

EXHIBIT 7 TO  
ATTACHMENT



**Pullman Swindell**

Division of Pullman Incorporated

441 Smithfield Street  
Pittsburgh, Pennsylvania 15222  
(412) 562-7000  
Telex 868 500

Metallurgical Examination  
Cracked Field Weld No. 212  
Feed Water Pipe to Nozzle; Steam Generator 1-2.

Pacific Gas & Electric Co.  
Diablo Canyon Nuclear Project

by

Pullman Power Products Co.  
Williamsport, Pennsylvania

Date: 6/23/77

Prepared by:



R.H. Caughey  
Chief Metallurgist

8404180373 840413  
CF ADOCK 05000275  
P PDR

## INTRODUCTION

On March 17, 1977, during hot functional testing, a water leak was discovered in the butt weld (Field Weld No. 212, line K16-555-16IV) which joined the 16 inch diameter feed water pipe to the No. 4 nozzle on steam generator 1-2. The line pressure and temperature at this time was approximately 90 p.s.i. and 300°F respectively.

Subsequent on site non-destructive testing by both ultrasonic and radiographic means (by both Kellogg and P.G. & E. representatives) led to the conclusion to cut out and totally replace this weld. A satisfactory, acceptable replacement was completed during the period March 19-25, incl. 1977.

A summary of these events are described in Kellogg's report dated April 12, 1977 prepared by J.P. Runyan, Field QA/QC Manager. A copy of this report is attached (Appendix I, pages 11-15)

Incident with this replacement a spool piece was salvaged for subsequent laboratory examination by P.G. & E. It contained a conveniently large portion of the weld deposit and a representative portion of both the nozzle and pipe components. A sketch which describes the dimension of this piece; also the crack path and the extent of the crack relative to the weld deposit is included with the Kellogg report referenced above (Appendix I).

Kellogg, for the purpose of a laboratory examination, requested P.G. & E. to furnish representative specimens cut from this spool piece. Two were received.

The report which follows covers a description of these samples and the results and conclusions determined from this investigation.



## PROCEDURE & RESULTS OBTAINED

### A. History

Pertinent to this investigation was a complete review of the records appertaining to field weld joint No. 212, namely; the weld procedure; welder qualification records, heat treatment; material certifications; nondestructive examination personnel qualification and N.D.E. results. The following information was gleaned from the recorded documents on file with respect to this weld:

#### 1. WELD HISTORY REVIEW

Field weld 212 was fit-up and tack welded on Friday May 18, 1974. On Monday May 21, 1974 the tack welds and insert were removed. A new insert was installed on May 22, 1974. It is not documented as to why the original insert was removed, however, discussions with field inspectors who were on site at the time indicate that surface rust may have occurred over the weekend and the insert was removed to reclean the weld prep and install a new insert prior to consuming the ring.

The root pass was made on May 22, and accepted visually May 23, 1974. Welding proceeded following Q.C. acceptance and was completed on May 24, 1974.

The weld surface was ground and final visual inspection completed on May 28, 1974.

Other than replacing the insert no unusual or out of the ordinary circumstances were recorded.

#### 2. PREHEAT AND POSTHEAT

A review of the heat charts on F.W. 212 indicate that the weld area was preheated to 200°F min. prior to tack welding and subsequent welding.

The weld was preheated on May 22, 23, and 24. The heat was turned off at the end of each shift allowing the weld to cool.



2. PREHEAT AND POSTHEAT (Con't)

Following completion of the weld on May 24, the weld was allowed to cool and no further heating was performed until post weld heat treatment on June 24, 1974.

Preheat and post heat records from other welds of the same type indicate a similar history. NOTE: Other welds reviewed were the remaining three feedwater nozzle to pipe and all four main steam nozzle to pipe and all four main steam nozzle to pipe welds in Unit I and the main steam nozzle to pipe welds in Unit II. The feedwater nozzle to pipe welds are not welded in Unit II.

3. WELDING PROCEDURE AND WELDER PERFORMANCE QUALIFICATION RECORDS

Field Weld 212 was made using weld procedure number 200. The procedure was reviewed to assure compliance with ASME Section IX. No deviations were noted. The results of the procedure qualification tests were evaluated. Included were bend tests, tension tests, and Charpy V Notch tests. All results were acceptable.

Welder performance qualification records were reviewed. The records were in order and the welder was found to be properly qualified. In addition, records of other welds performed by the same welder were reviewed. It was determined that his performance record was good. There was no reason to suspect that welders capability or performance was below standard.

4. MATERIAL CERTIFICATIONS

Material Certifications of the weld material and pipe-side base material was reviewed for compliance with material specifications and job specifications, including supplementary requirements. All were found to be in compliance. The nozzle base material certifications were not available for review by M.W. Kellogg.



5. NONDESTRUCTIVE EXAMINATION PERSONNEL, PROCEDURES AND REPORTS

The original radiographs of F.W. 212 were reviewed. There was an area along with nozzle side of the root with greater density than other areas of the weld. This area is typical of other similar welds. The higher density is caused by the nozzle counterbore which is approximately 1/4" wide. There was no evidence of linear indications in the area where the crack occurred. Review of the radiographs of other similar welds did not show evidence of linear or crack-like indications.

B. Metallurgical Examination

A description of the two (2) specimens received from P.G. & E. follows:

One represented by about 1/2 inch of the circumference contained the full depth, "front" face of the crack as viewed toward the pipe component. An enlarged photograph showing the "front" face is displayed in Fig. 1 Page 8. This surface had been fully protected from post atmosphere affects by the application of a lacquer. The coating was removed for photographing.

The second (also about 1/2 inch of circumference) contained the full cross section of the weld joint. It had apparently been removed from a location where cracking had not occurred. A photograph of this sample is not included. It will be discussed with relation to microscopic examinations which were conducted on both specimens.

Photomicrographs of both specimens are displayed in Fig. 2 and 3\* respectively. Both represent the existing metallic structure in the locus of the weld root on the nozzle side of the weldment.

Noteable in Fig. 1, or the "front" face of the crack cross section is the distinct, variously "shaded" areas. There appears to be four in number as illustrated in the accompanying sketch.

\* Figure 2, Page 9  
Figure 3, Page 10

## DISCUSSION

Fractured or cracked areas showing these distinctions are typically associated with fatigue failures caused by the imposition of cyclic stress.

From this photograph the clear indication is that crack initiation took place in the root of the weld in the forged nozzle and ultimately propagated to failure through the weld deposit in at least 3 stages as shown in the sketch. (The cycling involved could have resulted either from multiple hydro-testing or from cyclic exposure during hot functional testing. These facts were not contained in the reported history cited above).

In such cases the causal phenomenon is usually a pre-existing discontinuity which may be either an inherent metallurgical plane of weakness or a physical crack like defect.

In the photograph of the fractured surfaces (Fig. 1) the first distinct area is the root of the weld joint. Close visual examination by macroscopic means showed sporadic small areas (light areas in the photograph) which were relatively bright or "shined".

Fig. 2 is a photomicrograph of the metallic structure which was found to exist in one of these areas. The indication is that these are associated with remanent, weld bevel "land" material of the forged nozzle component. The suggestion is that, crack initiation stemmed from this locus; also that the initiating defects were localized, incipient root cracks through the land area.

What is not clear from this examination is the cause for the defects. In the history of the field fabrication of this particular weld (cited above) the fact that repetitive preheating and cooling was permitted to take place on four separate occasions before the weld was completed, could be one factor. Thereby inordinately high thermal stresses could have resulted in incipient cracks.



### DISCUSSION (Con't)

Another contributing factor under these circumstances (which cannot be overlooked) could be the relative hardenability of the forged nozzle material the reported composition of which was a nickel, molybdenum bearing steel or A.S.T.M. A508-CL2. This is an air hardening composition. It is possible due to the noted in attention especially to cooling affects, following the root pass welding, that, air hardened, crack sensitive microstructures could have been effected and sporadic cracks on cooling promoted in the initial land area. (Micro-structure affects in the specimens examined would, of course, be obscured by the subsequent stress-relief heat treatment.)

Understanding this weld (NO. 212) was one which was completed under restrained conditions (or as a closure weld) the possible circumstances i.e., in attention to preheating and cooling and metallurgical transformations, would augment the cracking tendencies.

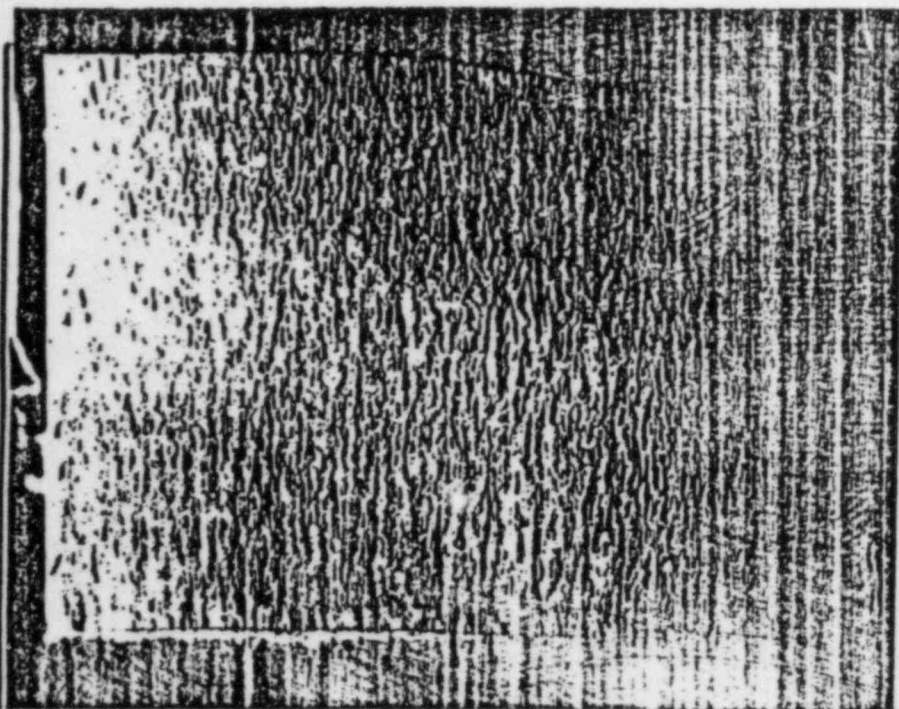
Fig. 3 or the photomicrograph of the uncracked weld joint (localized at the root weld in nozzle forging) shows the normally expected microstructure; good penetration; and no evidence for lack of fusion or cracking. Certain evidence of small cracks are shown to exist in the I.D. surface of the forging. But there is no reason to believe these or like defects could have contributed to ultimate failure, once the weld was completed and stress relieved.



### CONCLUSIONS

1. The crack failure in the FW212 resulted from crack like defects which apparently existed in the weld bevel land.
2. The cause for the crack defects is not clear. They are believed, however, to have resulted from the welding process and probably portend the affects of repetitive preheats and cooling applied before welding was completed. Imposition of high thermal stress, especially in the early stages of welding, is a plausible explanation.
3. Ultimate failure through the weld deposit was due to a cyclic fatigue stress phenomenon, which it is suggested was the consequence of repetitive loading due either to preliminary hydrotesting or inherent in the hot functional testing program.
4. The fact that cracking was only discovered during the hot functional testing, and not evident from preliminary in-process inspections i.e., ultrasonic and radiography (probably due to the inherent insensitivity of these procedures to indicate small incipient cracking) the recommendation is hereby made that all like welds should be reinspected upon the completion of functional testing and before service in order to discover any evidence of crack propagation or enlargement; not withstanding the fact that in process documents failed to disclose the possibility of similar incidents.



