final inspections and tests will be observed prior to shipment. The PG&E representative who normally services your plant shall be notified forty-eight (48) hours in advance of the time material or work is ready for inspection or test."

PACIFIC GAS AND ELECTRIC COMPANY

SAN FRANCISCO, CALIFORNIA

Department of Engineering

ACCOUNTING DATA

GM 167027 & 169972
Loc. Div. 18
Account 61
Activity Item 30
Location and/or Item 40

SPECIFICATION NO. 8828

Rev. No. 4
Project File No. 131.10
Plant Structure
Safety Related: No

SPECIFICATION
FOR
ARCHITECTURAL FINISH WORK
UNITS 1 AND 2
DIABLO CANYON SITE

CONTRACTOR SIGN HERE TO INDICATE
THAT THIS REVISION IS ACCEPTABLE

Firm _____

By _____

Date _____

APPROVED BY

ATL
J. J. McCann/ATL (NLT/APP) (EDC)

R.V. Bettinger
R. V. Bettinger/IN (SHS/FMG/GPB)

DVK
D. V. Kelly

GVR
G. V. Richards/CER

ACCEPTED BY

JBH
J. B. Hoch

DATE June 1, 1978

BAIN Attachment 4

ATL
6/2/78

SPECIFICATION FOR
FIELD CONTRACTOR'S QUALITY ASSURANCE PROGRAM
(FOR SPECIFICATION 8828)

1 GENERAL

1.1 This Specification establishes the requirements for Contractor's Quality Assurance Program to assure quality during the procurement and installation of components or equipment and the performance of work for those components identified in the attached Supplement, which are to be constructed after the issuance of this Specification change.

*1.2 Contractor's Quality Assurance Program shall apply to all activities affecting the quality of material supplied and work performed including: Purchasing, Receiving, Handling, Constructing, Erecting, Maintaining Storing, Documenting, Inspecting and Testing.

1.3 Contractor shall also assure compliance with all quality requirements contained in the contract that are not described in this Specification.

1.4 This Specification shall be used in conjunction with the specified codes or standards (N.F.P.A., U.L., A.S.T.M., A.W.S., etc.) in order that activities not included in the codes or standards will be provided for.

2 DOCUMENTS FOR SUBMISSION

2.1 Contractor shall submit, to Company for approval, information which fully describes the Quality Assurance Program demonstrating that work will be performed under a controlled program conforming to the requirements of Paragraph 3 below.

2.2 Eight (8) controlled copies of final, approved Quality Assurance Programs shall be submitted to the Company by Contractor for approval.

3 QUALITY ASSURANCE PROGRAM

3.1 Contractor's Quality Assurance Program shall describe in detail the procedures and methods used by Contractor to assure that all supplies purchased and work performed satisfy all contract requirements. The Program shall describe the methods of implementation of the following requirements:

3.1.1 Organization: The Contractor shall assign and identify personnel who will be responsible for implementing the Quality Assurance Program and such assigned personnel shall have direct access to such levels of management as necessary to achieve effective implementation of the Contractor's QA program.

3.1.2 Procurement Document Control: Contractor shall assure that applicable requirements and specifications necessary to assure adequate quality are included or referenced in Contractor's procurement documents. Changes shall be subject to the same degree of control utilized in the preparation of original procurement documents.

3.1.3 Instructions, Procedures, and Drawings: Contractor shall assure that all activities affecting quality are prescribed by documented instructions, procedures, or drawings. Such instructions, procedures, or drawings shall include quantitative or qualitative criteria for determining that activities affecting quality have been accomplished satisfactorily. Quantitative criteria, such as dimensions, tolerances, and test limits, and qualitative criteria, such as comparative workmanship samples, shall be specified, when appropriate, for determining acceptable work performance and quality compliance.

3.1.4 Procurement Control: Contractor shall perform receipt inspection on all material and equipment delivered into his custody to assure conformance to the procurement requirements. Company-furnished materials and equipment need only be inspected for completeness and damage during handling if Company specifically identifies and exempts the equipment in writing.

Contractor shall assure that documentary evidence that items conform to the procurement requirements is available to the Company prior to the installation or use of such items. Documentary evidence shall be sufficient to identify the specific procurement requirements that have been met. Where not precluded by other procurement requirements, written certifications of conformance which identify the procurement requirements that have been met may be used as documentary evidence, providing means are available to verify the validity of such certifications.

3.1.5 Document Control: Measures shall be established and documented to assure that all quality-related documents are reviewed for adequacy, approved for release by authorized personnel, and properly distributed. Changes to documents shall receive the same degree of review and approval as the original documents.

Written procedures governing document control shall provide for the identification of individuals or organizations responsible for preparing, reviewing, approving, and issuing documents and changes thereto. These procedures shall preclude the possibility of use of superseded, obsolete, or void documents.

3.1.6 Identification and Control of Material and Equipment: Contractor shall establish and document measures to identify and control material and equipment. These measures shall prevent the use of incorrect or defective material.

Traceability when required by Specification for material and equipment shall be maintained with records and markings. When identification marking is used, the marking shall be clear, unambiguous, and indelible, and the method of marking shall not affect the function of the material or equipment.

- *3.1.7 Control of Measuring and Test Equipment: Contractor shall assure that all tools, gages, instruments, and other measuring and test equipment used in activities affecting quality are of the proper range, type, and accuracy to verify conformance to established requirements.
- *3.1.8 Inspection: Contractor shall assure that activities affecting quality are inspected for conformance to the documented instructions, procedures, and drawings used in the accomplishment of the activity.

