



UNITED STATES  
ATOMIC ENERGY COMMISSION  
DIVISION OF COMPLIANCE  
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APR 28 1971



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THRU: ~~X~~ J. Long, Senior Reactor Inspector  
Region II, Division of Compliance

INSPECTOR'S EVALUATION AND OPINION - PACIFIC GAS AND ELECTRIC COMPANY  
(DIABLO CANYON UNIT NO. 1), LICENSE NO. CPPR-39, DOCKET NO. 50-275

This memorandum refers to the feeder report for the inspection conducted  
April 12-14, 1971.

From my review of the PG&E QA Manual, the PG&E inspection instructions,  
procedures and the contractor's QC Manual, I have concluded that a  
suitable QA/QC program has been developed for the E/I work scheduled  
for the present electrical contract.

I was favorably impressed by the large number of PG&E personnel onsite.  
This group appears to have implemented the program suitably to date.

I feel that G. Richards has identified the need for someone in his QE  
group with E/I experience due to our inspection. I believe that the  
addition of such a person would strengthen the QE group considerably;  
however, I do not feel that we should actively push for this since they  
already have a larger onsite staff in the general QA/QC area than most  
licensees at the projects I have visited.

The short and really inconclusive period of time that I was able to discuss  
the E/I QA activity with E. Barrido suggested that he was not yet fully  
on top of his responsibilities. He has only been assigned to this site  
for some three months which may be his problem. In any event he appears,  
at present, to be a weak point in this program that hopefully will improve  
over the near future.

As discussed in the report, there are several areas that appear to need  
strengthening. In particular, I don't feel they have fully analyzed the  
many problems associated with the cable installation. I feel that Wright's  
reference to the use of color coding is a plug factor but not the total  
answer he seemed to think it was. The real secret to success in this  
area would seem to be more related to close supervision and continued QC  
inspection during installation than any other approach.

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I hope they continue to develop strong and detailed procedures particularly for cable traceability, seismic certifications, separations criteria, conductor termination, etc., that we discussed during the visit. The next inspection in this area should reveal the effectiveness of this inspection.

*F. U. Bower*

F. U. Bower  
Reactor Inspector

CO:II:FUB

Enclosure:  
Feeder Report (Bower)

FEEDER REPORT

Pacific Gas and Electric Company  
Diablo Canyon Unit No. 1  
Docket No. 50-275, License No. CPPR-39  
Category A

Location: San Luis Obispo, California

Date of Inspection: April 12-15, 1971

SCOPE

The inspection activities during this visit were directed toward the requirements of PI 3800/2, Attachment H and I, Sections 5105.03, .04 and 5205.03, .04, as they relate to the present construction activity. Additionally, the opportunity to discuss and review planning action for future construction activity in this area was taken as a means of orienting the individuals and organization involved to the interests and expectancies of the Division of Compliance in the control of quality of electrical/instrumentation (E/I) installations.

SUMMARY

1. Procedures reviewed indicated an adequate program for the E/I installation work in progress and as scheduled for the immediate future. (See Section C.2.)
2. Although Pacific Gas and Electric Company (PG&E) has a very large site staff, there may be a weakness in the E/I area in the QC and QE groups. (See Sections C.2 and C.4.)

3. E/I construction activity, both completed and in progress, is so minor that an evaluation of workmanship and related inspection action could not be meaningfully made at this time. (See Section B.)
4. Several potential problem areas, involved in future work, were discussed with indications that the QA/QC planning effort was incomplete. (See Section C.4.)

Management Interview - The inspector participated in the close out meeting with the principal inspector and presented the results of his inspection.

The following items were presented in summary with questions and/or statements of clarification being the only response from the PG&E staff members present.

1. Seismic requirements and the documentation of tests and/or analysis for the E/I class of equipment and its installation. (See Section D.2.)
2. Traceability of cable manufacturers test data certification. (See Section C.4.)
3. Conductor termination and inspection program. (See Section D.1.)
4. Cable installation administrative program. (See Section C.4.)
5. Program for inspecting installed safety-related cables to a given standard. (See Section C.4.)
6. Impulse line location and installation for safeguards system instrument channels. (See Section D.3.)

7. Control of conductor splicing. (See Section D.4.)
8. In the more positive view, the inspector discussed the several procedures and construction drawings reviewed and found suitable for their intended purposes. These included the receiving inspection and warehousing of electrical goods, the deficient deviation/variation reporting and disposition program and the electrical penetration design and layout.