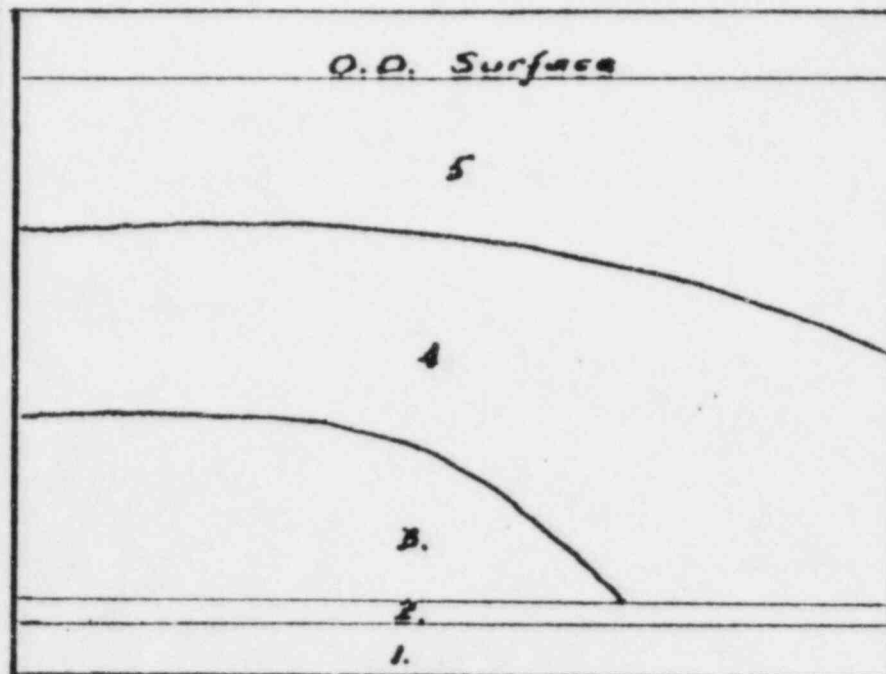


As Received

5X

Photograph

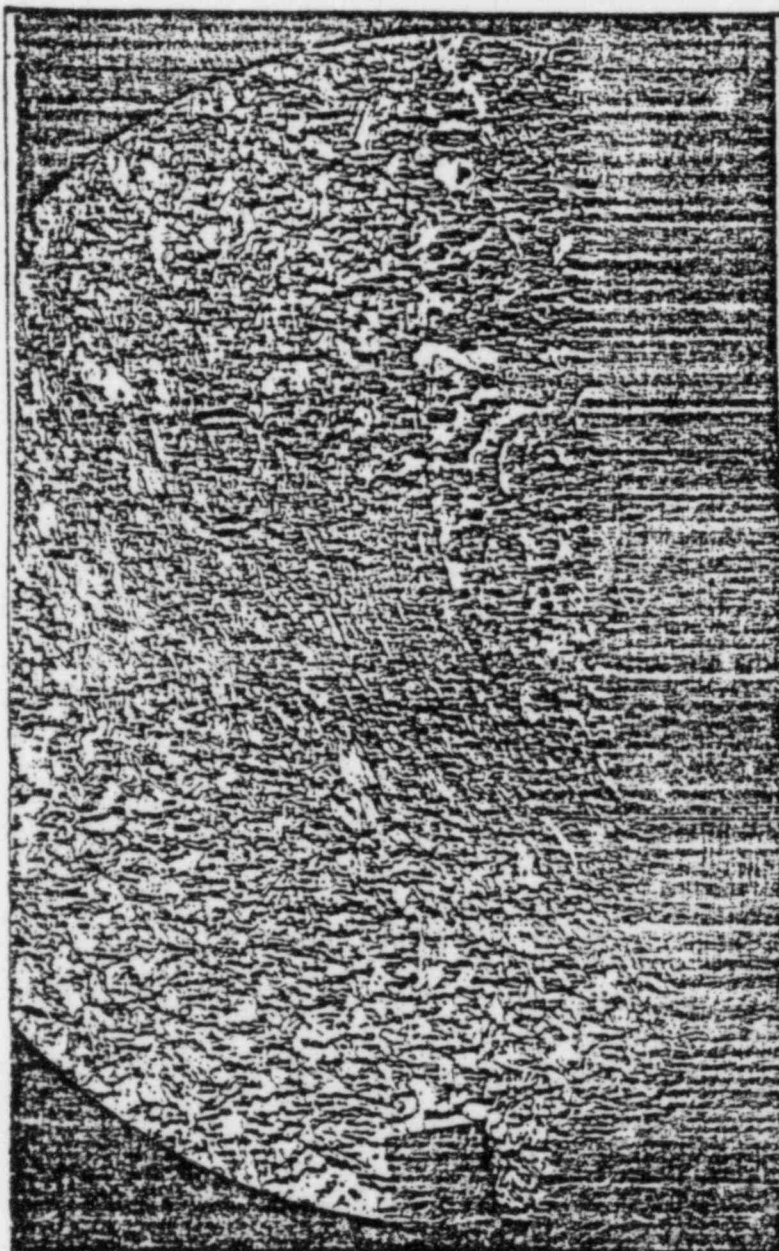
Crack "Front" Face; Viewed Toward  
Pipe Component.



LEGEND

1. K-insert, weld reinforcement.
2. Remanent weld bevel land; probable crack initiation region. Refer to photomicrograph, Fig. 2.
3. 2nd-crack stage.
4. 3rd-crack stage.
5. Final stage, thru wall penetration.





- A. Remanent weld  
bevel land in  
forged nozzle.
- B. K-insert, weld  
I.D. Reinforce-  
ment.

4% nital etch

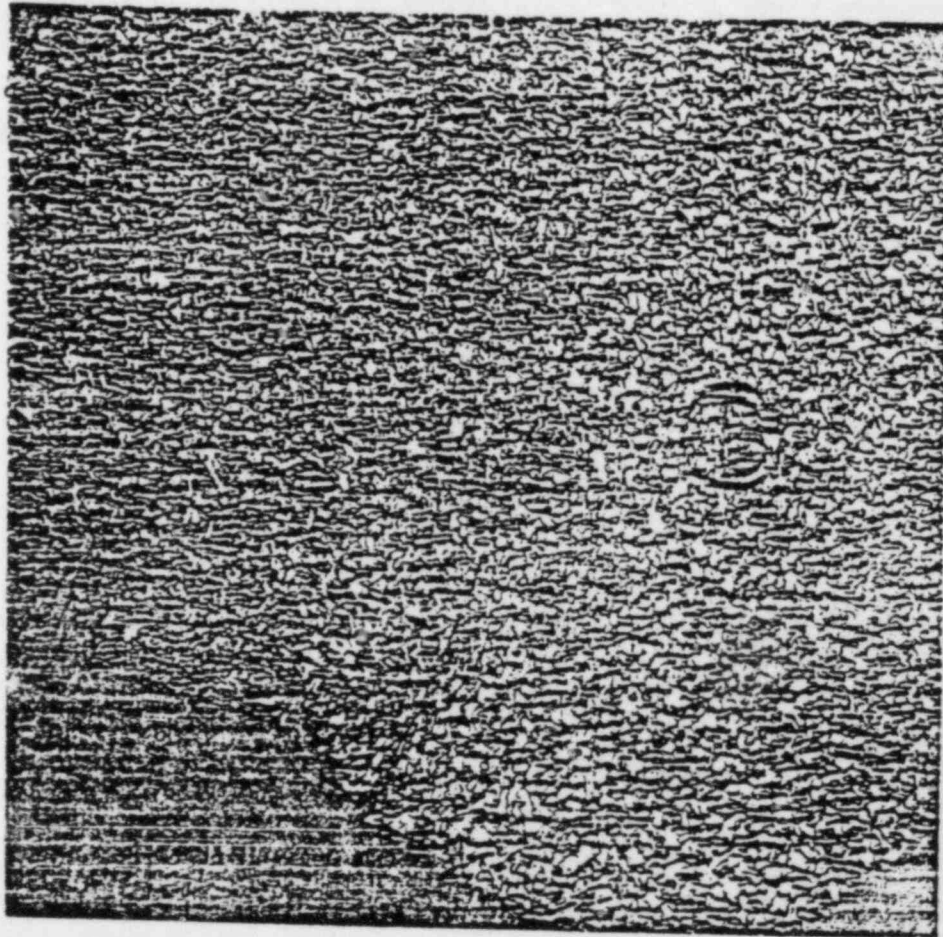
250X

Photomicrograph  
Crack Evidence in Initial Weld Bevel Land



**Pullman Swindell**  
Division of Pullman Incorporated

## APPENDIX I



2% Nital Etch

100X

A. Nozzle Forging

B. K-insert root weld and  
I.D. Reinforcement

Photomicrograph; Root Weld, Nozzle  
Forging Component

Fig. 3

DIABLO CANYON NUCLEAR PROJECT

JOB # 7177

SPEC # 8711

QUALITY ASSURANCE REPORT

OF

Crack in Steam Generator Feed  
Nozzle to pipe weld  
(Generator No. 1-2)

THE M.W. KELLOGG CO.  
Avila Beach, Ca.

PREPARED BY

J. P. Runyan  
J. P. RUNYAN  
Field Q.A./Q.C. Manager

DATE

April 12, 1977

QUALITY ASSURANCE REPORT  
OF  
CRACK IN STEAM GENERATOR FEEDWATER NOZZLE  
TO PIPE WELD (GENERATOR NO. 1-2)

PURPOSE

To document events from the time of discovery of the leak until the completion of the repair.

SCOPE

This report covers the on site findings, the review of documentation including preheat and postheat charts, radiographs from the defective weld, the subsequent procedures for removing the defective area and performing the repair.

FINDINGS

On Thursday, March 17, 1977 a leak was observed in field weld 212, line K16-333, by P.G. & E. We were advised of the leak on that date.

The weld in question is where the 15" feedwater pipe ties into nozzle #4 on Steam Generator 1-2.

Visual observation revealed a weep type leak which occasionally sprayed a fine stream of water. When observed with a 10X magnifying glass there appeared to be a small intermittent linear indication approximately 3/8" in length in the center of the weld running around the pipe. Magnetic particle examination of the area with a D.C. converted yoke did not show evidence of a linear defect.

P.G. & E. requested that we grind the area. As grinding proceeded, the indication opened to reveal a linear defect approximately 2" long when the weld crown was flush with the pipe surface. At this point the grinding was stopped. We were requested to perform an Ultrasonic examination to determine the extent of the indication. The pipe temperature was approximately 180° F which made it impossible to perform U.T. with the standard transducers on site.

We were then instructed to "hold" until P.G. & E. Engineering Research arrived with their U.T. equipment and high temperature transducers. The weld was radiographed at this time. The radiograph revealed evidence of a linear indication which appeared to be approximately 6" in length.

On Friday, March 18, 1977 P.G. & E. Engineering Research arrived and performed Ultrasonic examination of the weld. They reported that there was a crack which appeared to extend approximately 2/3 of the distance around the weld. Based on these findings it was determined that the weld would be cut out and replaced.



## WELD REMOVAL

The weld was cut by grinding approximately 1/2" from the center line on the nozzle side and at F.W. 503 on the pipe side. The end of the pipe was then cut to remove a ring which included most of the weld and approximately 4" of pipe.

The piece was examined visually and by liquid penetrant on the O.D. and I.D. and a sketch made to reflect the observations. (Sketch Attached)

The piece was shipped to P.G. & E. research lab on March 20 for analysis.

## REPAIR

A piece of 16" pipe was removed from stores to replace the piece which was cut out. The pipe end preps, gamma hole and vent were machined in the P.G. & E. machine shop on March 19, 1977. The nozzle end prep at F.W. 212 and pipe end at F.W. 503 were ground in place on March 20. A liquid Penetrant examination was performed at that time to assure complete removal of any indications.

The new piece was moved into place and fit up on March 20. Preheat was applied prior to tack-up, (Ref. Chart # 547). After the fit up was approved by M.W. Kellogg Q.C. both roots were welded. Magnetic particle inspection was performed. Following magnetic particle acceptance two additional passes were welded in each weld.

Radiography was performed on March 21, 1977. The radiographs of F.W. 503 pipe to pipe were acceptable. F.W. 212, pipe to nozzle, had excessive porosity at the window closures. These areas were ground, rewelded and re-radiographed. One area had excessive porosity, the other had a linear indication approximately 1/2" long and an area which appeared to be suck back.

At this time, March 21, 1977, P.G. & E. Q.A. placed a "hold" on all work until their Engineering could review the total program and process appropriate paperwork. "This hold was not because of the difficulty in welding the window closures".

No work was performed on March 22, 1977.

On March 23, 1977 an on site meeting was held to review findings, work to date, and procedures for completion of the repair. Attending the meeting were representatives from P.G. & E. Engineering, Q.A., General Construction, Division, Westinghouse, M.W. Kellogg site Manager, Corporate Q.A. Manager, and the writer.

- A. It was determined that the procedure as outlined by D.R. 3366 was acceptable except that the preheat would be raised to 300° Min. for completion of the welding.
- B. The problem of making an acceptable closure weld was discussed. It was determined that the positive pressure maintained in the system was too high and that water remaining in the generator caused vapor to be carried out the window openings.

C. P.G. & E. Division agreed to drain the generator and reduce the purge pressure until the closure welds could be made.

On March 24, 1977 the defective areas at the closures were ground out and Magnetic particle performed to assure complete removal. No welding was performed since P.G. & E. had not removed the Hold. Preheat was being maintained through the "hold" period.

On March 25, 1977 the hold was released. The windows were closed and radiograph made. Both areas were acceptable and welding continued. The weld was completed on the afternoon of the 25th. Radiographs were shot in the hot as welded condition. No rejectable indications were noted. Post weld heat treatment was then performed.

On March 26, 1977 following post weld heat treatment, the weld was ground, re-radiographed, liquid penetrant inspected and ultrasonically examined. No rejectable indications were noted. The vent line and gamma plug were completed, inspected and the system turned over to division for resumption of testing.

#### SUBSEQUENT INVESTIGATION

Because of the unknown origin of the crack it was determined that other welds of the same type and welded using the same procedure should be reviewed to determine if the defect could be a generic nature.

Each of the remaining three feedwater nozzle welds and the four Main Steam nozzle welds were ultrasonically examined. The original radiographs were reviewed and the feedwater nozzle welds were re-radiographed. There was no evidence of like indications in any of the welds and no evidence of change in any of the noted, acceptable, indications since the original inspections.

