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DIVISION OF COMPLIANCE
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May 6, 1971

G. S. Spencer, Senior Reactor Inspector
Region V, Division of Compliance

PACIFIC GAS AND ELECTRIC COMPANY (DIABLO CANYON UNIT NO. 1)
DOCKET NO. 50-275

The attached report contains the details of our inspection of construction activities at the site of the subject facility. The announced inspection was conducted on April 12, 13 and 14, 1971, pursuant to PI 3800/2 and in accordance with the master inspection schedule for the project. No items of nonconformance were identified during the course of the inspection.

You will note in the report that the licensee intends (contrary to CO stated policy in J. L. Henderson's memorandum to G. S. Spencer dated 3/27/71) to continue sampling concrete for slump and strength determination as permitted by the ASTM standard prescribed in the PSAR. In view of the inspector's lack of technical information to show or belief that the licensee's procedures are inadequate, the inspector recommends that CO communicate directly with the licensee concerning the reasons for the CO policy and direct PG&E accordingly or in the alternate request DRL to amend the PSAR to reflect CO policy as implied in our evaluation memorandum accompanying CO Report No. 50-275/70-4, dated October 16, 1970.

In the inspector's opinion, the licensee efforts to resolve significant construction discrepancies have been detailed and adequately documented to justify the approved dispositions.

Mr. Bower found from his review of the PG&E QA manual, the PG&E inspection instructions and the contractor's QC manual, that a suitable QA/QC program has been developed for the electrical and instrumentation work currently in progress. This work includes installation of components other than cables which will be governed by a separate contract to be awarded this summer. The procedures to be developed concerning cable installation will be reviewed during the fall of 1971. You will note that Bower explained to the licensee Compliance's expectations as to detail procedures which address cable traceability, seismic certifications, separation criteria and conductor terminations, etc.

A-4

Excavation work for Unit No. 2 commenced the early part of April. Construction activities associated with the containment building were expected to start during June 1971. The same major constractors have been selected for the construction of the containment that are currently constructing Unit No. 1.

A. D. Johnson
Reactor Inspector

U. S. [illegible]
DIVISION OF [illegible]
[illegible]

Report of [illegible]

CO Report No. [illegible]

Licensee:

Date of Inspection:

Date of Previous Inspection:

Inspected by:

Reviewed by:

Proprietary Information:

Type of Facility:

Power Level:

Location:

Type of Inspection:

Accompanying Personnel:

Scope of Inspection:

Safety Items - None

Nonconformance Items - None

Status of Previously Reported Items - [illegible] were reported as a result of the previous inspection.

Other Significant Items

1. The PG&E corporate management [illegible] construction of the facility [illegible] Senior Vice President responsible for [illegible] research and planning. [illegible] to the newly-elected Senior [illegible]

2. Overall completion of construction activities has increased to 21.1% on April 8, 1971. (Section [illegible])

3. The wall thickness of the [illegible] the Pismo Beach warehouse [illegible] minimum design value. (Section [illegible])

4. A Quality Assurance Procedure [illegible] specific responsibilities [illegible] control information on all [illegible]

5. The reactor vessel has been [illegible] site. Surveillance procedures [illegible]

6. The licensee does not plan [illegible] for sampling of concrete for [illegible] conform with Compliance policy [illegible] provided technical information [illegible] are inadequate. (Section [illegible])

7. The QA/QC program and procedures [illegible] installation (2/2) appear adequate [illegible] and scheduled for the remainder [illegible] installation contract will not [illegible] to commence during September [illegible] procedures concerning cable [illegible] review. (Section 6.)

8. Out of tolerance dimensions [illegible] reinforcing collar for the [illegible] were shown to be acceptable [illegible] physical tests. (Section 2.)

