

FOLEY
ELECTRICAL CONTRACTORS

QCP-32

REV. 0

DATE: 7-1-83

DIABLO CANYON
NUCLEAR POWER PLANT
QUALITY CONTROL PROCEDURE
FOR
INTERNAL AUDITS

APPROVED FOR CONSTRUCTION

QUALITY DIRECTOR

APPROVED 2 R. W. [Signature]

DATE 5/11/83

PROJECT MANAGER

APPROVED [Signature]

DATE 5-11-83

THE
HOWARD P. FOLEY
COMPANY

P. O. BOX 327,
AVILA BEACH, CALIF.
93424
805-595-7377

Offices:

ALLENTOWN, PENNSYLVANIA
BALTIMORE, MARYLAND
CHICAGO, ILLINOIS
DALLAS, TEXAS
HARRISBURG, PENNSYLVANIA
HOUSTON, TEXAS
LOS ANGELES, CALIFORNIA
MARTINEZ, CALIFORNIA
MEMPHIS, TENNESSEE
NEW ORLEANS, LOUISIANA
PHILADELPHIA, PENNSYLVANIA
PHOENIX, ARIZONA
PITTSBURGH, PENNSYLVANIA
RICHMOND, VIRGINIA
SALT LAKE CITY, UTAH
TAMPA, FLORIDA
TUCSON, ARIZONA
WASHINGTON, D.C.

Canadian Subsidiary:

EDMONTON, ALBERTA

THE HOWARD P. FOLEY COMPANY

APPROVAL (AS NOTED)	
<input type="checkbox"/>	Approved as to Substance
<input type="checkbox"/>	Subject to Notations Shown
<input type="checkbox"/>	Not Approved
<input type="checkbox"/>	Revised Drawings Required
<input type="checkbox"/>	Furnish Reproductions
<input checked="" type="checkbox"/>	Approved for Constr.
Resident Engineer: <u>[Signature]</u>	
By <u>N/A</u>	Date <u>6/2/83</u>
PACIFIC GAS & ELECTRIC CO. Diablo Canyon	

QUALITY PROCEDURE CHANGE NOTICE

Procedure Number QCP-32

PCN Number 1

Revision Number Rev. 0

Effective Date 10-12-83

PAGE	PARAGRAPH	PAGE	PARAGRAPH
2	4.4 Revised		
2	4.4.1 Revised		
2	4.4.2 Revised		

APPROVAL:

CUSTOMER APPROVAL:

C. W. Neal 9-21-83
ENGINEERING MANAGER DATE

Z. R. Wil 9/21/83
QUALITY DIRECTOR DATE

[Signature] 9-26-83
PROJECT MANAGER DATE

APPROVAL (AS NOTED)	
<input type="checkbox"/>	Approved as to Substance
<input type="checkbox"/>	Subject to Notations Shown
<input type="checkbox"/>	Not Approved
<input type="checkbox"/>	Revised Drawings Required
<input type="checkbox"/>	Furnish Reproductions
<input checked="" type="checkbox"/>	Approved for Construction
Resident Engineer <u>[Signature]</u>	
By	Date <u>10/10/83</u>
PACIFIC GAS & ELECTRIC CO. Diablo Canyon	

Instruction

- 1) A file of this change notice shall be maintained in the Q.C. File.

QCP-0
HPF/PCN 6-8-83

PG&E G.C. QUALITY CONTROL	
REVIEWED <u>D. Bell</u>	
DATE	<u>10/10/83</u>

QCP-32
REV. 0



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1. SCOPE

1.1 This procedure establishes the system for the scheduling and conducting of Quality Assurance Audits to determine the adequacy and effectiveness of The Howard P. Foley Company on-site Quality Program.

2. REFERENCES

2.1 American National Standard ANSI/ASME N45.2.12 - 1977.

2.2 The Pacific Gas and Electric Company Specifications as assigned to The Howard P. Foley Company.

2.3 The Howard P. Foley Company Quality Assurance Manual.

3. RESPONSIBILITIES

3.1 The Quality Director shall be responsible for employing all measures necessary to assure audits are conducted in accordance with the contract documents and this procedure. The Quality Director shall also be responsible for assuring those performing Internal Quality Assurance Program Audits are not directly responsible for the performance of the activities they will audit.

3.2 The Quality Assurance Manager shall be responsible for providing systematic audits which objectively evaluate the adequacy and effectiveness of the on-site Quality Program. In addition, he shall be responsible to provide direction and training for Quality Assurance personnel involved in auditing.

4. PREPARATION

4.1 Audits shall be scheduled for each calendar quarter on the Quality Assurance Activity Plan, (HPF/QAAP, Exhibit 1).

4.1.1 The Activity Plan shall be signed by the individual who prepared it and approved by the Quality Assurance Manager.

4.1.2 The plan may be changed during the active quarter as deemed necessary by the Quality Assurance Manager.

4.2 The subject matter and frequency of scheduled audits will be based on the status and significance of current activities.

4.3 Unscheduled audits may be conducted whenever deemed necessary by the Quality Director.

PCN-1 4.4 Audits shall be prepared by development of a written audit plan and checklist.

PCN-1 4.4.1 The audit plan (Exhibit 4) shall include as a minimum:

- a) Audit Number
- b) Audit Subject
- c) Scope of Audit
- d) Documents Researched
- e) Tentative Audit Points

PCN-1 4.4.2 The audit checklist shall consist of specific questions derived from the tentative audit points.

4.5 Auditor selection shall be made by the Quality Assurance Manager. When an audit team is to be utilized, a qualified auditor shall be chosen as Audit Team Leader.

4.5.1 The Audit Team Leader's responsibilities include orientation of the team, coordinating the audit process, establishing the pace of the audit, assuring communications within the team and with the department being audited, participation in the audit performance and coordinating the preparation and issuance of reports.

4.5.2 Audit Team Members can be auditors-in-training or those individuals having specialized knowledge in the area(s) being audited.



THE
HOWARD P. FOLEY
COMPANY

4.6 Managing personnel of departments to be involved in the audit, as well as the Senior Site Representative shall be notified prior to the start of audit activities.

5. PERFORMANCE

5.1 A Pre-Audit Conference may be held after notification and before the commencement of a Quality Assurance Program Audit.

5.1.1 During the Pre-Audit Conference the Audit Team Leader should present the audit plan, confirm the audit scope, distribute checklists, introduce auditors, meet counterparts, verify the audit schedule and establish lines of communication.