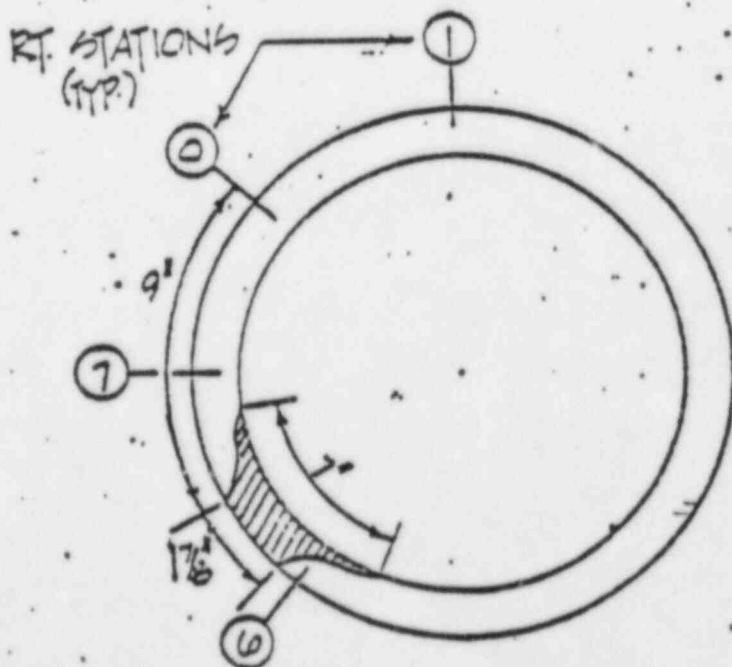
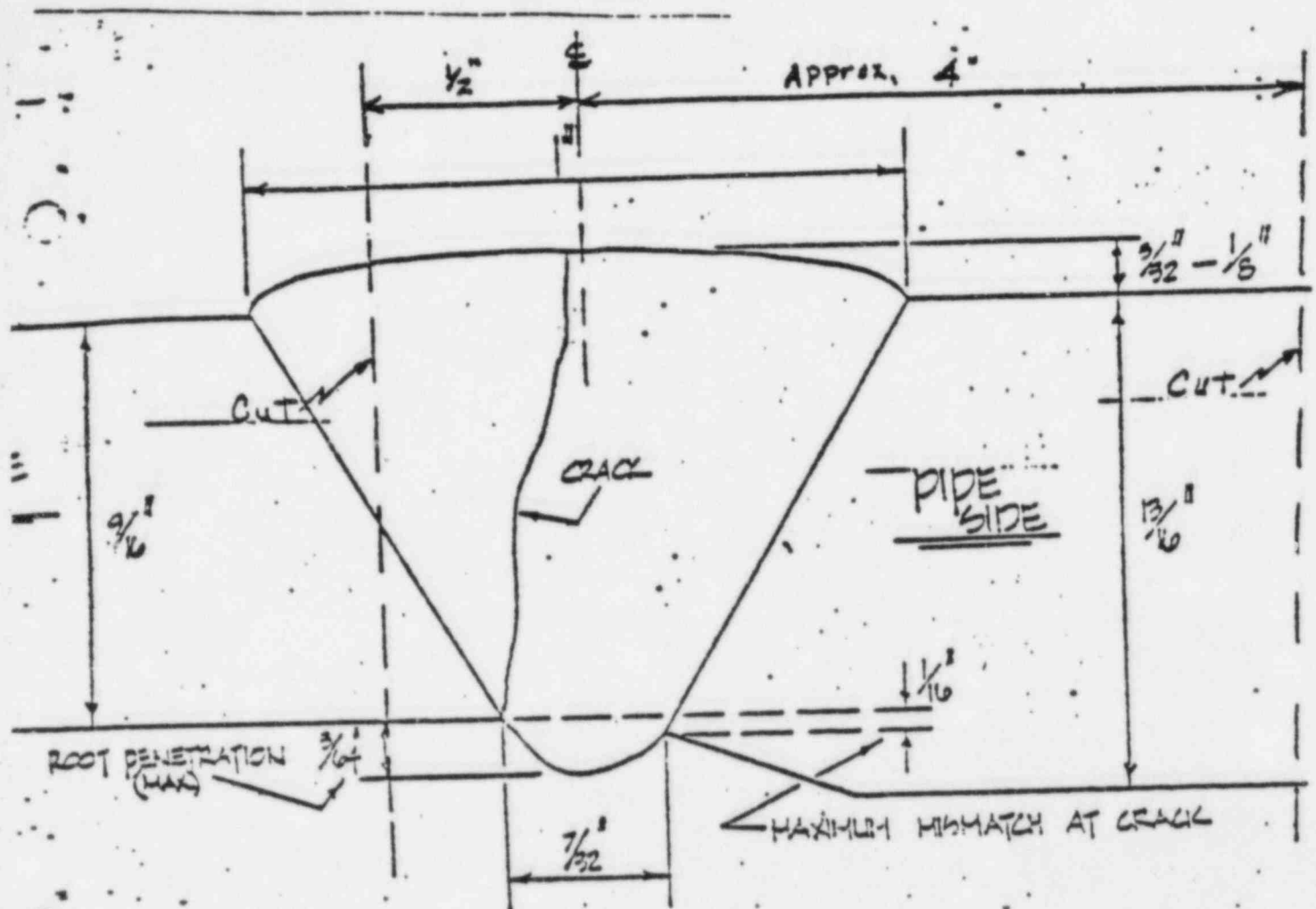
There was, however, an indication noted in F.W. 197 on generator 1-1. The indication was present on the original radiographs but had not been noted on the radiographs report. A second set of radiographs were on file for F.W. 197. This set also exhibited the same indication, however, the radiographic report did reflect the condition as being a drop thru. The indication had apparently been evaluated and determined acceptable at the time.

Because of the problem with F.W. 212 it was determined that any questionable situation should be resolved. It was therefore determined that the drop thru should be removed. A D.R. was initiated and the repair was made. The indication was removed by grinding. No welding was required. (See D.R. 3370 Attached)

#### SUMMARY

To date the metallurgical analysis has not been completed of the crack sample. We had requested, from P.G. & E., a piece of the defective material for our own analysis. This was received on Thursday, April 7, 1977 and forwarded to E. F. Gerwin in Williamsport.

It is my belief that the crack was peculiar to F.W. 212 only and not of a generic nature. Therefore, at this time we are assuming that no further repair will be required and that when the disposition of D.R. 3370 is completed the subject will be closed.



NOTE:

1. WALL THICKNESS MEASR. ARE APPROXIMATE
2. REF. TO DR. 3366 REV A
3. STEAM GENERATOR 1-2  
FW. #212  
NO. 500140  
LINE # KU-555-10 II

DR 3366 Rev I  
ATTACHMENT # 2

EXHIBIT 8 TO  
ATTACHMENT I

PULLMAN POWER PRODUCTS

EVALUATION OF DISCREPANCY REPORT IN RELATION  
TO REQUIREMENTS OF 10CFR PART 21

D.R. # 3453 Rev1, to which this page is attached and  
become a part of, is not, may be ) considered to be reportable  
to the NRC under the requirements of 10CFR Part 21.

PULLMAN POWER PRODUCTS

by [Signature]

Pacific Gas & Electric Company ( does does not ) consider this  
discrepancy reportable and ( has reported, will not report ) the  
above discrepancy.

This form returned to Pullman Power Products on 9/17/77  
DATE

PACIFIC GAS & ELECTRIC CO.

by R.D. Tyler

PULLMAN POWER PRODUCTS

EVALUATION OF DISCREPANCY REPORT IN RELATION  
TO REQUIREMENTS OF 10CFR PART 21

D.R. # 3453, to which this page is attached and  
become a part of, is not, may be ) considered to be reportable  
to the NRC under the requirements of 10CFR Part 21.

PULLMAN POWER PRODUCTS

by *[Signature]*

Pacific Gas & Electric Company ( does, does not ) consider this  
discrepancy reportable and ( has reported, will not report ) the  
above discrepancy.

This form returned to Pullman Power Products on 8/29/77.  
DATE

PACIFIC GAS & ELECTRIC CO.

by *R. D. Etzler*



# THE M.W. KELLOGG COMPANY

A DIVISION OF PULLMAN INCORPORATED

Page 1 of 3

D.R. NO. 7457 Rev. 1 Rev. 2

ISO. NO. 500146 Sh. 4 of 5

UNIT NO. 1

CODE NO. N/A

## DISCREPANCY REPORT

CUSTOMER: Pacific Gas & Electric SPEC. NO: 8711 DATE: 8-26-77  
PROJECT: Diablo Canyon JOB NO.: 7177 INSPECTOR: Runyan/Scannell/Guest

DISCREPANT ITEM: Line K16-556-16"; Spool Piece 500; El. 154'-4 1/4"; Area G; Sect. 1

EXPLANATION OF DISCREPANCY: Reference P.G.&E. Drawing 500146, Rev. 9B

Per P.G.&E.'s request, an internal inspection of F.W. 244 on Steam Generator 1-4 Feedwater Nozzle will be performed. The line entry will be made in the following manner, see Recommended Disposition.

FOR INFORMATION ONLY

### RECOMMENDED DISPOSITION:

1. Measure 2" from F.W. 244 center upstream on pipe (Spool Piece 500) circumscribe the pipe using a wrap around, then prick punch the scribe line.
2. Using air-arc, cut the pipe all around maintaining less than a 40° total bevel to within approximately 1/8" from the I.D. (See Sketch #1).
3. Using a thin blade grinder, cut through the center of the bevel, then dress up both bevels (See Sketch #1).
4. Jack pipe away from cut on upstream side per Superintendent's instruction. Install a dam in nozzle beyond F.W. 244 to prevent air from entering Steam Generator.
5. Clean and inspect F.W. 244 internally as directed by P.G.&E. (Con't on Page 2)

Approved By: M.W.K. Field C.A. Mgr. J.P. Runyan Date 8/26/77 Customer R.D. Styler Date 8/29/77

FINAL DISPOSITION: ☒ In Accordance With Above

☒ Other (explanation and approval required)

Work Completed Insp. AD Burke Date: 11-2-77

Work Completed Insp. AD Burke Date: 11-2-77

### EXPLANATION (IF NECESSARY):

Revision 1 - Delete Step 6 in its entirety (access was achieved). Refer to Attachment #1 for results of initial inspection and recommended disposition.  
Revision 2 - See Page 3 of 3 and Attachment #3.

Rev #2 J.P. Runyan Date 9/1/77 - R.D. Styler Date 8-26-77  
Rev #1 J.P. Runyan Date 8/26/77 Customer R.D. Styler Date 8/29/77

STEPS TO PREVENT RECURRENCE Not Applicable

Field C.A. Manager

DISTRIBUTION: ☒ Master C.A. File ☒ Auth. Insp. ☒ Engineering Dept. ☐ Other  
☒ Customer ☐ Receiving ☐ Field Inspector

# THE M.W. KELLOGG COMPANY

A DIVISION OF FULLMAN INCORPORATED

Page 2 of 3

O.R. NO. 3453 Rev. 1 RE  
ISO. NO. 500146 Sht. 4 of  
UNIT NO. 1  
CODE NO. N/A

## DISCREPANCY REPORT

CUSTOMER: Pacific Gas & Electric SPEC. NO: 8711 DATE: 8-26-77  
PROJECT: Diablo Canyon JOB NO.: 7177 INSPECTOR: Runyan/Scannell/Guest

DISCREPANT ITEM: Line K16-556-16"; Spool Piece 500: El. 154'-4 1/2"; Area G: Sect. 1

### RECOMMENDED DISPOSITION: (CON'T)

6. If access to F.W. 244 I.D. cannot be achieved, proceed with alternate instructions (See Sketch #2).
7. Upon completion of inspection, remove dam, grind bevel to facilitate fit-up as needed, clean and fit to ESD-215 and ESD-220.
8. Weld out using F.W. 549 and procedure 4/5.
9. Inspect and NDE to ESD-215 and ESD-206.
10. Add all information to process sheet and isometrics.

FOR INFORMATION ONLY

# THE M.W. KELLOGG COMPANY

A DIVISION OF PULLMAN INCORPORATED

Page 3 of 3.

## DISCREPANCY REPORT

D.R. NO. 3453 REV 2  
ISO. NO. 500146 Shr. 4 of 5  
UNIT NO. 1  
CODE NO. N/A

CUSTOMER: Pacific Gas & Electric SPEC. NO.: 8711 DATE: 8-26-77  
PROJECT: Diablo Canyon JOB NO.: 7177 INSPECTOR: Runyan/Scannell/Guest

DISCREPANT ITEM: Line K16-556-16": 5000 Piece 50D; El. 154'-4 1/2"; Area G; Sect. 1

D.R. 3453, Revision 2

### EXPLANATION OF DISCREPANCY:

During the performance of grinding per D.R. 3453, Revision 1, Step #5, four (4) indications of heavy drop through with roll over were removed along with all of the existing root penetration. Re-inspection revealed a linear indication 11" long on the fusion line to the Feedwater Nozzle. Further grinding, to a maximum depth of .110", removed the linear indication (see Attachment #3).

## FOR INFORMATION ONLY

### COMMENDED DISPOSITION:

Add the following to Step #5 and delete original Steps #7, 8, 9 and 10. Perform the following repair:

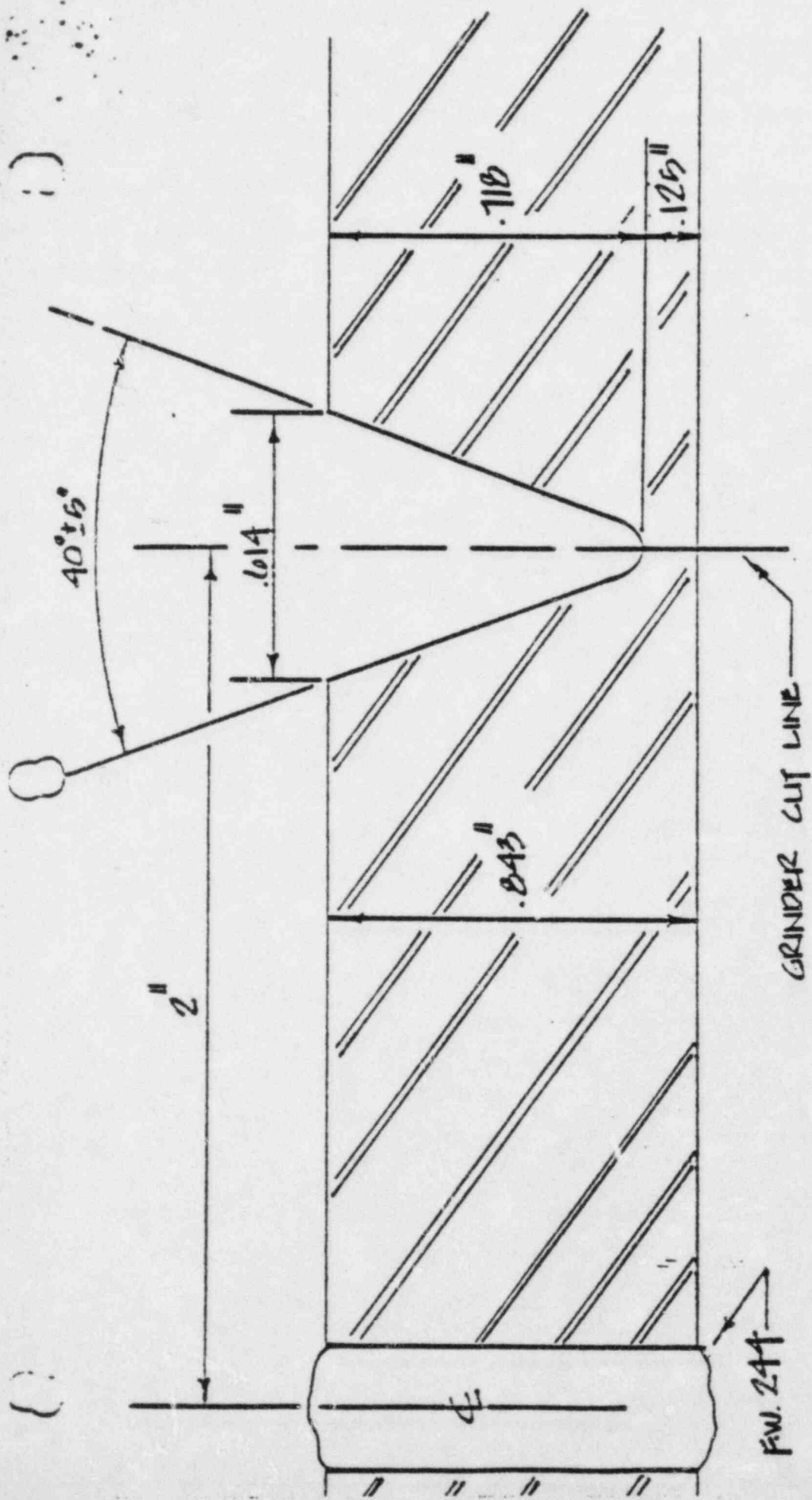
- Grind the bevels to facilitate Fit-Up of F.W. 549.
- M.T. I.D. of F.W. 244 using ESD-247 coil method, and clean grooved root pass at F.W. 244 per ESD-215.
- Remove the dam from the nozzle at F.W. 244.
- Preheat F.W. 244 to a minimum of 250°F; interpass not to exceed 550°F maximum. Maintain this preheat until stress relief begins.
- Weld to procedure 200 (F.W. 244 R1), using E70S2 wire with the GTAW process, to conform to blended configuration of the balance of the weld. I.D. ONLY
- Grind and polish the added weld metal to blend with base metal surfaces.
- Inspect and NDE to ESD-215 and PGSE DER TO TEE/ELB L.P. AT PREHEAT-TEMP  
PURNISH MWK WITH COPY OF PGSE CERT.