Management Interview

The inspectors met with Messrs. [illegible] the TCAM's onsite staff to discuss the [illegible]

Although the cable installation contract [illegible] discussed, at the request of the licensee [illegible] related to the QC provisions for [illegible] discussion included the areas of:

1. Seismic requirements and [illegible]
2. Traceability of cable [illegible]
3. Conductor termination and [illegible]
4. Administrative program for cable [illegible]
5. Inspection of installed cables.
6. Impulse line locations and [illegible]
7. Control of conductor splicing.

During the discussion concerning [illegible] strength tests, the licensee's position [illegible] re-evaluate their present sampling [illegible] interpretation of the prescribed [illegible] showing that the standards are [illegible] are included in Section D.3. of this report.

[illegible]

A. Persons Contacted

[illegible] R. Hersey	-	Project [illegible]
G. V. Richards	-	[illegible] Engineering
L. S. Garvin	-	[illegible]
[illegible] W. Wood	-	[illegible]
[illegible] Good	-	[illegible]
P. L. Bussolini	-	[illegible]
[illegible] L. Wright	-	[illegible] Engineer
[illegible]	-	[illegible]
J. Price	-	[illegible]
[illegible] McDonald	-	[illegible] Inspector
C. Townsend	-	[illegible] Inspector

[illegible] Foley Company - [illegible]

L. Bergstrom	-	Project [illegible]
J. Moore	-	Quality [illegible]

B. Status of Construction

Overall completion of construction [illegible] estimated by PG&E's Construction [illegible] April 6, 1971. Specifically the containment [illegible] complete with 53% of the liner [illegible]. [illegible] was considered to be approximately [illegible] complete. [illegible] indicated hot functional tests will commence during [illegible]. [illegible] date is approximately six months later than previously reported.

C. Administration [illegible]

During March 1971 the Board of Directors of PG&E [illegible] as Senior Vice President, with responsibility for planning, [illegible] and construction. Mr. Fred [illegible], Manager of the [illegible] Department, was elected Vice President-Engineering [illegible]. [illegible] Chief Civil Engineer, was elected to the [illegible] and Research. Mr. R. V. [illegible] has been [illegible] the position of Chief Civil Engineer for PG&E.

With the organizational change, the Director of Quality [illegible] reports to the Senior Vice President rather than the Vice President of Engineering.

During January Mr. R. [illegible], an [illegible] Engineer, [illegible] of the Civil Engineering Group in the PG&E [illegible] Office in San Francisco, [illegible] Mr. E. J. Garvin was named to replace [illegible]. Mr. Garvin holds Bachelor of Science degrees in Chemical Engineering, Metallurgical Engineering, and Nuclear Engineering. Mr. Garvin's work experience includes:

1. 1956 - 1960 (summers), Engineer [illegible].

2. 1962 - 1967, Instructor at [illegible], California. Subjects included [illegible], Chemistry, Nuclear [illegible], Engineering Materials and Mechanical Theory [illegible], etc.

3. 1967 - 1969, Student and [illegible] Oregon State University. Instructed course on "[illegible] of Materials".

Since joining PG&E in June 1969, Mr. Garvin has been assigned various [illegible] responsibilities associated with the [illegible] project within the [illegible] Construction Department.

D. [illegible]

During the previous visits several items have been brought to the attention of the licensee for evaluation and possible action. The following summarizes the disposition of these items.

1. [illegible]

As a result of confirming that the installation [illegible] on the primary piping satisfied the [illegible] code requirements, the licensee became aware that the wall thickness of the pipe was possibly less than the minimum design [illegible]. Optical and ultrasonic measurements were then made [illegible] was the case. Contrarily, the [illegible] confirmed the results of PG&E's findings, [illegible] the optical measurements showed that the wall thickness [illegible] than the design requirement. Evaluation of the test data indicated that the difference between the UT data and the optical [illegible] from a particular heat of material. Calibration of the UT equipment to the particular heat of material [illegible], showing the wall thickness to [illegible] greater than previously measured by UT. [illegible] the optical data. Mr. Garvin [illegible] the literature on the subject, [illegible] not [illegible]

to 10% to be introduced if the QC equipment is not calibrated to the particular heat of stainless steel that is undergoing the test. He said this apparently is due to differences in crystalline structure of the materials.