5.2 Audits shall be performed as delineated in the audit checklist. The checklist does not limit the investigation when evidence indicates further examination is warranted.

5.3 Audits shall give special attention to discrepancies identified during previous audits.

5.4 All conditions requiring prompt corrective actions will be reported to management immediately.

5.5 At the conclusion of an audit a Post-Audit Conference shall be held with management of the audited areas to present audit results and clarify misunderstandings.

6. REPORTING

6.1 The Audit Team Leader shall sign the audit report which should include the following:

- a) The audit scope.
- b) Identification of the Audit Team Members.
- c) Names and titles of personnel contacted during the course of the audit.
- d) A summary of audit results, including conclusive statements concerning the adequacy and effectiveness of the areas audited.
- e) A detailed description of the audit results and/or open audit findings in sufficient detail to assure that corrective actions can be effectively implemented.

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THE
HOWARD P. FOLEY
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REV. 0



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- f) Recommendations for correcting open audit findings.
- g) Reference to controlling documents.
- h) Signature(s) of auditor(s) and Audit Team Leader.

6.1.1 The audit report shall be issued within 30 days of the conclusion of the audit.

6.1.2 The audit report shall be documented in business letter format, addressed to the Senior Site Representative and contain all the pertinent information required by this procedure.

6.1.3 Concerns and unresolved items shall be identified within the audit report and require written response by the audited department.

6.1.4 Generic discrepancies and program implementation discrepancies shall be documented on a HPF/Audit Finding Report, (HPF/AFR, Exhibit 2) and intergrated into the audit report. Open Audit Finding Reports will be issued to the responsible department with a noted Completion Due Date for Corrective Action required.

6.1.5 An audit report normally consists of individual audit findings and will not be closed until findings are closed.

6.2 Each calendar quarter, a report of audit status shall be prepared. Copies shall be submitted to the Senior Site Representative, Regional Vice-President, Pacific Gas and Electric Company and the Quality Director for their review.

7. AUDIT REPLIES

7.1 The completion due date for audit replies is thirty (30) days following the issuance of the audit. Request for delay may be submitted to the Quality Assurance Department. The acceptance or rejection of requests for extension shall be subject to the approval of the Quality Director.

7.1.1 Open audits that have not been replied to within the thirty day issuance period shall be brought to the attention of the Quality Director.

QCP-32
REV. Ø

7.2 Those responsible for answering audits shall:

- a) Define the action taken to correct the individual discrepancies identified in the audit.
- b) Define the research taken to expose similar deficiencies and
- c) Define the measures taken to prevent recurrence.

7.3 When an Inspection Report and/or a Nonconformance Report is generated as a result of an open audit finding, the finding may be documented as closed upon approval of the Proposed Disposition of the report.

7.4 Audit replies shall be made on The Howard P. Foley Audit Reply, (HPF/AR, Exhibit 3) and submitted to the Quality Assurance Department.

7.4.1 Acceptable audit replies shall be summarized and/or referenced, by the auditor, in the corrective action space on the Audit Finding Report. The Audit Reply shall be included in the completed audit package.

8. FOLLOW-UP

8.1 Action to correct audit discrepancies shall be verified as complete and properly implemented prior to closure of the audit findings.

9. DOCUMENTATION

9.1 Records generated as a result of this procedure which are intergrated into the Audit Report (i.e., HPF/QAAP, HPF/AFR, and HPF/AR) shall be maintained with the Quality Assurance Department in a readily retrievable manner.



THE
HOWARD P. FOLEY
COMPANY

EXHIBIT 1

QUARTERLY REPORT FOR

[illegible]

PREPARED

DATE _____

APPROVED _____

DATE _____

Audit Finding Report

EXHIBIT 2

Audit Number _____ Page _____ of _____
Audit Date: From _____ To _____ Completion Due _____
Audit Subject _____
Controlling Documents _____
Auditor(s) _____

Quotation(s) from Controlling Documents

Audit Finding(s)

Q.A. Recommendation(s) (optional)

Corrective Action(s)

Prepared By

Closed By

Review/App. By

Date

Date

Date

AUDIT NUMBER _____

PAGE ____ OF ____

AUDIT REPLY

EXHIBIT 3

THE HOWARD P. FOLEY COMPANY QUALITY PROGRAM

AUDIT NUMBER _____ DATE OF AUDIT _____ PAGE _____ OF _____

SUBJECT OF AUDIT

SUBMITTED BY: _____ DATE _____

[illegible]

REPLY TO AUDIT NUMBER _____

PAGE ____ OF ____

AUDIT ITEM(S)

ALLEGATION DATA FORM Instructions on reverse side

U.S. NUCLEAR REGULATORY COMMISSION

RECEIVING OFFICE

1. Facility(ies) Involved:
(If more than 3, or if generic, write GENERIC)

(Name) Diablo Canyon 1/2

Docket Number (if applicable)

0	5	0	0	0	2	7	5
0	5	0	0	0	3	2	3

2. Functional Area(s) Involved:
(Check appropriate box(es))

<input type="checkbox"/>	operations
<input checked="" type="checkbox"/>	construction
<input type="checkbox"/>	safeguards
<input type="checkbox"/>	other (Specify) _____

<input type="checkbox"/>	onsite health and safety
<input type="checkbox"/>	offsite health and safety
<input type="checkbox"/>	emergency preparedness

3. Description:
(Limit to 100 characters)

A	l	e	g	a	t	i	o	n	s	1	3	6	a	n	d	1	3	7
F	o	l	e	y	a	u	d	i	t	p	r	o	c	e	d	u	r	e
f	i	n	d	i	n	g	s	n	o	t	p	r	o	p	e	r	l	y
h	a	n	d	l	e	d												

4. Source of Allegation:
(Check appropriate box)

<input type="checkbox"/>	contractor employee
<input type="checkbox"/>	licensee employee
<input type="checkbox"/>	NRC employee
<input type="checkbox"/>	organization (Specify) _____
<input checked="" type="checkbox"/>	other (Specify) <u>Confidential</u>

<input type="checkbox"/>	security guard
<input type="checkbox"/>	news media
<input type="checkbox"/>	private citizen

5. Date Allegation Received:

MM	DD	YY
01	+	84

H.L. Canter

6. Name of Individual Receiving Allegation:

(First two initials and last name)

7. Office:

		R	V

ACTION OFFICE

8. Action Office Contact:

(First two initials and last name)