NOTE: Proceed with D.R. 3456, and X-ray weld, hot, for information only.

- Upon completion of inspection, remove dams from F.W. 549 pipe side, clean and fit F.W. 549 to ESD-215 and ESD-220.
- Weld out using F.W. 549 with procedure 4/5 A-D.
- Grind F.W. 549 for X-ray.
- Inspect and NDE F.W. 549 to ESD-215 PGSE DER TO TEE/ELB L.P. AT PREHEAT-TEMP  
PURNISH MWK WITH COPY OF PGSE CERT. 9/30/77 11 AM

NOTE: X-ray weld hot for information only.

- Stress relieve at F.W. 244 R1 and F.W. 549 1100°F to 1150°F per ESD-218.
- NDE F.W. 244 R1 and F.W. 549 to ESD-207.
- " " " " to ESD-211 PGSE 9/30/77
- Add information to process sheets.

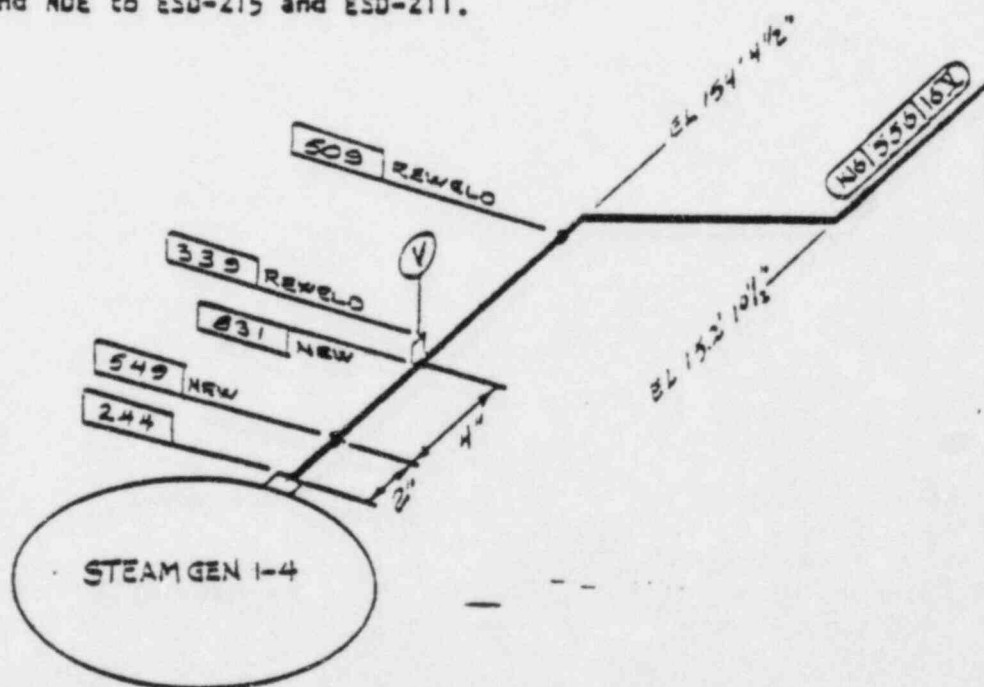


#  
DR-3453  
SKETCH #1

3X ACTUAL SIZE

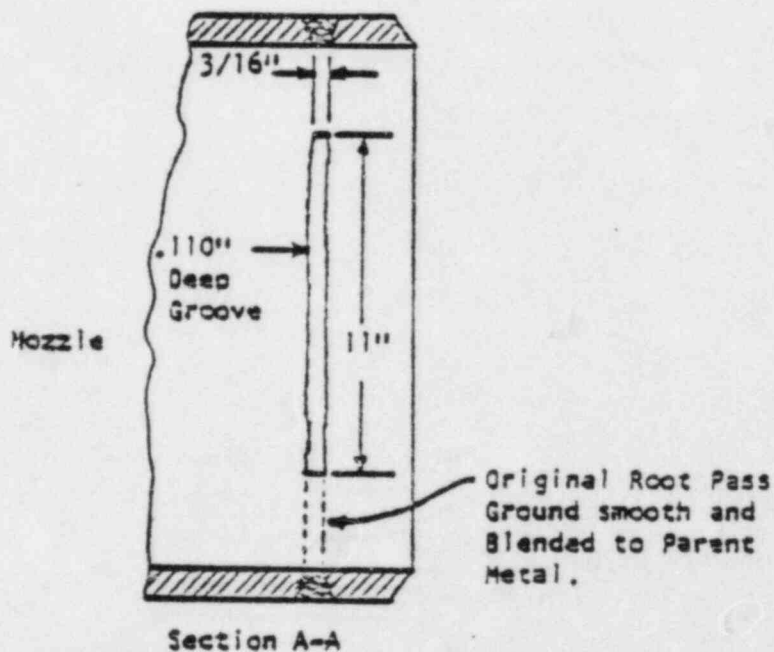
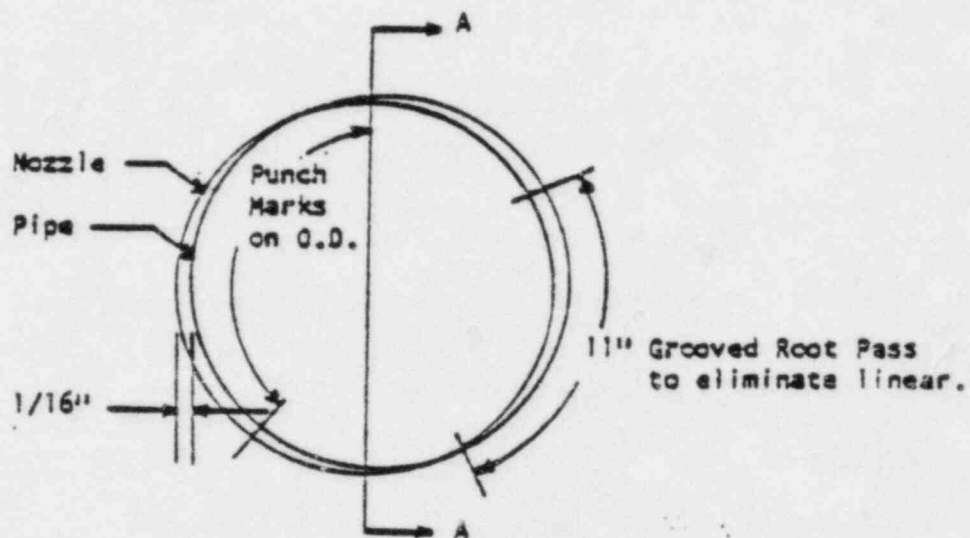
# ALTERNATE INSTRUCTIONS

1. Cut out F.W. 509 using air-arc and taking necessary steps to maintain the ability to bevel the  $45^\circ$  all side of the weld to  $20^\circ \pm 2\frac{1}{2}^\circ$  and a  $3/32"$   $1/16"$  land. Also, cut out F.W. 339 shown on Iso. 3-246.
2. Requisition:  $8\frac{5}{8}"$  of 16" Pipe, Schedule 80 A106 Gr B and a  $3/4"$  3000# S.W. Half Coupling or soc-o-let A105.
3. Install the  $3/4"$  half coupling or soc-o-let four (4) inches from the end of the 16" pipe.
4. Clean and Fit to ESD-215 and ESD-220.
5. Weld out with procedure 92/93 (F.W. 831).
6. Inspect and NDE to ESD-215 and ESD-211.
7. Upon completion of F.W. 244 I.D. inspection and P.G.&E.'s direction, fit-up 16", Schedule 80 pipe and proceed with Step 7 of attached D.R. using F.W. 549 and F.W. 509.
8. Reweld F.W. 339, as shown on Iso. 3-246, maintain original line configuration.
9. Clean and Fit-up to ESD-215 and ESD-220.
10. Weld out with procedure 92/93.
11. Inspect and NDE to ESD-215 and ESD-211.





Findings at F.W. 244



NOTE: Average Wall Thickness = .580" to .600"  
Remaining Wall At Groove = .450"  
Punch Marks On The O.D. = .047" Deep  
(Punch Marks are directly on the fusion line of F.W. 244 to  $1/8''$  inside the fusion line .047" deep.)

INTEROFFICE CORRESPONDENCE

ATTACHMENT #1  
DR-3453 Rev. 1

TO J. P. RILYAN, Q.A./Q.C. MANAGER

DATE AUGUST 31, 1977

FROM D. R. GESKE, NDE SUPERVISOR

SUBJECT LIQUID PENETRANT EXAMINATION, F.W. 244, INSIDE DIAMETER

On August 31, 1977, F.W. 244, Line K16-556, Isometric 1-03-500146, Feedwater piping to Steam Generator 1-4 Nozzle, was liquid penetrant examined on the inside diameter.

The following indications were noted:

1. 2" from top center of nozzle, a small faint transverse linear-nonrelevant due to weld geometry.
2. 7" from top center of nozzle, heavy 1" drop through with roll over.
3. 9" from top center of nozzle, heavy 2" drop through with roll over.
4. 37" from top center of nozzle, heavy  $1\frac{1}{2}$ " drop through with roll over.
5. 39" from top center of nozzle, heavy  $1\frac{1}{2}$ " drop through with wire protrusion.
6. Approximately  $1/16$ " mismatch exists from 7:00 to 9:00 facing the nozzle.

We recommend that the root pass be ground and polished to blend with base metal surfaces. Particular care should be taken to avoid the removal of base material. Then re-examine the I.D. with liquid penetrant, if acceptable, proceed to "Recommended Disposition", Step 7 of D.R. 3453, Revision 1.



Donald R. Geske  
NDE Supervisor

DRG/js

DR 3453

SCHEDULE TO CUT, INSPECT, RESTORE I-C F/W NOZZLE

PLAN: AIR-ARC CUT PIPE 3-2" FROM NOZZLE WELD.

STOP SHORT OF PIPE I.D. MAINTAINING N<sub>2</sub>

PURGE ON 5/6. REMOVE N<sub>2</sub> PURGE PRESSURE.

FINISH CUT OF PIPE WITH THIN GRINDING DISK.

PULL FLOWLINE LINE BACK FROM NOZZLE 3 1/2"

TO 4". INSERT PURGE DAM INTO THE 5/6

NOZZLE TO HOLD POSITIVE PRESSURE ONLY.

(PURGE DAM WILL NOT HOLD PRESSURE)

CONTINUE WORK BY HOLDING LINE AWAY

FROM CUT A MINIMUM OF 3 1/2"

CLEAN I.D. OF NOZZLE WELD WITH SOAP AND

WATER UNTIL CLEAN.

PERFORM P.T.

IF P.T. IS ACCEPTABLE, RESTORE WELD REPAIRS,

ACCOMPLISH FITUP AND MAKE WELD.

ALTERNATE PLAN: IF MINIMUM OF 3 1/2" OPENING

CANNOT BE ACCOMPLISHED IT WILL BE

NECESSARY TO MAKE SECOND CUT AT 45°

ALL, REMOVE 8" "PIIP" AND FOLLOW ABOVE

STEPS.