#### DETAILS

##### A. Persons Contacted

###### PG&E

J. Garvin - Quality Engineering - Site  
R. Woods - Quality Engineering - Site  
B. Good - Quality Engineering - San Francisco  
E. Barredo - Quality Engineer - Site  
R. Wright - Resident Engineer (Electrical) - Site  
J. Price - Electrical Inspector - Site  
I. McDonald - Lead Electrical Inspector - Site  
C. Townsend - Lead Electrical Inspector - Site  
G. Richards - Director Quality Engineering - San Francisco

###### Howard P. Foley Company - Electrical Contractor

L. Bergstrom - Project Manager  
J. Moore - Chief - Quality Assurance

##### B. Construction Progress

With the exception of the station ground grid, cast-in conduit and a minor amount of exposed conduit, little of the E/I installation has been started. Work is commencing in the spreading area under the 12-4.16 Kv distribution boards in the turbine building which are safety related, however, this work is not being pressed.

A total E/I work force of ten electricians is indicative of the priority presently placed on this activity.

A review of planned events indicates that vigorous activity in the E/I areas is still some weeks in the future. From this review it was determined that the next inspection could possibly be deferred until fall or early winter without deleterious effect on the Compliance inspection program.

When the facility construction effort advances to the point where the several key areas become available, electrical construction activity could mushroom rapidly because a very large portion of the electrical equipment has already been received and is in storage at the site. As a result of this availability, the labor force may be expanded very rapidly and effectively which in turn could tax the QA/QC organization. This is a point that should be monitored.

C. QA/QC Program (3800/2, Attachments H and I)

1. \*5105.03 - Implementation of QA Program

A QA program, as evidenced by the several documents, has been developed and implemented as required. The specific provisions of the QA program is set forth in a document entitled, "PG&E QA Manual, Diablo Canyon Unit No. 2." In answer to the question regarding effectiveness against Unit No. 1, the staff confirmed that the provisions of the document had been developed to meet the licensing requirements imposed for Unit No. 2 and the 18 criteria of Appendix B to 10 CFR Part 50. Now the document is equally effective against both Unit Nos. 1 and 2 and, in fact, the QA program is a single effort with no distinction in requirements between the two units.

2. \*5105.04 - Review of QC System

\*b.6

General instructions regarding handling and storage are contained in the QA Manual previously discussed. Any specific instructions, as detailed by the supplier or implied by the physical characteristics of the equipment, will be inspection items identified and listed by the purchase specification. These instructions become inspection points required to be observed by the contractor QC organization and the PG&E QC organization.

The required QC actions are described by procedures contained in the Howard P. Foley Company "QA Manual" and the PG&E "Electrical and Instrumentation Instruction Book for QA."

\*b.7

E/I components identified as nonconforming are handled in the same manner as other components and the procedure utilized are common.

In essence the component found discrepant is tagged "Hold" and a "deviation report" prepared. While the deficiency is being analyzed for ultimate disposition, the component is isolated in a segregated area if feasible. If not feasible to move the component, the hold tag is considered suitable to avoid installing or using the discrepant component.

A procedure has been devised for review and disposition of discrepancies that assures conformance with all requirements and provides documentation of the action taken.

Exhibit A, attached hereto, is a flow chart of the discrepancy disposition action that appears to indicate all milestones in this procedure.

\*c.1

All handling and installation requirements are imposed upon the E/I contractor by the construction specification which forms a part of the relevant contract documents.

By reviewing the construction specification (No. 8807) effective for the E/I work presently in progress, it is readily apparent that both general and specific requirements are set forth therein in a manner intended to be both effective and complete to assure that the work performed will meet quality standards. These quality standards consist of both industry standards and/or PG&E standards both of which have been referenced and made available for use and are intended to provide an E/I installation in conformance with the commitments of their application.

\*c.2

The use of qualified electricians experienced in the trade is required by contract. Individuals with special skills for work requiring special experience for such purposes as terminations, stress cones, testing, etc., will be identified as the job progresses and such skills will be employed as required. Confirmation of performance will be certified through QC action.

\*C.3

a. Inspection of the E/I installation is organized in a way to give a three tier approach. The electrical contractor is the first tier and is required by contract to establish and maintain an onsite QC unit of a semiautonomous character that inspects and documents in accordance with an approved plan.

The second tier of inspection in the PG&E onsite electrical organization (see Exhibit B) which also inspects installed hardware as well as audits the QC activity of this electrical contractor. This activity performed in accordance with a plan set forth in their "Electrical and Instrumentation Instruction Book for QA."

*3.*  
opinion

The staff individual, responsible to the electrical resident engineer for the QA function, is relatively new to the site (three months) and does not presently appear to have a full grasp of his responsibilities. Hopefully, future evaluations will reveal increased competence, assuring suitable performance in this important post.

The third tier is a periodic audit function performed in accordance with a predetermined plan by the onsite Quality Engineering (QE) unit of PG&E.

b. Testing will be performed by the onsite PG&E electrical organization. Although little has been accomplished in actual installation, the test unit and a mobile test laboratory are onsite performing preliminary calibrations and test of equipment received at the site. The electrical resident engineer discussed their plans for testing which will seemingly be a very comprehensive program that is designed to meet or exceed the requirements of the PG&E QA Manual.