H.L. Canter

9. FTS Telephone Number:

4	6	3	-	3	7	1	9
---	---	---	---	---	---	---	---

10. Status:
(Check one)

<input checked="" type="checkbox"/>	Open, if followup actions are pending or in progress
<input type="checkbox"/>	Closed, if followup actions are completed

11. Date Closed:

MM	DD	YY

11.1 Document Nos. _____

12. Remarks:
(Limit to 50 characters)

12.1 Man-hours/Date
13. Allegation Number:

Office	Year	Number
	R	V
-	8	4
-	A	-
0	0	4
0		

315 ~~232-A-39~~

RECEIVING OFFICE

Docket Number (if applicable)

1. Facility(ies) Involved:

(If more than 3, or if generic, write GENERIC)

(Name)

Diablo Canyon 1/2

0	5	0	0	0	2	7	5
0	5	0	0	0	3	2	3

2. Functional Area(s) Involved:

(Check appropriate box(es))

<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

operations

construction

safeguards

other (Specify) _____

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

onsite health and safety

offsite health and safety

emergency preparedness

3. Description:

(Limit to 100 characters)

F	o	i	e	y	a	l	l	e	g	a	t	i	o	n	s	n	u	m	b	e	r
1	3	4		4	0		1	3	7												

4. Source of Allegation:

(Check appropriate box)

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>

contractor employee

licensee employee

NRC employee

organization (Specify) _____

other (Specify) Confidential

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

security guard

news media

private citizen

5. Date Allegation Received:

MM	DD	YY
01	-	-
8		4

6. Name of Individual Receiving Allegation:

(First two initials and last name) _____

7. Office:

		R	V
--	--	---	---

ACTION OFFICE

8. Action Office Contact:

(First two initials and last name)

H.L. Canter

9. FTS Telephone Number:

4	6	3	-	3	7	1	9
---	---	---	---	---	---	---	---

10. Status:

(Check one)

<input checked="" type="checkbox"/>
<input type="checkbox"/>

Open, if followup actions are pending or in progress

Closed, if followup actions are completed

11. Date Closed:

MM	DD	YY

11.1 Document Nos. _____

12. Remarks:

(Limit to 50 characters)

12.1 Man-hours/Date

13. Allegation Number:

Office	Year	Number
	R	V
-	2	4
-	A	-
	0	0
	1	1

D140-21-A-40



#136

December 13, 1983

INTER-OFFICE MEMO

TO: Ted Canning/Q.C. Manager

FROM: Bob Walcheski/Q.A. Auditor

RE: H.P. Foley Audit PA-135, Item 12.

Your response to Item 12 of Internal Audit PA-135, which was received by our department on 12-1-83 is not sufficient in itself to close the item. By re-establishing the required daily and weekly Storage Oven Inspections, the problem is partially resolved. However, for the period of time when these inspections were not performed, there exists a documentation deficiency which renders the quality of welding electrodes indeterminate.

Para. 4.7 of QCP-4A states, "Nonconforming items that are not possible to "Correct In-Process" shall be documented in accordance with QCP-3." According to QCP-3, Para. 4.4, a Nonconformance is defined in part as, "a deficiency in characteristic, documentation, or procedure which renders the Quality of an item unacceptable or indeterminate. Examples of nonconformance include: incorrect or inadequate documentation, or deviation from..... inspection....." The method for documenting the nonconforming condition is as prescribed in QCP-3, Para. 5.1. Whichever way you choose to document this condition, it should be noted that the goal is to achieve a "Use As-Is" disposition. A suggested way to achieve this disposition would be to review Weld Electrode Requisitions (HPF/WER) for applicable storage oven locations for the time in which the documentation/inspection discrepancy exists, as the WER documents storage oven temperatures. If no discrepancies are noted in this review, then significant basis for a "Use As-Is" disposition is established.

THE

HOWARD P. FOLEY
COMPANY

P. O. BOX 327,
AVILA BEACH, CALIF.
93424
805-595-7377

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RICHMOND, VIRGINIA
SALT LAKE CITY, UTAH
TAMPA, FLORIDA
TUCSON, ARIZONA
WASHINGTON D.C.

C. 1000 10 10 10 10

EDMONTON, ALBERTA

D/41 2304 41.

T. Canning
Page 2
December 13, 1983

Audit Finding #12 for PA-135 will remain outstanding until such documentation is generated to identify, and satisfactorily resolve the problem. Your response to this Item, only provides a Means for Preventing Recurrence but does not offer any Corrective Action for the resulting documentation/inspection deficiency. Please provide Q.A. with a response for corrective action to this outstanding problem as soon as possible.

Sincerely,

R. J. Walcheski

R.J. Walcheski
Q.A. Auditor

RJW:cw

cc: L.R. Wilson
Q.A. File



THE
HOWARD P. FOLEY
COMPANY

#136

Audit Number PA-135 Page 13 of 13
Audit Date: From 9-27-83 To 10-4-83 Completion Due _____
Audit Subject Welding Electrode Control
Controlling Documents HPF/QCP-4A
Auditor(s) S. Ryan, R. Walcheski

Quotation(s) from Controlling Documents:
QCP-4A, Para. 4.6, "Quality Control shall perform a daily and weekly inspection to assure that this procedure is being followed."

Audit Finding(s)

ITEM 12 - Contrary to the above requirement, daily and weekly inspections are not being performed by Q.C. for Unit I storage ovens. Quality Control is unable to gain access to Unit I due to Security Lockdown.
(See Exhibits 10&11 attached).

Q.A. Recommendation(s) (optional)

*No NCR was written contrary to QCP3
See attached LTR.*

Corrective Action(s)

R.J. Walcheski *RAW*

Prepared By

10-4-83

Date

Closed By

Date

Review/App. By

Date

AUDIT ITEM(S)

FINDING XII:

Access has been established to Unit #1 via key carded inspectors or escorted inspectors. With this required inspections will be re-established.

This doesn't answer the finding!

RECEIVED

QUALITY ASSURANCE

DEC 01 1983

HOWARD P. FULLER, JR.