# TIME REQUIRED:

1. CUT PIPE & PULL LINE @ 25 MM, 3" 2 MEN = 12 HRS
2. INSTALL PUGH DAM & RESTORE NL BLANKET - 24 HRS
3. CLEAN I.D. OF WELD AND PREPARE P.T.
  - 2 MEN = 2 HRS - Q.W. T.T. FOR P.T. - 3 HRS
4. RESTORE WELD PROCS B. FITUP - P.T.W. - 16 HRS
5. COMPLETE WELD - 3 M. - 12 HRS
6. RADIOGRAPH WELD - N.I. SHIPT (NO TIME LOST)
7. STRESS RELIEVE WELD - 1 HRS - 6 HRS

ALTERNATE PLAN 1, 2, 3 SAME AS ABOVE

4. MAKE SECOND CUT AT 4" O.C. - 2 MEN - 3 HRS
5. RESTORE WELD PROCS ON ADDITIONAL WELD -
  - 2 MEN - 16 HRS

6. MAKE SECOND WELD - 3 MEN - 12 HRS

RADIOGRAPHY & S/P CAN BE DONE AT SAME TIME AS ABOVE

BASED ON 40 HR WK - 8 HR DAY

START WORK

8-29-77

PIPE

ST SW MU

11

COMPLETE

9-2-77

ALTERNATE

9-12-77

## PULLMAN POWER PRODUCTS

EXHIBIT 9 TO  
ATTACHMENT IEVALUATION OF DISCREPANCY REPORT IN RELATION  
TO REQUIREMENTS OF 10CFR PART 21

D.R. # 3484, to which this page is attached and  
become a part of ( is not, may be ) considered to be reportable  
to the NRC under the requirements of 10CFR Part 21.

PULLMAN POWER PRODUCTS

by [Signature]

Pacific Gas & Electric Company ( does, does not consider this  
discrepancy reportable and ( has reported, will not report ) the  
above discrepancy.

This form returned to Pullman Power Products on 10-10-77.  
DATE

PACIFIC GAS &amp; ELECTRIC CO.

by R.D. GILLER / JEL



# THE M.W. KELLOGG COMPANY

A DIVISION OF PULLMAN INCORPORATED

Page 1 of 3  
Rev. 2

Q.R. NO. 3484 Rev. 1  
ISO. NO. 500146 Sht. 1 of 5  
UNIT NO. 1  
CODE NO. N/A

## DISCREPANCY REPORT

CUSTOMER: Pacific Gas & Electric SPEC. NO. 8711 DATE: 10-7-77  
PROJECT: Diablo Canyon JOB NO.: 7177 INSPECTOR: Runyan/Scannell/Guest

DISCREPANT ITEM: Line K16-554-16"; Piece #540; El. 154'-5"; Area F; Section 1

### EXPLANATION OF DISCREPANCY:

Per P.G.&E. request, an internal inspection of F.W. 197 on Steam Generator 1-1 is to be performed. The line entry will be made in the manner described below.

- ⚠ Inspection conducted October 11, 1977, required by Step #9 of the Recommended Disposition, revealed conditions requiring rework. (See Attachment #3, Report of Findings.)
- ⚠ Inspection conducted October 13, 1977, required by Attachment #3 revealed further rework is required. (See Attachment #4, Report of Rework).

Attachment #1 (Sketch)

Attachment #2 (Sketch)

- ⚠ Attachment #3 (Report of Findings)
- ⚠ Attachment #4 (Report of Rework)

### RECOMMENDED DISPOSITION:

1. Remove the 2", 3000# coupling at F.W. 827 from the pipe using air-arc and grinder (do not air-arc through). Clean and NDE removal area to ESD-220 and ESD-211 on F.W. 197 side of hole in pipe. Close hole with fire retardant material (Refer to Attachment #1).
2. Circumscribe the pipe using wrap around at the edge of hole in pipe nearest F.W. 197. This should be approximately 1 5/8" from the center of F.W. 197 (Reference Attachment #1).
3. Prick punch the scribe line.
4. Using air-arc, cut the pipe all around and apply a bevel of not more than 30° from O.D. of pipe to within not less than 1/8" of the I.D. of pipe directly below.

Approved By: M.W.K. Field C.A. Manager *[Signature]* Date 10/10/77 Customer *[Signature]* MWR Date 10-10-77 (Cont on Page 2)

FINAL DISPOSITION: ☒ In Accordance With Above

☐ Other (Explanation and approval required)

Work Completed Insp. *[Signature]* Date: 11-2-77

Work Completed Insp. *[Signature]* Date: 11-2-77

### EXPLANATION (IF NECESSARY):

Revision 1 - Adds Attachment #3 (Report of Inspection Findings). P.G.&E. will indicate rework released on Attachment #3 under Recommended Rework. See ⚠ for other changes.

Revision 2 - See page 3 . . . (AND ATT: #4)

M.W.K. Field C.A. Manager *[Signature]* Date 10/10/77 Customer *[Signature]* MWR Date 10-13-77

M.W.K. Field C.A. Manager *[Signature]* Date 10/14/77 Customer *[Signature]* MWR Date 10-17-77

STEPS TO PREVENT RECURRENCE ☒ Not Applicable

Field C.A. Manager *[Signature]*

DISTRIBUTION: ☒ Master C.A. File ☒ Auth. Insp. ☒ Engineering Dept. ☐ Other

# THE M.W. KELLOGG COMPANY

A DIVISION OF PULLMAN INCORPORATED

Page 2 of 3

D.R. NO. 3484 Rev. 1  
ISO. NO. 500146 Sheet 1 of 5  
UNIT NO. 1  
CODE NO. N/A


## DISCREPANCY REPORT

CUSTOMER: Pacific Gas & Electric SPEC. NO. 8711 DATE: 10-7-77  
PROJECT: Diablo Canyon JOB NO.: 7177 INSPECTOR: Runyan/Scannell/Guest

DISCREPANT ITEM: Line 34-16"; Piece #540; El. 154'-5"; Area F; Section 1

### RECOMMENDED DISPOSITION:

scribe line (do not cut through the pipe with air-arc). Using a 1/8" blade, grind through to I.D. of pipe.

5. Locate center of F.W. 500. Using wrap around, circumscribe weld center.
6. Prick punch scribe line.
7. Cut out F.W. 500 using air-arc maintaining a maximum bevel of 30° on ell side to within not less than 1/8" of the I.D. of pipe (do not cut through with air-arc). Using a 1/8" blade, grind through to I.D. of pipe.
8. Install dam in nozzle of Steam Generator 1-1 past F.W. 197.
9. Clean and inspect F.W. 197 internally as directed by P.G.&E. Report findings of inspection before proceeding with Step #10.  Proceed with rework requirements as directed by P.G.&E. on Attachment #3.
10. Upon completion of inspection, remove dam grind bevels to facilitate fit-up as needed. *AFTER GRINDING IS COMPLETE. JKH*
11. Install new pup, fit-up and inspect to ESD-215 and ESD-220.
12. Weld out F.W. 551 and F.W. 500, as shown on Attachment #2, to process 4/5A0.
13. Inspect and NDE to ESD-215 and ESD-206.
14. Upon acceptance of R.T.'s of F.W. 551 and F.W. 500, clean and fit-up gamma plug, as shown on Attachment #2, to ESD-215 and ESD-220.
15. Weld out to process 7/8 using F.W. 832.
16. Inspect and NDE to ESD-215 and ESD-211.
17. Post weld heat treat to ESD-218 (F.W.'s 551, 500 and 832).
18. Add all information to isometric and process sheets.

Field Q.A. Manager *JKH*

DISTRIBUTION: ☒ Master Q.A. File ☒ Auth. Insp. ☒ Engineering Dept. ☐ Other  
☒ Customer ☐ Receiving ☐ Field Inspector I

# THE M.W. KELLOGG COMPANY

A DIVISION OF PULLMAN INCORPORATED

## DISCREPANCY REPORT

2463 of 3  
D.R. NO. 3484 REV. 2  
ISO. NO. 500146, Sht. 1 of 5  
UNIT NO. 1  
CODE NO. N/A

CUSTOMER: Pacific Gas & Electric SPEC. NO: 8711 DATE: 10-14-77  
PROJECT: Diablo Canyon JOB NO.: 7177 INSPECTOR: Ryan/Scannell, Quest

DISCREPANT ITEM: NOTED

### REVISION 2:

Adds Attachment #4 (Report of Rework). P. G. & E. will indicate rework released on Attachment #4 under Recommended Rework, adds rework to Recommended Disposition as Step 9a.

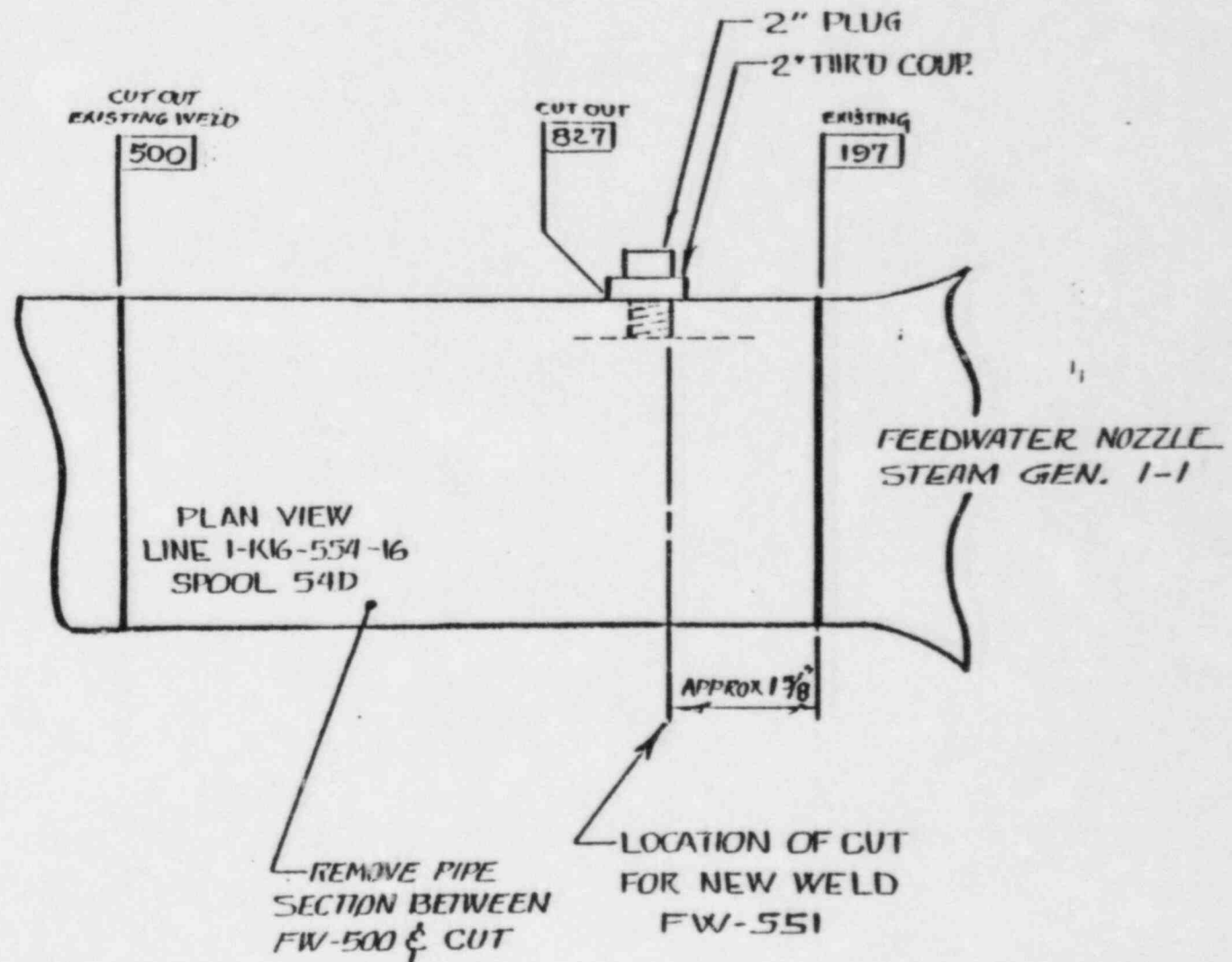
### RECOMMENDED DISPOSITION:

- 5 3/8" Linear Removal.
  - A. Grind to remove the 5 3/8" linear.
  - B. P.T. to ESD 211 to insure complete removal.
- Non-metallic Inclusion Removal.
  - A. Blend base material to eliminate the two non-metallic inclusions.
  - B. U.T. to ESD 244 to determine wall thickness remaining.
- Pipe-side Rough Grind & Machining Lines.
  - A. Polish the pipe-side counter-bore to eliminate rough grind edges and machining lines.
  - B. P.T. to ESD 211 to insure complete removal.
  - C. Remove dam prior to Step 4.
- Preheat to 250° min. 550° max. interpass; maintain pre-heat until stress relief.
- Weld the 5 3/8" Grindout to original I.D. configuration using Procedure 200.
- Grind 5 3/8" repair for R.T. while maintaining pre-heat.
- M.T. to ESD 207 or Hot P.T. by P. G. & E. D.E.R. *207*
- P. G. & E. to indicate N.D.E. to be performed (Step 7).
- Weld area of inclusion removal, if needed, to original counter-bore configuration, using Procedure 4/5 AO.
- Grind inclusion repair, if Step 3 is used, for R.T. while maintaining pre-heat.
- Perform Hot R.T. of repair area per ESD 207.
- Proceed with Step 10 of the original D.R. 3484 Recommended Disposition.

Field Q.A. Manager *[Signature]*

DISTRIBUTION: ☒ Master Q.A. File ☒ Auth. Insp. ☒ Engineering Dept. ☐ Other  
☒ Customer ☐ Receiving ☐ Field Inspector ( )

ATTACH SKETCH IF NECESSARY



NEW PUP BETWEEN  
FW-500 & FW-551  
WITH GAMMA PLUG  
ON SIDE OF PIPE.

REWELD  
[500]

NEW  
[551]

EASTING  
[197]

APPROX 1 7/8"

PLAN VIEW  
LINE 1-KK-554-16  
SPOOL 54D (MODIFIED)

375"  
REF.

GAMMA  
PLUG  
[832]

NOTE: PLUG CAN BE  
LOCATED ON EITHER  
SIDE ON PIPE.

FEEDWATER NOZZLE  
STEAM GEN. 1-1



## INTEROFFICE CORRESPONDENCE

TO J. P. RUNYAN, FIELD Q.A./Q.C. MANAGER

DATE OCTOBER 12, 1977

FROM D. R. GESKE, N.D.E. SUPERVISOR

SUBJECT LIQUID PENETRANT EXAMINATION, F.W. 197, INSIDE DIAMETER

On October 11, 1977, the inside diameter of F.W. 197 was Liquid Penetrant examined per Step #9 of D.R. 3484. The following indications were noted. All dimensions refer to a clock-wise direction beginning at the top (12 o'clock) of the nozzle.