2. Verification of Quality Record [illegible] Certification Requirements

During January 1971 the Director of Quality Engineering issued an approved QA procedure which prescribes that "the responsible engineer is responsible for (1) developing the complete lists of documents pertaining to his component, (2) verifying that these documents have been or will be evaluated to the greatest practicable degree, and (3) completing the Engineering Release including the certification that the component is satisfactory for installation in the plant."

Richards indicates that the implementation of the above QA procedure should reduce the probability of equipment installation without prior review of documentation by the appropriate responsible personnel. By requiring a completed engineering release form at the site prior to installation of equipment, the Construction Department has reasonable assurance that the necessary documentation concerning a given component has been reviewed and accepted by the Engineering Department.

3. Concrete Sampling

Pursuant to J. M. Henderson's memorandum dated March 27, 1971 the licensee was advised the week prior to the inspection that it was Compliance's position that concrete samples for determination of slump and strength tests be taken "in all cases" at the point of placement.

In a letter from M. M. Chandler, Manager, Station Construction, to O. V. Richards, Director of Quality Engineering, Chandler pointed out that:

a. The Diablo Canyon concrete plant consists of automatically controlled batching equipment and a 6-cubic yard stationary concrete mixer. All mixing of the concrete is done in this mixer.

b. The concrete is transported from the concrete plant to the various structures in 6-cubic yard capacity trucks. These trucks are not mixer or agitator trucks and no water or other ingredients are added after the concrete leaves the mixer.

c. The concrete samples to be used for concrete cube specimens are obtained as the concrete is being discharged from the mixer into the trucks, in accordance with PG&E's instructions which require strict adherence to the ASTM standard methods prescribed in the FSAR.

The letter goes on to explain that the procedures are consistent with the requirements and includes data of comparison studies made at Diablo Canyon of samples taken at the mixer vs samples from the trucks at point of pour and similar studies performed at three other projects. These data supported the technical adequacy of the procedures in use at the Diablo Canyon site.

Based on PG&E's Construction Department experience and their understanding of the provisions of the ASME code, Chandler recommended that their procedures concerning sampling of concrete remain unchanged unless directed to do otherwise. He also directed Richards attention to the necessity of defining "point of placement" if their understanding is in error. For example is the point of placement: (1) as the concrete is being discharged from the dumpcrete truck into the concrete buckets; (2) when the concrete from the bucket is discharged into the forms; or (3) from behind the forms. Chandler added that taking samples at (2) would be very advisable and warranted in the case of the exterior of the containment. In (3), due to the reinforcing steel, it would be impossible to get representative samples, even when the pour is completed.

Mr. Richards informed the inspector that PG&E's Engineering Department has reviewed the Construction Department's position and supports it. He also requested that if the inspector became aware of any pertinent information to show that their procedures were inadequate they would appreciate being informed so that their procedures could be re-evaluated in light of such information.

E. Construction Discrepancies

The inspector confirmed from a review of the Deviation and Minor Variation reports that the recorded items had been or were in the process of being resolved pursuant to PG&E's QA discrepancy procedure. One deviation report concerning the reinforcing collar for the containment personnel hatch was of particular interest and was reviewed in depth. The embedment and threads of the studs and holes around the perimeter of the hatch collar did not meet the requirements for 12 UN Class 2 A & B threads. In conjunction with PG&E's design engineer, Pittsburg-Des Moines (PDM) personnel evaluated each bolt position and determined that design requirements were satisfied. [illegible] and evaluation

were reviewed or verified by the responsible PG&E personnel. In addition, under the PG&E design engineer surveillance, pull tests performed on 10% of the studs, selected to represent the worst combinations of stud and hole thread dimensions, showed that the threads were capable of transmitting the required force.

According to the report, PGE is correcting their shop procedures regarding drilling, reaming and tapping to assure that hole and bolt thread tolerances can be met. Shop QA personnel have been instructed to obtain approval prior to fabrication on, or shipment of, items that do not meet the specification requirements.