Avila Beach, CA

The Howard P. Foley Company

Audit Finding Report

136

Audit Number PA-125 Page 11 of 17
 Audit Date: From 1-17-83 To 1-26-83 Completion Due 3-4-83
 Audit Subject Work on Containment I Annulus Steel Modifications
 Controlling Documents P.G. & E. W/R #C-6181, HPF/Travelers & Procedures
 Auditor(s) P.F. Ratterman/P.W. French

Quotation(s) from Controlling Documents HPF/QCP-17, Rev.1

4.6.1When Quality Inspection Hold Points are identified by the Work Process Traveler, work shall not proceed until the Quality Department has been notified and such inspections have been completed and Production has been notified of the results of the inspection.

Audit Finding(s)

During the course of this audit it was noted there are Hold Points established for P.G. & E. Final Acceptance of welds. These appear on approximately 40% of the Work Process Travelers generated as a result of Work Request #C-6181. The P.G. & E. Hold Points are in place as the result of a verbal agreement between P.G. & E. and The H.P. Foley Company to have Constructor approval of each weld on the Annulus Steel Modification Work. In each case where welds are completed and accepted by H.P. Foley personnel, there has been no P.G. & E. concurrence; thus, the loss of double coverage. Although this is not considered to be an Open Item, it is a situation requiring clarification. (Continued)

Q.A. Recommendation(s) (optional)

Item X- 1, 2 & 3 Research the Quality Control and Work files to identify all cases where work has progressed beyond Hold Points without the required sign-offs. A Nonconformance Report should then be initiated for dispositioning of this discrepancy. Included in the "Means to Prevent Recurrence", should be a commitment to inform those involved, with work and inspection, of the importance of not progressing past un-signed Quality Hold Points. (Continued on Page 12)

Corrective Action(s)

Item X- 1, 2 & 3 - See attached Audit Reply to Item X, submitted by R. Wilson on 8-15-83.

P.F. Ratterman *[Signature]*

P.W. French *[Signature]*

[Signature]

Prepared By
1-27-83

Closed By
8-16-83

Review/App. By

Date

Date

Date

43
D/43 *[Signature]*

AUDIT FINDING(s) (Continued from Page 11)

Item X - Generally, HPF/Quality Hold Points are being signed-off in accordance with the above quotation; however, there were several Work packets examined where work had progressed without the required Hold Point sign-offs.

- 1) On Connections G-7, G-8, V, X-1 and more, bolts were installed and tensioned (not yet checked with a calibrated wrench) where the Hold Points established for the bolts, i.e., Material, Dimensions and Edge Prep., had not been signed.
- 2) Weld No.14 on Connection GG and weld No's. 14 and 15 on Connection HH have been completed and accepted on the appropriate Weld Inspection Sheets. The Quality Hold Points for these welds have not been signed-off.
- 3) Hold Points for piece No. H C41.1 on Connection 41 have not been signed-off. The plate has been installed and the welds which attach the plate have all been completed and accepted with Hold Points signed-off.

Q.A. RECOMMENDATION(s) (Continued from Page 12)

It was observed that earlier revisions of Travelers are not always kept with the current copy in the work packages. Quality Hold Point sign-offs are not generally transferred to new Traveler revisions. It is a recommendation of this department that all revisions of individual Travelers be maintained in the current work packet.

1. SCOPE

This procedure establishes the methods for reporting, documenting, and processing materials; parts; components; or services which are not in conformance with design or procedural requirements.

2. REFERENCES

2.1 Title 10, U.S. Code of Federal Regulations, Part 21 (10CFR21)

2.2 American National Standards Institute (ANSI)
N43.2.10-1973 "Quality Assurance Terms and Definitions"

2.3 Pacific Gas and Electric Company Specifications as assigned to The Howard P. Foley Company

2.4 The Howard P. Foley Company Quality Assurance Manual Sections XV, Control of Nonconformances, and XVI, Corrective Action

2.5 The Howard P. Foley Company "Quality Control Procedure for Receiving, Handling, and Storage", QCP-4

2.6 The Howard P. Foley Company "Quality Control Procedure for Corrective Action", QCP-33

3. RESPONSIBILITIES

3.1 The Project Manager shall be responsible for employing all measures necessary to accomplish the work in accordance with the requirements of the contract documents and this procedure.

3.2 The Engineering Manager shall be responsible for recommending dispositions on NCR's and dispositioning IR's.

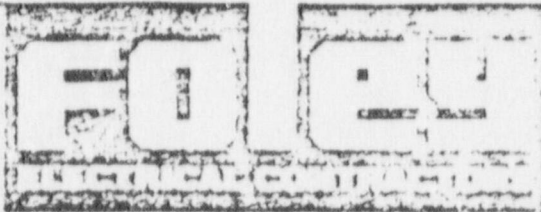
3.3 The Production Superintendent shall be responsible for accomplishing all work in accordance with the specifications, design drawings, and procedures. He is also responsible for immediately notifying Quality Control when nonconforming conditions exist.

3.3.1 It shall be the responsibility of the individual Production Superintendent to ensure that Production forces under his supervision are trained and working in accordance with current revisions of quality procedures.



THE
HOWARD P. FOLEY
COMPANY

D144 44. ~~201.1~~



#135

May 16, 1983

Mr. R. D. Etzler
 Project Superintendent
 Pacific Gas and Electric Company
 Post Office Box 117
 Avila Beach, CA 93424

RE: Internal The Howard P. Foley
 Audits

Dear Mr. Etzler:

Due to an intensive internal training and certification effort, the restructuring of several key procedures and revision of The Howard P. Foley Company Quality Assurance manual; The Howard P. Foley Company is foregoing its formal activity audit performance for a period of approximately ninety days.

This action will not adversely affect our Quality Assurance Program; will allow us to effectively utilize all of our personnel in the execution of these tasks, and will provide necessary time to implement the new procedures effectively. At the end of this period The Howard P. Foley Company will perform a program audit to assure that the effort is successfully completed.

Sincerely,

R. Wilson

Rick Wilson
 Quality Director

RW:tc

cc: P. Bourque
 F. Lench
 R. Twiddy
 J. Bratton
 QA File

*Foley Audit Program was stopped
 May 16, 1983. Last one was March 83.*

*Since Vela the
 1st audit issued was in Sept 83.*

Audit Program was halted for 6 months!!

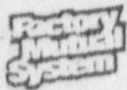
THE
 HOWARD P. FOLEY
 COMPANY
 P. O. BOX 327
 AVILA BEACH, CALIF.
 93424
 805-595-7377

Offices

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 SALT LAKE CITY, UTAH
 TAMPA, FLORIDA
 TUCSON, ARIZONA
 WASHINGTON, D.C.