1. 8" clock-wise: 15" of mis-match with root pass roll over on the nozzle side.
2. 8" clock-wise: 1 3/4" of heavy roll over on the nozzle side and slight roll over on the pipe side. (Previous rework in this area removed drop-through with voids.)
3. 16" clock-wise: 1" of undercut on the pipe side of the root pass.
4. 18" clock-wise: 1" of undercut on the pipe side of the root pass.
5. 41" clock-wise: 3/16" crack-like linear on the land surface of the counter-bore 3/16" from the root edge, pipe-side.
6. 41 1/2" clock-wise: 1/8" crack-like linear on the land surface of the counter-bore 5/32" from the root edge, pipe-side.
7. 41" clock-wise: 1/16" lack of penetration at the window close area.
8. 46 1/2" clock-wise: 1 1/2" of heavy drop-through with root pass roll over on both sides of the root.
9. The entire pipe-side counter-bore has been rough ground to facilitate fit-up.

### RECOMMENDED REWORK

1. Liquid Penetrant examine to redevelop the noted condition.
2. Grind and polish the root pass. Flush with the base metal from 8" clock-wise for 15", 41" clock-wise at window close, and 46 1/2" clock-wise for 1 1/2". (Indications 1, 2, 3, 4, 7 and 8.)

ATTACHMENT #3

TO: J. P. RUNYAN, Q.A./Q.C. MANAGER

DATE OCTOBER 12, 1977

SUBJECT: LIQUID PENETRANT EXAMINATION, F.W. 197, INSIDE DIAMETER

PAGE NO. 2

3. Grind and polish the land surface to remove the two (2) linear indications in the land area of the counter-bore. (Indications 5 and 6.) *DO NOT REMOVE MORE THAN .010" OF BASE METAL.*

NOTE: If the crack-like linears join and grow, versus reduce in size and remove, suspend grinding and report the findings.

4. Polish the entire pipe-side counter-bore to eliminate rough grind edges. DO NOT remove more than .010" of base metal.
5. Liquid Penetrant examine all grind areas to redevelop indications, i.e. remaining undercut (Indications 3 and 4) and lack of penetration at the window close area (Indication 7).
6. Grind and polish to remove the remaining indications.  
*DO NOT REMOVE MORE THAN .010" OF BASE METAL.*  
NOTE: If the indications grow, versus reduce and remove, suspend grinding and report the findings.
7. Determine the remaining wall thickness using ultrasonic thickness measuring methods and report the findings.
8. Upon completion of rework, proceed with Step #10 of D.R. 3484 or revise D.R. 3484 to indicate further required rework.

*Donald R. Geske*

Donald R. Geske  
N.D.E. Supervisor

ORG/js

*OK  
GTC  
11/12/77*

TO: J. P. RUNYAN, Q.A./Q.C. MANAGER

DATE OCTOBER 12, 1977

SUBJECT: LIQUID PENETRANT EXAMINATION, F.W. 197, INSIDE DIAMETER

PAGE NO. 2

3. Grind and polish the land surface to remove the two (2) linear indications in the land area of the counter-bore. (Indications 5 and 6.) ~~DO NOT REMOVE MORE THAN .010" OF BASE METAL.~~  
*REMOVAL OF .010" DID NOT REMOVE LINEAR. CONTINUE GRINDING FOR REMOVAL. DO NOT REMOVE BELOW MINIMUM WALL THICKNESS.*  
NOTE: If the crack-like linears join and grow, versus reduce in size and remove, suspend grinding and report the findings. *1072-7*
4. Polish the entire pipe-side counter-bore to eliminate rough grind edges. DO NOT remove more than .010" of base metal.
5. Liquid Penetrant examine all grind areas to redevelop indications, i.e. remaining undercut (Indications 3 and 4) and lack of penetration at the window close area (Indication 7).
6. Grind and polish to remove the remaining indications.  
~~DO NOT REMOVE MORE THAN .010" OF BASE METAL.~~  
NOTE: If the indications grow, versus reduce and remove, suspend grinding and report the findings.
7. Determine the remaining wall thickness using ultrasonic thickness measuring methods and report the findings.
8. Upon completion of rework, proceed with Step #10 of D.R. 3484 or revise D.R. 3484 to indicate further required rework.

ORG/js

*modified 7/77*  
*OK*  
*9/12/77*  
Donald R. Geske  
Donald R. Geske  
N.D.E. Supervisor

## INTEROFFICE CORRESPONDENCE

TO J. P. Runyan, Q.A./Q.C. Manager

DATE October 14, 1977

FROM D. R. Geska, N.D.E. Supervisor

SUBJECT Result of Rework, F.W. 197 Inside Diameter

On October 12, 1977, the inside diameter of F.W. 197, Steam Generator 1-1 was reworked per Attachment #3 to D.R. 3484. At the end of shift, the rework had not been completed. The following indications remained.

1. 3" clock-wise from top center of the nozzle, 10" of root pass edge fusion line with slight weld metal remaining above the metal.
2. 41" clock-wise from top center of the nozzle, 3/16" on the pipe-side counter-bore. The original indication moved 3/32" laterally away from the weld. Tentative interpretation was the open edge of a non-metallic inclusion in the pipe.
3. 41 1/4" clock-wise from top center of the nozzle, 1/8" linear on the pipe side counter-bore. The original indication moved 3/32" laterally away from the weld. Tentative interpretation was the open edge of a non-metallic inclusion in the pipe.

On October 13, 1977, the indications listed above were further reworked. Weld metal was reduced to minimum wall, .566", to eliminate the 10" root pass edge fusion line. In addition, the area of non-metallic inclusion was explored ultrasonically. The following are results of rework.

1. 41" to 41 1/4" clock-wise: two non-metallic inclusions .600" from the O.D. surface, parallel to the surface. The edge of each inclusion was exposed as a result of counter-bore machining. Total surface measures 5/8" x 3/16" with the longest dimension parallel to the weld.
2. 14 1/2" clock-wise: one linear indication 3 3/8" long, in the land surface of the nozzle, 1/16" from the original root pass weld metal. Observation, during weld metal removal and physical measurement, revealed that this indication was hidden by root pass roll over during the first penetrant examination.
3. Pipe side counter-bore surface was not reworked. Rough grind edges and machining lines remain.

ATTACHMENT #4

TO: J. P. Runyan, Q.A./Q.C. Manager

DATE October 14, 1977

SUBJECT: Result of Rework, F.W. 197 Inside Diameter

PAGE NO. 2

Upon reaching minimum wall thickness with indication remaining, rework was suspended and a Q. A. Hold tag applied.

RECOMMENDED REWORK

1. Grind to remove the 5 3/8" linear indication 14 1/2" clock-wise from top center of the nozzle. Re-weld the ground-out to original weldment configuration.
2. Grind to remove the two non-metallic inclusions. Measure remaining wall thickness. Weld out to original wall thickness if required and grind to original configuration of the counter-bore.
3. Grind and polish the pipe-side counter-bore to eliminate rough grind edges and machining lines.
4. GRIND AND POLISH ROOT WELD FLUSH WITH PIPE/NOZZLE I.D. *John* 10-17-77

Donald R. Eske  
Donald R. Eske  
N.D.E. Supervisor

DRG/jf

OK  
DR



## INTEROFFICE CORRESPONDENCE

TO J. P. RUNYAN, FIELD Q.A./Q.C. MANAGER

DATE OCTOBER 19, 1977

FROM D. R. GESKE, N.D.E. SUPERVISOR

SUBJECT REWORK OF F.W. 197, INSIDE DIAMETER

O.R. 3484, dated October 7, 1977, directed entry into line K16-554-16" approximately 1 5/8" on the pipe-side of F.W. 197. Entry was required to facilitate an internal inspection of the piping to nozzle weldment, identified as F.W. 197.

Entry into the line was completed on October 11, 1977, and the initial inspection was conducted using Liquid Penetrant methods per ESD-211. The inspection revealed conditions requiring rework. These conditions were added to the O.R. by means of Revision 1.

On October 12, 1977, P.G.&E. released the recommended rework noted in Revision 1 to O.R. 3484. The rework was released with a modification "Do not remove more than .010" of base metal". Rework actions were begun. Two (2) linear indications in the pipe-side land surface of the counter-bore were not removed with removal of .010" of base material. P.G.&E. further modified Revision 1 to O.R. 3484 on October 12, 1977, by indicating "Removal of .010" did not remove linears. Continue to blend for removal. Do not remove below minimum wall requirements". At the end of shift, the rework had not been completed.

On October 13, 1977, the remaining indications were further reworked. Pipe and weld wall thickness was reduced to minimum wall (.566") and both linears in the pipe-side counter-bore were explored ultrasonically. Results of these actions were added to O.R. 3484 with Revision 2 on October 14, 1977.

Rework was continued on October 17, 1977, based upon O.R. 3484, Revision 2. Further grinding of weld metal removed all of the existing indications except the pipe-side rough grind and machine lines. Wall thickness at the 5 3/8" linear was reduced to .350" with .520" at the non-metallic inclusions. Revision 2 to O.R. 3484 was then modified by P.G.&E. to include "Grind and polish root weld flush with pipe/nozzle I.D." Rework continued until end of shift.

Liquid Penetrant examination was conducted on October 18, 1977, after preliminary grind and polish of root pass removal and pipe-side counter-bore rough grind edges and machining lines. The examination revealed the following conditions:

1. 17" from top center of the nozzle - 4 1/2" x 1/8" area of a fine network of linears on either side of the weld centerline. These two networks were located in the base metal on the face of each counter-bore.

TO: J. P. RUNYAN, FIELD Q.A./Q.C. MANAGER

DATE OCTOBER 19, 1977

SUBJECT: REWORK OF F.W. 197, INSIDE DIAMETER

PAGE NO. 2

2. 31" from top center of the nozzle - 2 1/2" fine linear on either side of the root pass removal area.

Both conditions noted above were reported by telephone. Further rework was stopped pending review by P.G.&E.

The areas in question were examined by a representative from P.G.&E. Mechanical, P.G.&E. D.E.R. and Westinghouse on October 18, 1977. Instruction from P.G.&E. Mechanical was to remove the indications by grind and polish. Further discussion resulted in instruction to proceed under the existing revision to D.R. 3484. Rationale applied was that the two (2) linears at 31" was part of root pass removal and the network of linears at 17" was part of the rough grind clean-up action.

Rework of the inside surface continued to the end of shift. All noted indications were removed and a preliminary Liquid Penetrant examination verified removal.

Liquid Penetrant examination per ESD-211 was re-applied on October 19, 1977. Examination revealed all previously noted discontinuities were removed and rework was concluded. Ultrasonic thickness measurements of remaining wall indicated average wall in the flush grind areas is .580". Grind areas are as follows:

1. 8" clock-wise from top center of the nozzle a 10" crescent groove .350" of remaining wall.
2. 31" clock-wise from top center of the nozzle a 2 1/2" crescent groove .420" of remaining wall.
3. 41" clock-wise from top center of the nozzle a 2" rounded grind-out .520" of remaining wall.

On October 19, 1977, rework of F.W. 197 inside surface was continued per D.R. 3484, Revision 2, Step #9A, Item 4.

*Donald R. Geske*

D. R. Geske  
N.D.E. Supervisor

DRG/js

Attachment - D.R. 3484, Rev. 2

THE H. V. KELLOGG COMPANY  
A DIVISION OF FULLMAN INCORPORATED

LIQUID PENETRANT EXAMINATION RECORD

ISO/DWG NUMBER 500146A (OR 3484, REV 2) DATE 10-19-77  
JOINT NUMBER FW-197 (INSIDE SURFACE AFTER GRIND OUT) "F" SHEET N/A  
MATERIAL 1/2" C.S. TO STEAM GENERATOR 1-1 NOZZLE JOB NO. 7177  
EXAMINATION PROCEDURE KPT- 8711 ESO- 211  
ACCEPTANCE STANDARDS ASME SECTION I  
LIQUID PENETRANT BRAND MAGNAFLUX DYE CHECK  
LIQUID PENETRANT BATCH NUMBER CLEANER 6J004 PENETRANT 2L095 DEVELOPER 5M113



ACCEPTED



REJECTED

Donald R. Burke

SIGNATURE OF INSPECTOR

MAGNETIC PARTICLE EXAMINATION RECORD

/DWG NUMBER \_\_\_\_\_ DATE \_\_\_\_\_  
JOINT NUMBER FW- "F" SHEET N/A  
MATERIAL CARBON STEEL JOB NO. 7177  
EXAMINATION PROCEDURE KMT- 8711 ESO-  
ACCEPTANCE STANDARDS ASME  
MAGNETIC PARTICLE POWDER BRAND MAGNAFLUX  
MAGNETIC PARTICLE POWDER COLOR RED (8A)  
COLOR OF COMPONENT METALLIC

INDICATIONS

☒ near  
☒ end  
☐ Aligned



ACCEPTED



REJECTED

YES NO 7:07 SHOP ☐ FIELD ☒

## RADIOGRAPHIC INSPECTION REPORT

0410 10-19-77

[illegible][illegible]



THE H. V. KELLOGG COMPANY  
A DIVISION OF FULLMAN INCORPORATED

LIQUID PENETRANT EXAMINATION RECORD

ISO/DWG NUMBER \_\_\_\_\_ DATE \_\_\_\_\_  
JOINT NUMBER FW "F" SHEET N/A  
MATERIAL \_\_\_\_\_ JOB NO. 7177  
EXAMINATION PROCEDURE KPT- 8711 ESO  
ACCEPTANCE STANDARDS ASME  
LIQUID PENETRANT BRAND MAGNAFLUX DYE CHECK  
LIQUID PENETRANT BATCH NUMBER CLEANER PENETRANT DEVELOPER  
☒ ACCEPTED ☐ REJECTED  
SIGNATURE OF INSPECTOR \_\_\_\_\_

MAGNETIC PARTICLE EXAMINATION RECORD

ISO/DWG NUMBER 500146A (DR 3484, REV 2) DATE 10-19-77  
JOINT NUMBER FW-147 (INSIDE SURFACE AFTER WELD-OUT) (300°) "F" SHEET N/A  
MATERIAL CARBON STEEL JOB NO. 7177  
EXAMINATION PROCEDURE KMT- 8711 ESO- 247 10-28-77  
ACCEPTANCE STANDARDS ASME SECTION I  
MAGNETIC PARTICLE POWDER BRAND MAGNAFLUX  
MAGNETIC PARTICLE POWDER COLOR RED (8A)  
COLOR OF COMPONENT METALLIC  
INDICATIONS  
☒ Linear  
☐ Round  
☐ Aligned  
NOTE: COIL METHOD WAS USED  
10-28-77

☒ ACCEPTED ☐ REJECTED

*Donald R. Burke*



10 CR-21  
(SI) or (IS NOT)  
ATTACHED



# Pullman Power Products

EXHIBIT 10 TO  
ATTACHMENT 1

D.R. NO. 4662  
ISO. NO. 500146  
UNIT NO. 1  
CODE NO. 1

## DISCREPANCY REPORT

CUSTOMER: Pacific Gas & Electric SPEC. NO: 8711 DATE: 11-8-82  
PROJECT: Glabe Canyon JCS NO: 7177 INSPECTOR: R. Hudson/MacGree

ESD-246 and ESD-247 - Magnetic Particle Procedure/ Dry/Continuous Coil Retest  
DISCREPANT ITEM: not per Spec 8711

### EXPLANATION OF DISCREPANCY:

Internal Audit #101, A.A.R. #1, identified that there was no Procedure Qualification Record for ESD-246 and ESD-247.