7. Reactor Vessel

The reactor vessel was transported by barge from San Francisco, California to Avila Beach, approximately seven miles from the site, during September. The vessel was unloaded and temporarily stored by the dock until December 1971 when it was transported to the site. During the periods of temporary storage in the San Francisco and Avila Beach areas, the vessel was to be under constant surveillance.

All handling of the vessel was performed by Diggs Crane and Rigging Company pursuant to written procedures which had been approved by PG&E. PG&E also used Earl and Wright Consulting Engineers, San Francisco, California to analyze and evaluate the equipment and procedures used for handling and transporting the vessel. The analysis included calculations for strength of hoists, hooks, cables and resting pads. The firm also provided an engineer to assist the PG&E's staff during all transporting operations.

Shortly before unloading the vessel at Avila Beach the turbine stator, which weighs approximately 20 tons more than the vessel, was successfully unloaded and transported to the site. The conveyor vehicle used to transport the vessel to the site had been previously load-tested with a weight of 330 tons. The vessel weight was stated to be 375 tons.

At the time of the inspection the vessel was observed to be stored at the site on a skid designed to distribute the load properly. The vessel was uncovered but the exterior was painted. A 0.5 psi pressure was indicated by the gauge sensing the nitrogen atmosphere which is being maintained in the vessel during storage.

Storage procedures require daily inspection of the vessel to assure that the nitrogen atmosphere is maintained. The vessel is also required to be inspected on a monthly basis to determine the adequacy of the protective paint. A review of the documentation confirmed that the inspections have been performed as required. According to Carvin the inside area of the vessel will undergo inspection by PG&E after the vessel has been installed and the top dome removed.

G. Instrumentation and Electrical (7" [illegible]/2, Attachments K. and K.1

1. 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 banks in the turbine building, 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.

2. 5105.03* - Implementation of [illegible]

A QA program, as evidenced by the several documents, has been developed and implemented as required. The specific provisions of the QA program are set forth in a document entitled, "PG&E QA Manual, Diablo Canyon Unit No. 2." The staff confirmed that although the provisions of the document has been developed to meet the licensing requirements imposed on Unit No. 2 and the 18 criteria of Appendix B to 10 CFR Part 50, they are also applicable to Unit No. 1 with no distinction in requirements between the two units.

3. 5105.04* - Review of QC Program

b.6 - Special Handling and Storage [illegible]

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 identified as inspection items 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 "QC Manual" and the PG&E "Electrical and Instrumentation Instruction Book for QA".

b.7 - Quarantine of Nonconforming Components

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

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*5000/2

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) is a flow chart of the discrepancy disposition action that appears to indicate all milestones in this procedure.

c.1 - Handling and Installation Specifications

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. 3007) effective for the E/I work presently in progress, it was readily apparent that both general and specific requirements have been 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 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 - Use of Expertise in Installation

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, cores cores, testing, etc., will be identified as the job progresses and such skills will be employed as required. Confirmation of performance will be verified through QC action.

c.3 - Inspection and Testing Requirements

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 is 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 is performed in accordance with a plan set forth in their "Electrical and Instrumentation Instruction Book for QA".

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.

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 and preliminary calibrations and tests of equipment received at the site have been performed. 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.

4. 5205.03* - Implementation of QA Program (Cables and Terminations)

The general QA program discussed 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.