3. \*5205.03 - Implementation of QA Program

The general QA program discussed herein under item "1" above is equally effective across the board and is suitably implemented to make a positive finding for this inspection point as is indicated for item "1."

4. \*5205.04 - Review of QC System

\*b.2

The specification and purchase order for cables has not yet been released by Engineering; however, it is clear that the general policy for test is to require the manufacturer to perform such tests as set forth in the specification and provide test results to PG&E by certified document.

Discussions with the QE and QC personnel indicated a lack of a specific program that would provide traceability and assurance

that cables as installed were certified as required by their program. This inspection point ~~should~~<sup>will</sup> be reexamined at a later date when elements of their cable certification program have been detailed.

\*c.3

The procedure for receiving inspection and discrepancy reporting is equally effective against cables and is deemed suitable to assure that discrepant materials will be held segregated and will not be installed.

\*d.3

Storage areas and/or protective shelters have not yet been established for cables.

This inspection point ~~should~~<sup>will</sup> be reexamined at an appropriate time in the future.

\*f.2

Wireway location and installation is a design function that has been performed by the engineering unit and is required by the general provisions of their PSAR in terms of separation and protection.

The PG&E QA/QC unit sees their obligation as one of confirming that the construction drawings are converted accurately to installed hardware. They do not feel obligated to confirm that design has fulfilled all requirements of applicable criteria nor

has such a document generally known as a "separation criteria" been written for the use of all groups with related responsibilities.

During the discussions it was pointed out to the site staff that the Compliance inspector would be inspecting from a standpoint of criteria, along with the construction drawings. When installed hardware is found to diverge from the criteria, a nonconformance is considered to exist, irrespective of construction drawings.

This inspection point <sup>will</sup> ~~should~~ be reexamined at a later time when a more positive evaluation has been made based on performance of their program as applied to a representative sample of installed materials and equipment.

\*f.4, f.5, and f.6

Cable routing, redundancy, separation and wireway loading is intended to be controlled, in the major sense, by a computerized program (EDP) developed and implemented by PG&E engineering.

The program, as developed, must wait until an appreciable amount of related work has been performed for evaluation, however, it seemingly has elements that could give assurance that at least some of the many possible variables are controlled.

A specific program for inspection and documenting installed cables to a given standard has not yet been developed to the degree expected. The discussion on this subject revealed that the QE group did not have a member that was experienced in the E/I area. Although not a commitment, it was indicated that a program and a suitably experienced person would be considered.

These inspection points ~~should~~<sup>will</sup> be reexamined at a later date before a finding is reached.

\*f.9

Site NDT for installed cables will be performed by the PG&E test unit. Details of this program have not been developed since no urgency presently exists in this area.

This inspection point ~~should~~<sup>will</sup> be deferred for later visits.

D. Discussion Item

1. The elements of a program for conductor termination and inspection ~~was~~<sup>were</sup> discussed.

They do not presently have a formal program for this function and it is not clear that one will be developed by the OE unit and others listened attentively to the inspector's remarks on the merits of a tool control program and the potential problem associated with poorly made terminals.

list like this

2. The problem identified at other projects\*\* in securing and maintaining suitable documentation confirming that the E/I equipment would perform as required during and after the design seismic event was discussed by the inspector.

In response, the PG&E staff stated that their procurement specifications required that the equipment meet these requirements, but it

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\*3800/2.

\*\*Note: The problem was discussed without reference to the specific projects.

was not clear that the vendor was required to provide a certified document that the equipment had been tested and/or analyzed and did meet the seismic requirements.

This item ~~should~~ remain open for future discussion and evaluation.

3. The subject of impulse lines for safeguards instrument channels was discussed from the standpoint of their relative importance as a part of a redundant system.

It was mentioned that these lines are quite often located in areas where high energy accident conditions could occur. Since these lines are usually the first element of a system sensing variables outside the set points, it was stressed that their importance should not be underestimated. The inspector stated that, although the IEEE 279 standard dealing with the single failure criteria was not specifically effective against these lines, it provided an excellent guide for consideration in the routing and installation of such systems. They were urged to not let these lines be installed under the "field routed" concept, traditional in regular industrial installation of such systems, since the chances were good that such procedure would not produce an installation that was acceptable.

Since the PG&E staff had not identified these installations as critical, they did not know what control would be provided by Engineering.

This item ~~should~~ remain open for continued discussion and evaluation.

4. The construction specification that will control the installation of safety-related cables has not yet been written. In response to the inspection question, the staff stated that it was PG&E policy to make all conductor splices in boxes or cabinets provided for the purpose. Specifically, they stated that splices were not made in conduit, trap or wireways.

This item ~~should~~ remain open until the specification in question is released and the staff commitment can be confirmed.