Canadian Subsidiary
 EDMONTON, ALBERTA

D145
 45
 1154



actory Mutual Research

1151 Boston-Providence Turnpike
Norwood, Massachusetts 02062

26543
(4610)

October 28, 1975

FIRE ENDURANCE TEST
on
PENETRATION SEAL SYSTEMS IN PRECAST CONCRETE FLOOR
UTILIZING SILICONE ELASTOMERS
(CHEMTROL DESIGN FC 225)

for

DOW CORNING CORPORATION
MIDLAND, MICHIGAN 48640
and
CHEMTROL CORPORATION
10600 HEMPSTEAD RD.
HOUSTON, TEXAS 77018

GENERAL

This report describes the construction, the test procedure and lists the results of a fire test conducted on twelve penetration seal systems installed in a 17 ft - 10 in. by 14 ft - 2 in. nominal 8 in. thick precast concrete floor assembly. The penetration seals included silicone elastomeric foam, silicone bonded lead radiation shields, flexible silicone impregnated fiberglass boots, silicone adhesive/sealant, and alumina silica damming material. The penetrations consisted of rectangular openings containing cable trays with conductors and various combinations of steel pipe sleeves containing electrical conductors and steel pipe conduits. The test assembly was constructed as shown on Illustration 1.

Chemtrol's specifications of the products employed in the construction of the penetration seal systems are attached as appendix sheets to this report. The raw materials or the in-place products of the seal systems are not manufactured or produced under Factory Mutual quality assurance follow-up in-plant inspection program.

The object of this test program was to investigate the fire endurance characteristics of the penetration seal systems as described herein. The test was performed following the procedures for evaluating floor-ceiling assemblies as defined under the Standard for Fire Tests of Building Construction and Materials ASTM E119-73, (NFPA 251).

The penetration seals were subjected to fire exposure for 3 hours. The performance of the twelve seal systems during fire exposure is detailed in this report.

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19pp.

F-10

DESCRIPTION

MATERIALS

The materials used in the construction of the floor assembly and the designated penetration seal components are described below:

Concrete Floor - Nominal 8 in. thick precast, prestressed hollow-core concrete planks manufactured by Spancrete Northeast Inc. Deck units were 40 in. wide by 13 ft 9 in. long.

Concrete - Laboratory mixed concrete consisting by volume of 1 part Portland cement, 2 parts sand and 2 parts pea gravel mixed with 6.0 gallons of water per 94 lb. bag of cement.

Foamed-In-Place Silicone Elastomer System - Dow Corning 03-6548 Silicone RTV Foam/Chemtrol Part No. CT-18 designed as a medium density penetration seal for liquids, gases and fire confinement. Dow Corning supplied certificate of compliance that the material furnished was within all applicable specification requirements. The average open-cup density of the silicone foam was 18.3 lbs. per cu ft. See Appendix E for cup specifications. Specification No. 3300 covering the foam is included in this report as Appendix A.

Foamed-In-Place Silicone Lead System - Chemtrol CT-300L gamma radiation shielding penetration sealing material. Material formulated utilizes a matrix including Dow Corning's Sylgard 170 silicone elastomer and powdered lead. Certificate of compliance for the Sylgard 170 was supplied by Dow Corning certifying the material as complying with applicable specifications. The nominal 150 and 250 lb. per cu ft density lead foam were 156.5 lb. per cu ft and 246.8 lb. per cu ft respectively Chemtrol Specification No. 3400 for the radiation shielding foamed-in-place silicone lead is included in this report as Appendix B.

Penetration Boot Seal System - Chemtrol CT-15B silicone rubber fabric. Boot seal intended for use as a seal for pipe and duct penetrations where movement or vibration is present. The boot seal was installed with a fire stop. The boot fabric was fastened with Dow Corning 96-081 RTV Adhesive/Sealant or Chemtrol Part No. CT-4C. Certificate of Compliance for the adhesive was supplied by Dow Corning certifying the 96-081 RTV Adhesive/Sealant as complying with applicable specifications. Chemtrol Specification No. 3410 for the boot seal and specifications for the adhesive are included in this report as Appendix C.

Damming Materials - The following materials were used to contain the liquid silicone in a specific area while it reacts and expands into a solid mass. The damming materials were left in place and are an essential component of the seal.

- a) Chemtrol Part No. CT-23F - Loose alumina-silica fiber for service temperatures of 2300°F.

26543

- b) Chemtrol Part No. CT-23B - Nominal 1 in. thick alumina-silica fiber blanket for service temperatures of 2300°F.

Specifications for the damming materials are given in Appendix D.

Cable Trays - 5 ft long solid bottom and ladder back ventilated cable trays were used in the construction. The sides of the open ladder trays were channel shaped, 4 in. deep with outward extending flanges $7/8$ in. wide and a $3/8$ in. wide return flange on the cable side, fabricated from 12 gage (0.107 in. thick) galvanized steel. The rungs were 1 in. diameter tubes of galvanized steel and located 12 in. O.C. The inside dimensions of the trays were nominally 3 in. deep by 18 in. wide.

The solid bottom cable trays were constructed with channel shaped sides 4 in. deep and fabricated from 17 gage (0.060 in. thick) galvanized steel. The cable side flange was formed into a $3/8$ in. square closed box shape. The solid bottom was 23 gage (0.030 in. thick) corrugated galvanized steel with a pitch of $1\ 1/2$ in. and $5/16$ in. deep. The trays were nominally $3\ 5/8$ in. deep by 18 in. wide.

The 34 in. wide cable trays were fabricated at the laboratory by joining two ladder back trays with the adjoining sides removed. The rungs were joined with pipe sleeves and welded to form a single unit. The 34 in. wide solid back trays were fabricated in the same manner with a 18 gage (0.052 in. thick) galvanized steel back welded to the ladder backed trays.

Electrical Conductors - The copper electrical wires used to fill the cable trays and conduits were as follows:

- a) Anaconda W Type TW No. 14AWG. 600 volt oil resistant single conductors and having a thermoplastic coating.
- b) Anaconda W Type THW 300MCM. 600 volt oil resistant single conductors and having a thermoplastic coating.
- c) Anaconda M power and control tray cable, Type THHN or THWN CDRS, 7 conductor No. 12AWG 600 volt cable for installation in continuous rigid cable supports and having a thermoplastic coating.