Subsequent investigation has revealed that ESD-247 was used to MT examine the inside diameter of FW #197, Iso #500146, Steam Generator 1-1, DR #3484, on two occasions (see attached examination records) ESD-247 is listed on DR #3453 as well, under Recommended Disposition and is suspected to have been used (there is no examination record with the D.R.) to MT examine the inside diameter of FW #244, Iso #500146, Steam Generator 1-4. The welds in question are on lines K16-554-16 IV and K16-556-16 IV, both Seismic Class 1 code.

The use of ESD-247 on Seismic Class 1 pipe without a Procedure Qualification Record is a nonconformance to Contract Specification 8711 Section 3 Table I and Notes to Table I, Section Paragraph 3.23, Section 5 Paragraph 1.2, Section 2 Paragraph 2.1 and Section 3 Paragraph 1.4.

--CONTINUED ON PAGE 2 OF DISCREPANCY REPORT--

### RECOMMENDED DISPOSITION:

INDICATE APPROVAL BY CIRCLING THE APPROPRIATE "RECOMMENDED DISPOSITION"

1. Accept-as-is all work examined by ESD-247
2. File a copy of this D.R. in the following locations:
  - A. Document package for Iso #500146 FW 197 and original DR 3484
  - B. Document package for Iso #500146 FW 244 and original D.R. 3453
  - C. Originals of ESD 246 and 247

OR

X P.G.&E. to disposition

PG&E G.C.  
QUALITY CONTROL  
REVIEWED  
DATE 2/9/83

Approved By P.P.P. Field C.A. Manager Date 11/8/82 Customer Date 2/9/83

FINAL DISPOSITION: In Accordance with Appendix 1 to 2

☐ Other (specification and approval required)

Work Completed Inset Date 2/2/83

Work Completed Inset Date

EXPLANATION (IF NECESSARY):

P.P.P. Field C.A. Manager Date Customer Date

TO PREVENT RECURRENCE ☐ Not Applicable

A/P.C. Manager shall assure that N.D.E. procedures have the necessary Procedure Qualification records performed and included as part of the procedure prior to submitting to P.G.&E. for approval.

Field C.A. Manager Date 11/8/82

REVISION: ☐ Major C.A. file ☐ Audit info. ☐ Engineering Dept. ☐ Other

ISI or IIS NOT  
ATTACHED

DISCREPANCY REPORT

C.R. NO. \_\_\_\_\_  
ISG. NO. 520146  
UNIT NO. \_\_\_\_\_  
CODE NO. 6

CUSTOMER: Pacific Gas & Electric SPEC. NO: 5711 DATE: 11-9-92  
PROJECT: Glendale Canyon JCS NO: 7177 INSPECTOR: 12

DISCREPANT ITEM: ESD 247 - Mainline Pipeline (Continued) / Day 1 Continuous Cold start in Section 1

EXPLANATION OF DISCREPANCY:

Internal Audit # 101, AAR#1, identified that there is no Positive Qualification Record for ESD 247. Subsequent investigation has revealed that ESD 247 was used to MT examine the inside diameter of FW# 197, doo# 500146, Steam A 2nd section 1-1, DR# 2434, on two occasions (see attached examine records). ESD 247 is listed on DR# 3453 under Recommended Disposition and is suspected to have been used (there is no examine record with the DR) to MT examine the inside diameter of FW# 244, doo# 500146, Steam (continued)

RECOMMENDED DISPOSITION:

1. ESD 247 have a (Positive) Qualification Record established by actual examination of the pipe.
2. Accept as is all work examined by ESD 247
3. Reject all work examined by ESD 247, and an audit is performed on all ISME Section 1, B3.1 and Section 1 work to determine if ESD 247 was used to examine work in these systems, and reexamine identified work with a qualified VUE procedure.
4. Accept FW's as is based on subsequent VUE performed during repair, work.

Approved By: P.P.P. Field C.A. Manager \_\_\_\_\_ Date \_\_\_\_\_ Customer \_\_\_\_\_ Date \_\_\_\_\_

FINAL DISPOSITION: ☐ In Accordance With Above

☐ Other (explanation and approval required)

Work Completed Inset \_\_\_\_\_ Date \_\_\_\_\_

Work Completed Inset \_\_\_\_\_ Date \_\_\_\_\_

EXPLANATION (IF NECESSARY):

P.P.P. Field C.A. Manager \_\_\_\_\_ Date \_\_\_\_\_ Customer \_\_\_\_\_ Date \_\_\_\_\_

STEPS TO PREVENT RECURRENCE ☐ Not Applicable

Field C.A. Manager

DISTRIBUTION: ☐ Master C.A. File ☐ Auth. Insp. ☐ Engineering Dept. ☐ Other \_\_\_\_\_  
☐ Customer ☐ Receiving ☐ Field Inspector ( \_\_\_\_\_ )

ATTACH SKETCH IF NECESSARY



# Pullman Power Products

10 CR-21  
(IS) or (IS NOT)  
ATTACHED

## DISCREPANCY REPORT

D.R. NO. \_\_\_\_\_  
ISG. NO. 530146  
UNIT NO. 1  
CODE NO. 1

CUSTOMER: Pacific Gas & Electric SPEC. NO: 5711 DATE: 11-8-92  
PROJECT: Diablo Canyon JOB NO.: 7177 INSPECTOR: M. J. [illegible]

Generator 1-4. The wellhead on lines K16-554-16II and K16-556-16II, both Service Class 1 series. The wellhead ESD 247 on Service Class 1 pipe is not a Pressure Limitation device as a nonconformance to Contract Specification 5711 Section 3 Table I and Notes to Table I, Section 4.3.22, Section 5.1.2 Section 2.2.1 and Section 3.14.

THE H.W. KELLOGG COMPANY  
A DIVISION OF FULLMAR INCORPORATED

LIQUID PENETRANT EXAMINATION RECORD

DATE \_\_\_\_\_  
ISO/DWG NUMBER \_\_\_\_\_ "F" SHEET N/A  
JOINT NUMBER FV- JOB NO. 7177  
MATERIAL \_\_\_\_\_  
EXAMINATION PROCEDURE KPT- 8711 ESD-  
ACCEPTANCE STANDARDS ASME  
LIQUID PENETRANT BRAND MAGNAFLUX DYE CHECK  
LIQUID PENETRANT BATCH NUMBER CLEANER PENETRANT DEVELOPER  
☒ ACCEPTED ☐ REJECTED  
SIGNATURE OF INSPECTOR \_\_\_\_\_

MAGNETIC PARTICLE EXAMINATION RECORD

DATE 10-19-77  
ISO NUMBER 500146A (DR 3484 REV 2) "F" SHEET N/A  
JOINT NUMBER FV-197 (INSIDE SURFACE AFTER WELD-OUT) (300°) JOB NO. 7177  
MATERIAL CARBON STEEL  
EXAMINATION PROCEDURE KMT- 8711 ESD- 247 10-28-77  
ACCEPTANCE STANDARDS ASME SECTION I  
MAGNETIC PARTICLE POWDER BRAND MAGNAFLUX  
MAGNETIC PARTICLE POWDER COLOR RED (8A)  
COLOR OF COMPONENT METALLIC  
INDICATIONS Linear  
Round  
Aligned  
NOTE: COIL METHOD WAS USED  
10-28-77  
☒ ACCEPTED ☐ REJECTED  
Donald R. Baker  
SIGNATURE OF INSPECTOR

THE H.W. KELLOGG COMPANY  
A DIVISION OF FUELMAN INCORPORATED

LIQUID PENETRANT EXAMINATION RECORD

DATE \_\_\_\_\_  
"F" SHEET N/A  
O/T'G NUMBER \_\_\_\_\_  
JOINT NUMBER FW- JOB NO. 7177  
MATERIAL \_\_\_\_\_  
EXAMINATION PROCEDURE KPT- 8711 ESD-  
ACCEPTANCE STANDARDS ASME  
LIQUID PENETRANT BRAND MAGNAFLUX DYE CHECK  
LIQUID PENETRANT BATCH NUMBER CLEANER PENETRANT DEVELOPER  
☐ ACCEPTED ☐ REJECTED  
SIGNATURE OF INSPECTOR \_\_\_\_\_

MAGNETIC PARTICLE EXAMINATION RECORD

DATE 10-20-77  
"F" SHEET N/A  
SO/DWG NUMBER 500146A (DR 3484) JOB NO. 7177  
JOINT NUMBER FW- 197 (INSIDE SURFACE AFTER WELD)  
MATERIAL CARBON STEEL  
EXAMINATION PROCEDURE KMT- 8711 ESD- 247  
ACCEPTANCE STANDARDS ASME SECTION I  
MAGNETIC PARTICLE POWDER BRAND MAGNAFLUX  
MAGNETIC PARTICLE POWDER COLOR RED (8A)  
COLOR OF COMPONENT METALLIC  
INDICATIONS  
Linear  
Round  
Aligned  
☒ ACCEPTED ☐ REJECTED  
SIGNATURE OF INSPECTOR Donald R. Baker



# THE M.W. KELLOGG COMPANY

A DIVISION OF FULLMAN INCORPORATED

Page 1 of 3

D.R. NO. 3453 Rev. 1  
ISC. NO. 500146 Sh. 4 of 5  
UNIT NO. 1  
CODE NO. N/A

## DISCREPANCY REPORT

CUSTOMER: Pacific Gas & Electric SPEC. NO: 5711 DATE: 8-26-77  
PROJECT: Diablo Canyon JOB NO.: 7177 INSPECTOR: Runyan/Scannell/Guest

DISCREPANT ITEM: Line K16-556-16"; Spool Piece 500; E1, 154'-4 1/2"; Area G; Sect. 1

EXPLANATION OF DISCREPANCY: Reference P.G.&E. Drawing 500146, Rev. 9B

Per P.G.&E.'s request, an internal inspection of F.W. 244 on Steam Generator 1-4 Feedwater Nozzle will be performed. The line entry will be made in the following manner, see Recommended Disposition.

FOR INFORMATION ONLY

### RECOMMENDED DISPOSITION:

1. Measure 2" from F.W. 244 center upstream on pipe (Spool Piece 500) circumscribe the pipe using a wrap around, then prick punch the scribe line.
2. Using air-arc, cut the pipe all around maintaining less than a 40° total bevel to within approximately 1/8" from the I.D. (See Sketch #1).
3. Using a thin blade grinder, cut through the center of the bevel, then dress up both bevels (See Sketch #1).
4. Jack pipe away from cut on upstream side per Superintendent's instruction. Install a dam in nozzle beyond F.W. 244 to prevent air from entering Steam Generator.
5. Clean and inspect F.W. 244 internally as directed by P.G.&E. (Con't on Page 2)

Approved By: M.W.K. Field C.A. Mgr. J.P. Runyan Date 8/26/77 Customer R.D. Ely Date 8/29/77

FINAL DISPOSITION: ☒ In Accordance With Above

☒ Other (explanation on approval required)

Work Completed Inscr. AB Burke Date: 11-2-77

Work Completed Inscr. AB Burke Date: 11-2-77

### EXPLANATION (IF NECESSARY):

Revision 1 - Delete Step 6 in its entirety (access was achieved). Refer to Attachment #1 for results of initial inspection and recommended disposition.

Revision 2 - See Page 3 of 3 and Attachment #3.

Rev #2 J.P. Runyan

9/7/77

R.D. Ely

DEVIATION 254

8-26-77

M.W.K. Field C.A. Manager J.P. Runyan Date 8/29/77 Customer R.D. Ely Date 8/29/77

STEPS TO PREVENT RECURRENCE Other Applicable

Field C.A. Manager

DISTRIBUTION: ☒ Master C.A. File ☒ Auth. Insp. ☒ Engineering Dept. ☐ Other  
☒ Customer ☐ Receiving ☐ Field Inspector

ATTACH SKETCH IF NECESSARY

# THE M.W. KELLOGG COMPANY

A DIVISION OF FULLMAN INCORPORATED

## DISCREPANCY REPORT

Page 2 of 3

D.R. NO. 3453 Rev. 1 RFL  
ISO. NO. 500146 Sht. 4 of 5  
UNIT NO. 1  
CODE NO. N/A

CUSTOMER: Pacific Gas & Electric SPEC. NO: 5711 DATE: 8-26-77  
PROJECT: Diablo Canyon JOB NO: 7177 INSPECTOR: Runyan/Scannell/Guest

DISCREPANT ITEM: Line K16-556-16"; Scool Piece 500; El. 154'-4 1/2"; Area G; Sect. 1

### RECOMMENDED DISPOSITION: (CON'T)

6. If access to F.W. 244 I.D. cannot be achieved, proceed with alternate instructions (See Sketch #2).
7. Upon completion of inspection, remove dam, grind bevel to facilitate fit-up as needed, clean and fit to ESD-215 and ESD-220.
8. Weld out using F.W. 549 and procedure 4/5.
9. Inspect and HDE to ESD-215 and ESD-206.
10. Add all information to process sheet and isometrics.