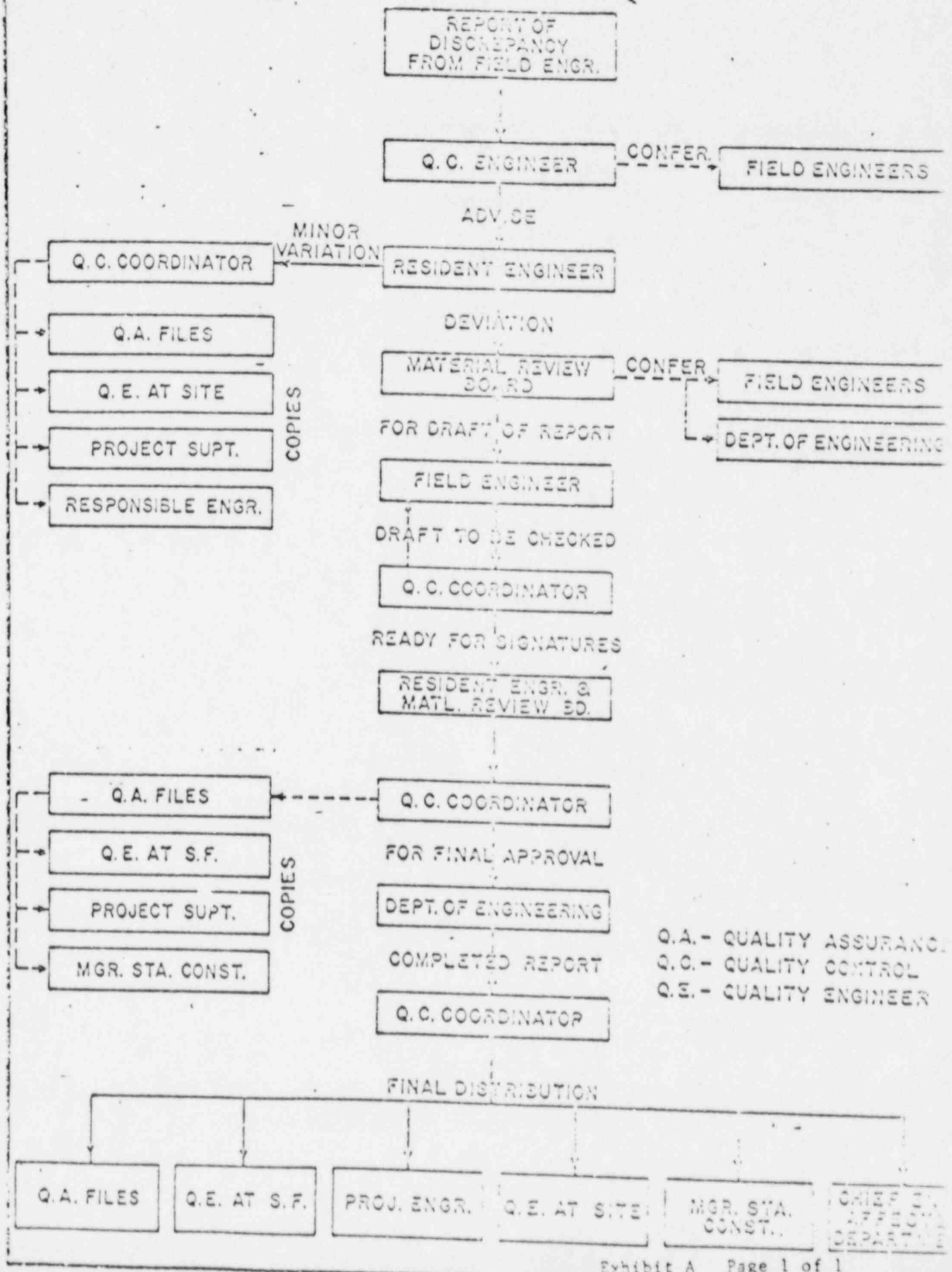
5. 5204.04* - Review of QC System (Cables and Terminations)

Cable installation will be governed by a separate contract. Plans were to let the contract for bids during June with work to commence during September 1971. In view of this situation, detailed QC procedures were unavailable for review. However, the inspector discussed in general what is expected to be included in an adequate QC program concerning installation of cables and terminations. A review of the procedures will be performed during an inspection subsequent to award of the cable installation contract.

Attachments:
Exhibit A
Exhibit B

*3800/2

DISCREPANCY REPORTS FLOW CHART



DIABLO CANYON ELECTRICAL ORGANIZATION CHART