Cable trays in one penetration were filled with the following copper conductors:

- a) Raychem Flamtrol No. 4/0 AWG. 1000 volt, 90 C Type XLPE
- b) Raychem Flamtrol , 7 conductor No. 12 AWG. 2000 volt, 90 C Type XLPE.
- c) Raychem Flamtrol , No. 12 AWG single conductor. 600 volt, Type XLPE.

Conduits and Sleeves - Standard weight steel pipe of nominal 6 in. dia. (6-5/8 in. O.D.) with a 0.280 in. wall thickness and nominal 10 in. dia. (10-3/4 in. O.D.) with a 0.365 in. wall thickness.

PENETRATION SEALS
Foamed-in-Place - Silicone Rubber

Chemtrol CT-18/Dow Corning Q3-6548 Silicone RTV Foam (Medium Density)

PRODUCT DESCRIPTION

CT-18 is a two component silicone foam. When mixed in a one one ratio by weight, or volume, the Silicone RTV Foam exhibits excellent fire resistant properties (as a penetration seal).

ADVANTAGES

Chemtrol CT-18/Dow Corning Q3-6548 Silicone RTV Foam offers superior properties in:

- . Fire Retardance
- . Cell Structure
- . Lack of deterioration
- . Non-chaulking characteristics
- . Resiliency
- . Rate of expansion during cure process
- . Time of cure
- . Methods of handling
- . Safety factors while material is in its liquid state

and other proprietary chemical matrixes of CT-18 as listed in the following specifications.

USAGE

Chemtrol CT-18/Dow Corning Q3-6548 Silicone RTV Foam when installed with Chemtrol's proprietary installation procedure, offers excellent properties as a penetration seal to resist fluids passage, smoke passage, air passage, and fire penetration. CT-18 flexible, expanding Silicone Foam can be foamed-in-place to seal electrical cables, conduit, pipe, cable trays and pull box penetrations through wall, floors, and cabinets.

TYPICAL PHYSICAL PROPERTIES CURED FOAM

(Mixed one Part A - One Part B and cured at 72°F for a minimum of 24 hours)

<u>DESCRIPTION</u>	<u>TEST METHOD</u>	<u>RESULTS</u>
Appearance	CTM 0176	Dark Gray-Black
Density	CTM 0812 Power mixed for 30 seconds and cured in non-confined Chemtrol container #1516	Not less than 15 lbs/ft ³
Closed Cell Content	CTM 0826 Breathability Method	95%
Thermal Conductivity	CTM 0224 Cenco Fitch Method	1.8x10 ⁻⁴
Cream Time	CTM 092A	1.5 min.
Limiting Oxygen Index	CTM 0780 L.O.I. Rating	35

ELECTRICAL PROPERTIES (Cured Foam 125 mils thickness)

<u>DESCRIPTION</u>	<u>TEST METHOD</u>	<u>RESULTS</u>
Dielectric Strength	ASTM D877	165 Volts/mil
Dielectric Constant	ASTM D150 (100 Hz)	1.95
Dissipation Factor	ASTM D150 (100 Hz)	0.00505
Volume Resistivity	ASTM D257	2.24x10 ¹⁵ OHM-CM

RADIATION RESISTANCE PROPERTIES

<u>DESCRIPTION</u>	<u>TEST METHOD</u>	<u>RESULTS</u>
Megarads Exposure	CTM 0525	Modulus at 10% Compression, psi
0	CTM 0525	0.625
6	CTM 0525	0.672
22	CTM 0525	0.92
49	CTM 0525	2.00
124	CTM 0525	2.32 still resilient

TYPICAL PROPERTIES (The following properties are for general information. Physical data on properties not herein listed can be obtained by testing according to direction of the customer.)

PART A

<u>DESCRIPTION</u>	<u>TEST METHOD</u>	<u>RESULTS</u>
Appearance	CTM 0176	Black Liquid
Specific Gravity	ASTM D-70	1.05
Viscosity	ASTM D-1084 Brookfield Model Haf Spindle No.3 at 10 RPMS	50 Poise
Shelf Life	(Estimate)	6 Months
Flash Point	ASTM D-92	470°F
Fire Point	ASTM D-92	> 650°F
Sulphur Content	CTM 0787	None Detected Less than 2 PPM
Chlorine Content	CTM 0787	None Detected Less than 4 PPM
Bromine Content	CTM 0787	None Detected Less than 5 PPM
Iodine Content	CTM 0787	None Detected Less than 6 PPM

ELECTRICAL PROPERTIES (50 mils liquid)

Dielectric Strength	ASTM D877	680 Volts/mil
Dielectric Constant	ASTM D924 (100 Hz)	3.08
Dissipation Factor	ASTM D924 (100 Hz)	0.00103
Volume Resistivity	ASTM D169 (500 Volts)D.C.	3.23×10^{12} OHM-CM

PART B

<u>DESCRIPTION</u>	<u>TEST METHOD</u>	<u>RESULTS</u>
Appearance	CTM 0176	Off White Liquid
Specific Gravity	ASTM D70	1.05
Viscosity	ASTM D1084 Brookfield Model Haf Spindle #3 at 10 RPMS	60 Poise
Shelf Life	(Estimate)	6 Months
Flash Point	ASTM D92	270°F
Fire Point	ASTM D92	>390°F
Sulphur Content	CTM 0787	None Detected Less than 2 PPM
Chlorine Content	CTM 0787	None Detected Less than 4 PPM
Bromine Content	CTM 0787	None Detected Less than 5 PPM
Iodine Content	CTM 0787	None Detected Less than 6 PPM
<u>ELECTRICAL PROPERTIES</u> (50 mils liquid)		
Dielectric Strength	ASTM D877	900 Volts/mil
Dielectric Constant	ASTM D924 (100 Hz)	3.29
Dissipation Factor	ASTM D924 (100 Hz)	0.0034
Volume Resistivity	ASTM D169 (500 Volts)D.C.	3.38×10^{12} OHM-CM

Appendix Sheet A5

INSTRUCTIONS FOR

APPLICATION, DISPENSING, AND MONITORING OF SILICONE FOAM

1.0 SCOPE

Electrical cable, conduit, pipe, cable tray, and pull box penetrations through walls and floors, as indicated on the attached drawings, shall be sealed with CHEMTROL CT-18/Dow Corning Q3-6548 Silicone RTV Foam. These seals are to resist passage of fluids, smoke, air, and fire through said penetration openings.