Written procedures shall require that inspections are performed according to written instructions or checklists which are based on the instructions, procedures, and drawings used in accomplishment of the activity being inspected. Inspection procedures shall also require the documentation of the qualitative or quantitative results of the specific parameters being inspected.

- *3.1.9 Test Control: Contractor shall assure that a test program will be established which identifies and documents all testing required to demonstrate that an item will perform satisfactorily in service. Written procedures shall require that all testing be performed in accordance with written test procedures which incorporate all requirements and test limits specified in the design documents. Test procedures shall assure that prerequisites, such as calibrated instrumentation, appropriate equipment and environmental conditions, and trained personnel, are met. Test requirements, results, and acceptance criteria shall be documented and evaluated by authorized personnel to assure that all requirements have been satisfied.
- *3.1.10 Inspection Plan or Procedures: Contractor shall perform required inspections in accordance with a written inspection plan or procedure. The Contractor shall assure that all inspections required by the attached Supplement are identified in the inspection plan or procedure. The plan or procedure shall be developed in accordance with the following:

The plan or procedures shall identify the characteristics to be inspected.

The plan or procedures shall describe the inspection instructions or procedures to be used.

The plan shall list the records, forms, or other documentation used.

*The plan or procedure shall indicate all inspection hold points for Company witnessing and review of the inspection or test, as required by the attached Supplement. The plan shall provide for adequate advance notice to Company's inspector. Work shall not proceed beyond inspection hold points until such points have been witnessed or inspected by the Inspector. Records shall be kept of all tests and inspections including nonconformances observed and the identity and signature of the inspection and test personnel.

*3.1.11 Inspection and Operating Status: Contractor shall establish and document measures to identify inspection status of items and work. Such measures shall provide means for assuring that required inspections are performed and that the acceptability of items or work with regard to inspections is known at all times. Written procedures shall provide for the status of inspections through the use of indicators such as tags, markings, stamps, or records. The procedures shall assure that only items, or portions of work, that have passed required inspections are accepted and that nonconforming items are clearly identified.

*3.1.12 Nonconforming Material Control: Contractor shall assure that material, equipment, services, or activities which do not conform to requirements are identified, documented, segregated, evaluated, and accepted, rejected, reworked, or repaired in accordance with documented procedures. If Company-furnished material is found to be nonconforming, Contractor shall notify Constructor.

Written procedures controlling nonconformances shall define the responsibility and authority for the disposition of nonconformances. Such procedures shall provide for the reinspection of all repairs or rework in accordance with applicable procedures.

If Contractor proposes to use any special procedures or materials for repair or rework, a written description of Contractor's proposal shall be submitted for Constructor's approval. When Contractor elects to accept a nonconformance as is records shall document the basis for acceptability. When Contractor elects to scrap a nonconformance, adequate records shall be maintained to verify that the nonconformance has not been used.

3.1.13 Handling, Storage, and Shipping: Contractor shall establish and document measures to control handling, storage, and shipping, including cleaning, packaging, and preservation of material and equipment in accordance with instructions, procedures, or drawings, to prevent damage, deterioration, and loss.

*3.1.14 Corrective Action: Contractor shall assure that all conditions which are adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material, and nonconformances are promptly identified and corrected as soon as practical. Corrective action shall be sufficiently comprehensive to intercept and correct all items affected by the adverse conditions. In the case of significant conditions adverse to quality, written procedures shall require that the cause of the conditions be determined and appropriate corrective action taken to minimize the possibility of repetition.

Contractor shall maintain records on all conditions which adversely affect quality. These records shall identify each condition, the cause of the condition, and the corrective action taken, and shall be forwarded to both Constructor and Contractor management levels for review.

*3.1.15 Records: Contractor shall use, collect, and maintain records and documents sufficient to furnish documentary evidence of the quality of material supplied and work performed. Written procedures shall identify all records which are to be retained, and shall prescribe the retention period, storage location, and assignment of responsibility. Records collected shall include, as a minimum, the following: drawings, specifications, purchase orders, work orders, material certifications, work procedures, personnel and equipment qualification records, nonconformance reports, corrective action records. Work performance records shall indicate acceptability of the work and/or material or necessary corrective action in cases of nonconformances.

Requirements and responsibilities for record transmittal, retention, and maintenance subsequent to completion of work shall be established and documented consistent with procurement documents.

In general, records which identify the as-built condition of materials or equipment shall be maintained for a minimum of ten years. At the end of the ten-year period, Contractor shall request disposition instructions from the Company for all documents which Company has not requested custody of. These records shall be indexed, filed, and maintained in facilities that provide suitable environment to minimize deterioration or damage and to prevent loss. Until such time as they may be transferred to Company, all records shall be available for inspection and review by Company and regulatory agencies.

3.1.16 Audits: Contractor shall establish a system of audits to assure compliance with all aspects of the quality assurance program and to determine its effectiveness. Personnel performing audits shall not have direct responsibilities in the areas being audited. Follow-up action, including reaudit, shall be taken when necessary. Audit results shall be documented and forwarded to Contractor's management for review.

Written procedures which govern the audit program shall assign responsibilities for the audit program; establish the frequency of audits, prescribe the minimum qualifications for auditors and their independence from the area being audited; and prescribe the format for documenting audit results. The procedure shall prescribe the mechanism for submitting audit results to appropriate levels of management and also the criteria for determining when follow-up action is required.

4 COMPANY INSPECTION AND AUDITS

4.1 The Company will perform periodic audits as well as continuous inspection of Contractor's activities throughout all work performed.

*4.2 The Company will reject material and/or stop work which, in its opinion, is not in accordance with the quality assurance requirements herein. Work shall not be resumed until corrective measures, which are approved by the Company, have been adopted by Contractor.