2.0 SUBSTRATE PREPARATION

- 2.1 Chemtrol dams shall be provided and installed for those penetrations scheduled for sealing prior to foaming operation.
- 2.2 Electric cables through the penetration opening are to be spread where possible to facilitate the flow of silicone between cables.
- 2.3 If cables are too congested to allow spreading through penetration openings, the customer can request boxing outside the opening to spread the cables and such boxing then filled with silicone foam.

3.0 DEPTH OF FILL

- 3.1 Pipe, cable, conduit, etc., penetrations with surface areas of 80 in.² or less shall be sealed with 1" of CT-23 series damming and 7" of CT-18 silicone foam.
- 3.2 Pipe, cable, conduit, etc., penetrations with surface areas greater than 80 in.² shall be sealed with 1" of CT-23 series damming and 11" of CT-18 silicone foam.
- 3.3 Where seals are provided in fire rated walls or floors that have thickness of less than that specified in 3.1 and 3.2, then boxing shall be provided exterior to the openings to accomplish foam depths as specified in 3.1 and 3.2.
- 3.4 Should clearances in openings to be sealed (between cables and tray or between pipe and opening) be less than 4" then an approved silicone elastomeric caulking material can be used in lieu of silicone foam.
- 3.5 Boxing, spacing and dam materials are to be non-combustible where same are scheduled to be left in place following application of the foam.

4.0 MATERIAL HANDLING CHARACTERISTICS

- 4.1 CHEMTROL CT-18/Dow Corning Q3-6548 is formulated by Dow Corning as a two part liquid material separately packaged and supplied in either drum or bulk vessels.
- 4.2 The material as received should be kept at about 70°F. If the material should be subjected to temperatures below 32°F, it should be brought to not less than 50°F and reagitated to insure proper blend.
- 4.3 The material should be maintained at room temperature (70°F), if possible, prior to its becoming feed-stock material for dispensing through Chemtrol dispensing equipment.

5.0 MATERIAL STORAGE

- 5.1 Material containers should at all times be kept sealed while in storage to prevent contamination of the material prior to application.

6.0 CHEMTROL DISPENSING EQUIPMENT

- 6.1 Chemtrol dispensing machines have the primary function to receive two component material as feed-stock, individually maintain proper temperature, and dispense the material to precise pre-adjusted ratio through a variable speed shear mixer head.
- 6.2 The foaming machines to be supplied by Chemtrol are especially engineered machines. They are designed to maintain the required ratios. Pressure gauges and independent temperature controls are provided for both components.
- 6.3 Production time meters can also be provided to monitor the total operating time of the equipment.

7.0 APPLICATION PROCEDURE

- 7.1 The calibration of the dispensing unit must be checked each day prior to dispensing. The material must be brought to a pre-determined temperature by the individual component temperature adjustment, so as to create the proper cure rate required after the dispensing. An equally timed shot of a predetermined duration of the individual unmixed components, is extracted into containers of equal size. Both containers are to be weighed and the ratio calibrated accordingly.
- 7.2 After calibration, a small test pour is to be shot into a container permitting free rise of the foam for density check. If the obtained density is within the required specifications, the sample is to be

Appendix Sheet A7

properly identified and retained for Quality Control records. If the obtained density proves out of specification, a recalibration and examination of the material is required before the test pour procedure is repeated.

- 7.3 Machine mixing of the two components is to be accomplished in a mixing chamber and not mixed at a time more than 15 seconds prior to the mixed material being poured in place.
- 7.4 The foaming system shall not be set at a delivery range of more than 12 pounds per minute.
- 7.5 If foaming is required to be done in stages, the heights of each stage is to be determined by the onsite Quality Control Inspector.
- 7.6 Maintain component ratios with + or - 5%.
- 7.7 The above procedures are to be supervised by the Chemtrol Quality Control Inspector, and performed to his satisfaction prior to any infield production of the Chemtrol system.
- 7.8 All instrument calibration, material history tracing records, infield calibration, field test pour records, ambient condition reports, etc., should become permanent records kept on file by the assigned Quality Control Inspector and also distributed to the Home Office Document Control Clerk and the customer as required under the approved Quality Assurance Program.
- 7.9 Those technicians assigned to the foaming equipment shall have had at least two years experience in dispensing foam, or be able to demonstrate proficiency to satisfaction of the onsite Quality Control Inspector. In cases where a technician is assigned temporarily to operate the foaming equipment, who has had less than two years foaming experience, an additional technician must be assigned to be within 25 feet of the operating equipment at all times while foaming is in process. The second technician must have had at least two years experience in the operation of foaming equipment.

8.0 MONITORING REQUIREMENTS

- 8.1 Continuous visual inspections by an onsite technician shall be maintained on the flow indication control and flow rate of the dispensing unit.
- 8.2 Continual visual inspection shall be maintained of the temperature of the chemicals.
- 8.3 Foam reaction time shall be taken at least every 4 hours during actual production time and reported as follows:
 - 8.3.1 Gel time _____ minutes.
 - 8.3.2 Tack free time _____ minutes.

Appendix Sheet A8

8.4 Liquid and foamed samples will be taken and retained as required.

8.5 Total through-put will be determined and recorded daily.

Allegations -

184-187

ALLEGATION DATA FORM

Instructions on reverse side

U.S. NUCLEAR REGULATORY COMMISSION

RECEIVING OFFICE

(Name)

Diablo Canyon 1/2

Docket Number (if applicable)

050 00275

050 00323

(If more than 3, or if generic, write GENERIC)

2. Functional Area(s) Involved:

(Check appropriate box(es))

☐ operations
☒ construction
☐ safeguards
☐ other (Specify) _____

onsite health and safety
offsite health and safety
emergency preparedness

3. Description:

(Limit to 100 characters)

improper installation of
fire stop and sealant
ALLEGATIONS 184-187

4. Source of Allegation:

(Check appropriate box)

☒ contractor employee
☐ licensee employee
☐ NRC employee
☐ organization (Specify) _____
☐ other (Specify) _____

security guard
news media
private citizen

5. Date Allegation Received:

MM DD YY
02 01 84

6. Name of Individual Receiving Allegation:

(First two initials and last name)

D. P. Netley & A. D. Johnson

7. Office:

RES2
RV

ACTION OFFICE

8. Action Office Contact:

(First two initials and last name)

D. Kirsch

9. FTS Telephone Number:

943-3723

10. Status:

(Check one)

☒ Open, if followup actions are pending or in progress
☐ Closed, if followup actions are completed

11.1 Document Nos. _____

11. Date Closed:

MM DD YY

12. Remarks:

(Limit to 50 characters)

12.1 Man-hours/Date

13. Allegation Number:

FOIA-24-064

Office

Year

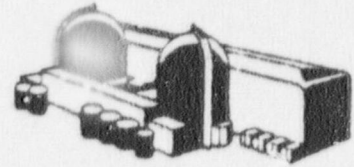
Number

F.1

F.1

INTEROFFICE MEMORANDUM

Diablo Canyon Project



PACIFIC GAS AND ELECTRIC COMPANY
BECHTEL POWER CORPORATION

To D. A. ROCKWELL

Date February 2, 1984

From R. G. McInerney

File No

Of Purchasing

Subject Bisco - Pipe Penetrations
Contract No. 226P25683

At Diablo Canyon Extension

3113

On February 2, 1984, Clay Brown of Bisco phone number (312) 298-1200 called in regards to pipe penetrations and explained the following:

Mentioned that Ken Dukes of Bechtel asked their Mr. Sims to leave the jobsite on 02-01-84 and if not he would ask security to escort Mr. Sims from the site.

Mentioned that Bechtel was not co-operative and that some of the pipe penetrations existing were not put in properly.

Mentioned that his Q.A. supervisors were told not to report any problems even if they dealt with 10CFR21 requirements and to consider the fact that it was reported to Bechtel enough.

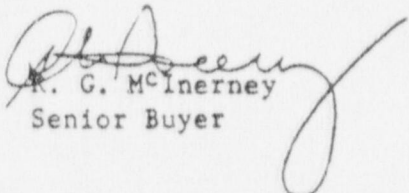
Mentioned that the PG&E Fire Marshall requested information on pipe penetrations and that Mr. Sims was told not to furnish the information.

Mentioned that the Silicone Foam installed by Plant Thorpe was incorrect and discussions with the Plant Thorpe Foam Installer revealed that he had no previous training with installing this material.

Mentioned that the Silicone Foam used has to be mixed properly or it will give off excess hydrogen while curing. Therefore, trained people should install this material.

Mentioned that Bechtel was trying to convince Bisco employees to go to work for them. Bisco employees wrote reports to the Home Office about such instances.

Mentioned that Frank Germano was notified of the above and that Bisco would write a report to him.


R. G. McInerney
Senior Buyer

F-2
FO

SILICONE FOAM TEST REPORT

UNIT ONE

Part A Lot No. EX123485~~6-99~~ FCO-99Part B Lot No. EX123563Scale No. 10064 Cal Due Date 6/14/84

REQUIREMENTS		ACPT/REQ	REQUIREMENTS	ACPT/REQ
Snap Time	4.3.1	ACPT		
Density	4.3.2	ACPT	24.0 lbs/FT ³ *	
Color	4.3.3	ACPT		
Cell Structure	4.3.4	ACPT		

TAG #	DESCRIPTION	CORRECTIVE ACTION	ACCEPT & DATE

REMARKS: * EXCEEDS REQUIREMENT ACCEPT AS IS
PER. D.A. ROCKWELL

TESTED BY: R. E. BeachDATE 1/24/84

CA-3 (10/80)

Ref. DCP-2

F-4

FIRE STOP INSPECTION REPORT

UNIT # 1 AREA 0 ELEVATION 140' 3-93 = FCU-90

Fire Stop Location GAPS IN WALLS OF START UP OFFICE

Date & Time Poured 1/22/84 0630-1600 HRS 1/24, 1/25/84 ^{0630-1600 HRS} Tubes Automatic Equipment

REQUIREMENTS	ACPT/REQ	REQUIREMENTS	ACPT/REQ
DAM CONSTRUCTION 4 1.1 4.1.2	ACPT		
SILICONE FOAM INSTALLATION 4.4.6	ACPT		
CELL STRUCTURE (for types only) 4.2.2	ACPT		

TAG #	DESCRIPTION	CORRECTIVE ACTION	ACCEPT & DATE

REMARKS: SAMPLE NO. 63, 65, 66

INSPECTED BY: Robert E. Bean DATE: 1/25/84

F-5

#21C

SILICONE FOAM TEST REPORT

lowes ? Ken Dukies (B)

G-93 # NAPart A Lot No. EQ031789Part B Lot No. EN021011Scale No. 10064 Cal Due Date 6-09-82

REQUIREMENTS		ACPT/REJ	REQUIREMENTS		ACPT/REJ
Snap Time	4.3.1	<i>accept</i>			
Density	4.3.2	<i>accept</i>	14.8 lbs/ft ³		
Color	4.3.3	<i>accept</i>			
Cell Structure	4.3.4	<i>accept</i>			

TAG #	DESCRIPTION	CORRECTIVE ACTION	ACCEPT & DATE

REMARKS: _____

TESTED BY: J. Glanis

DATE

7/10/81

QA-8 (10/80)

Ref. DCP-2

F-6

SILICONE FOAM TEST REPORT

SAMPLE #

Part A Lot No. E9053336

Part B Lot No. 5R063324

Scale No. 10064 Cal Due Date 6/14/83

TEST METHOD	ACPT/REQ	REQUIREMENTS
Snap Time 4.3.1	ACPT	
Density 4.3.2	ACPT	29.0 lbs/FT ³ *
Color 4.3.3	ACPT	
Cell Structure 4.3.4	ACPT	

TEST #	DESCRIPTION	CORRECTIVE ACTION	ACCEPT & DATE

REMARKS: * EXCEEDS REQUIREMENTS ACCEPT AS IS
 PER D.A. ROCKWELL

TESTED BY: Robert E. Beach DATE 10/19/83

SILICONE FOAM TEST REPORT

Part A Lot No. EQ 051853

~~8-23~~ # FCU-79

Part B Lot No. EM021793

E159

Scale No. 10064

Cal Due Date 6-14-84

REQUIREMENTS		ACPT/REJ	REQUIREMENTS	ACPT/REJ
Snap Time	4.3.1	ACPT		
Density	4.3.2	ACPT	15.9 lb/FT ³	
Color	4.3.3	ACPT		
Cell Structure	4.3.4	ACPT		

TAG #	DESCRIPTION	CORRECTIVE ACTION	ACPT/REJ & DATE

REMARKS: _____

TESTED BY: Robert E. Beach

DATE 8/29/83