FOR INFORMATION ONLY

DISTRIBUTION: ☒ Master C.A. File ☒ Auth. Insp. ☒ Engineering Dept. ☐ Other \_\_\_\_\_  
☒ Customer ☐ Response ☐ Field Inspector ( \_\_\_\_\_ )

A DIVISION OF PULLMAN INCORPORATED

O.R. NO. 3453 REV 2  
ISO. NO. 500146 She. 4 of 5  
UNIT NO. 1  
CODE NO. N/A

CUSTOMER: Pacific Gas & Electric SPEC. NO: 8711 DATE: 2-26-77  
PROJECT: Diable Canyon JOB NO.: 7177 INSPECTOR: Rumyan/Scannell/Guest

D.R. 3453, Revision 2

During the performance of grinding per D.R. 3453, Revision 1, Step #5, four (4) indications of heavy drop through with roll over were removed along with all of the existing root penetration. Re-inspection revealed a linear indication .11" long on the fusion line to the Feedwater Nozzle. Further grinding, to a maximum depth of .110", removed the linear indication (see Attachment #3).

Add the following to Step #5 and delete original Steps #7, 8, 9 and 10. Perform the following repair:

- A. Grind the bevels to facilitate fit-up of F.W. 244.  
B. H.T. I.D. of F.W. 244 using ESD-247 coil method, and clean grooved root pass at F.W. 244 per ESD-215.  
C. Remove the dam from the nozzle at F.W. 244.  
D. Preheat F.W. 244 to a minimum of 250°F; interpass not to exceed 550°F maximum. Maintain this preheat until stress relief begins.  
E. Weld to procedure 200 (F.W. 244 R1), using E70S2 wire with the GTAW process, to conform to blended configuration of the balance of the weld. I.D. ONLY  
F. Grind and polish the added weld metal to blend with base metal surfaces.  
G. Inspect and NDE to ESD-215 and PLATE DER TO PERFORM L.P. AT PREHEAT-TEMP.  
{ FURNISH WORK WITH COPY OF PERS CERT.

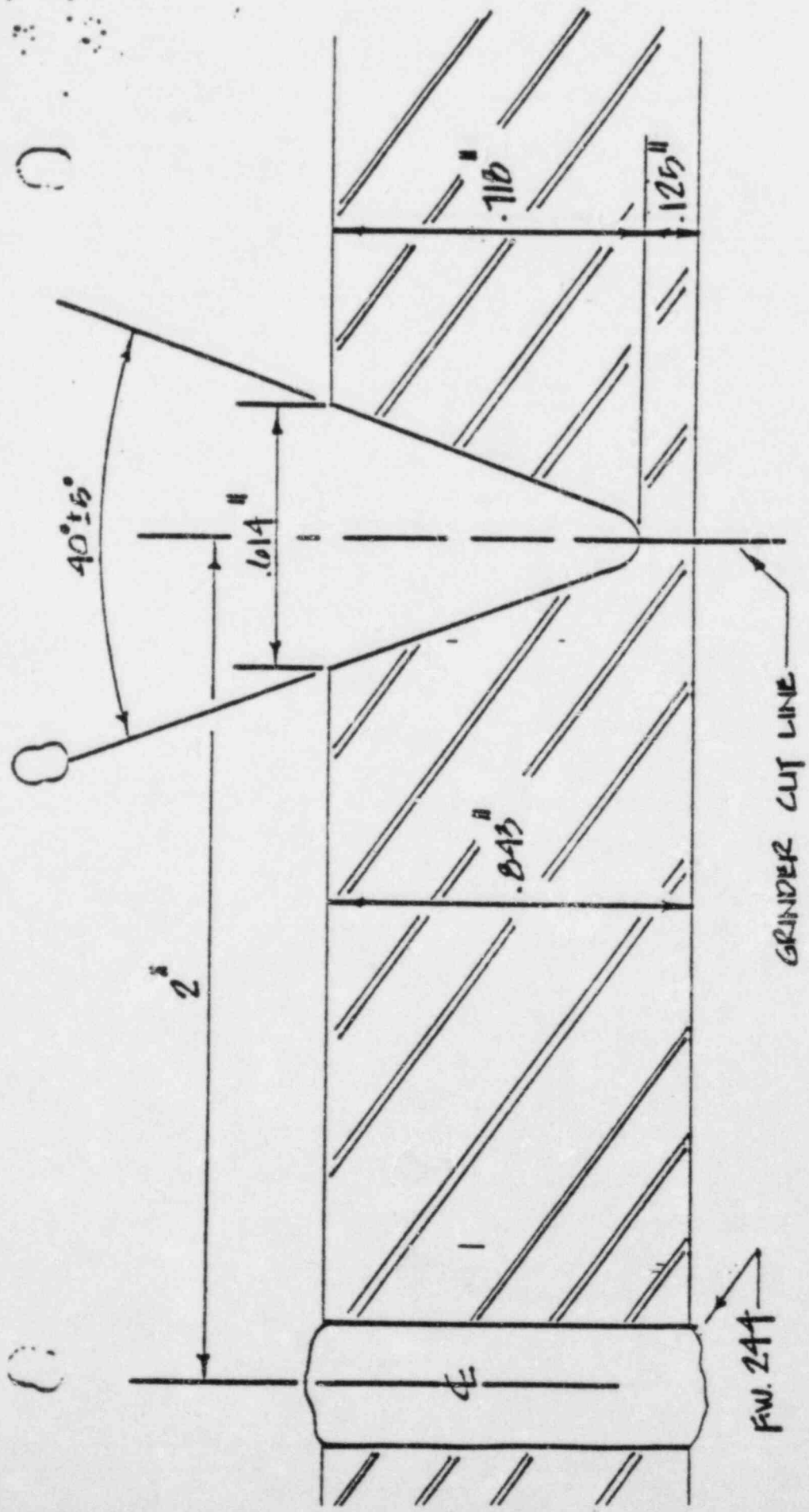
NOTE: Proceed with D.R. 3456, and X-ray weld, hot, for information only.

7. Upon completion of inspection, remove dams from F.W. 549 pipe side, clean and fit F.W. 549 to ESD-215 and ESD-220.
8. Weld out using F.W. 549 with procedure 4/5A.D.
9. Grind F.W. 549 for X-ray.
10. Inspect and NDE F.W. 549 to ESD-215 ~~and ESD-220~~

NOTE: X-ray weld not for information only.

11. Stress relieve at F.W. 244 R1 and F.W. 549 1100°F to 1150°F per ESD-218.
12. NDE F.W. 244 R1 and F.W. 549 to ESD-207.
13. " " " " " ESD-211 *Added 9/30/77*
14. Add information to process sheets.

DISTRIBUTION: ☒ Master C.A. File ☒ Asst. Insp. ☒ Engineering Dept. ☐ Other  
☒ Commander ☐ Receiving ☐ Field Inspector

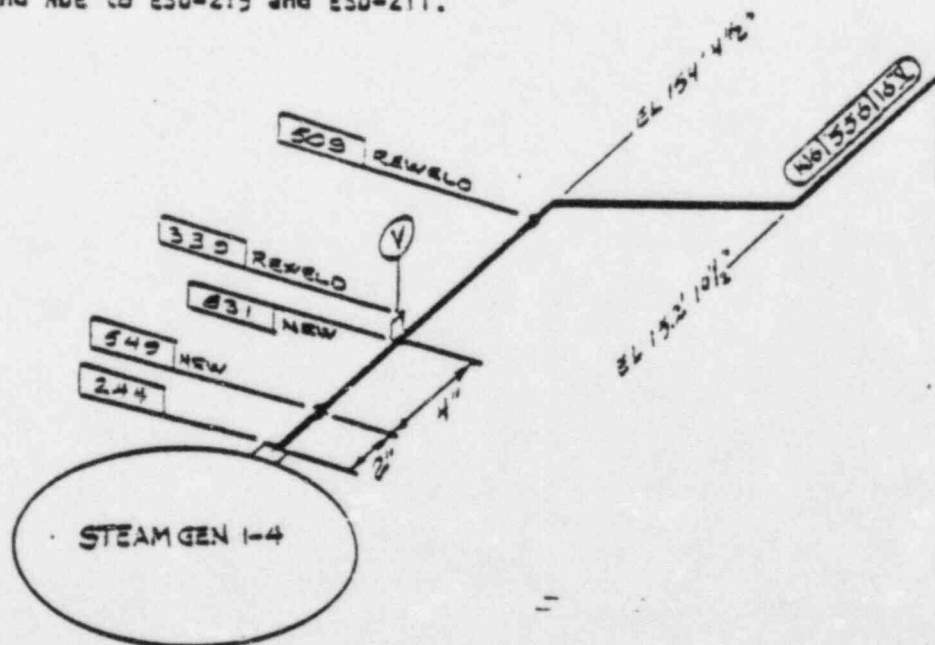


PR-3453  
SKETCH #1

3X ACTUAL SIZE

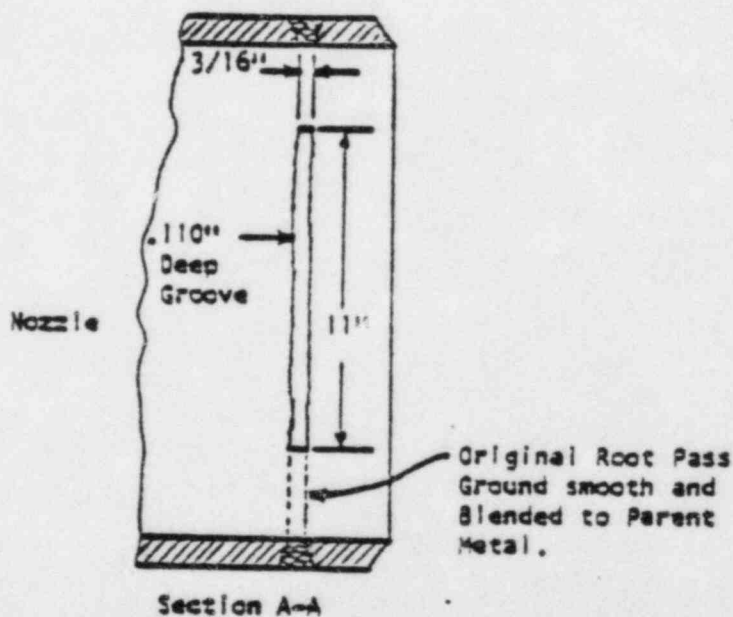
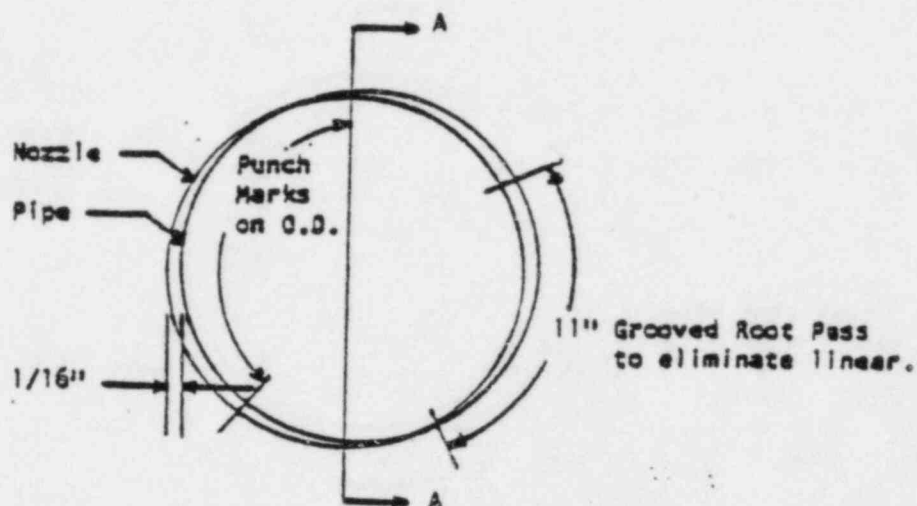
# ALTERNATE INSTRUCTIONS

1. Cut out F.W. 509 using air-arc and taking necessary steps to maintain the ability to bevel the  $45^\circ$  all side of the weld to  $20^\circ \pm 2\frac{1}{2}^\circ$  and a  $3/32"$   $1/16"$  land. Also, cut out F.W. 339 shown on Iso. 3-246.
2. Requisition:  $8\frac{5}{8}"$  of 16" Pipe, Schedule 80 A106 Gr B and a  $3/4"$  3000# S.W. Half Coupling or soc-o-let A105.
3. Install the  $3/4"$  half coupling or soc-o-let four (4) inches from the end of the 16" pipe.
4. Clean and Fit to ESD-215 and ESD-220.
5. Weld out with procedure 92/93 (F.W. 831).
6. Inspect and NDE to ESD-215 and ESD-211.
7. Upon completion of F.W. 244 I.D. inspection and P.G.S.E.'s direction, fit-up 16", Schedule 80 pipe and proceed with Step 7 of attached D.R. using F.W. 549 and F.W. 509.
8. Reweld F.W. 339, as shown on Iso. 3-246, maintain original line configuration.
9. Clean and Fit-up to ESD-215 and ESD-220.
10. Weld out with procedure 92/93.
11. Inspect and NDE to ESD-215 and ESD-211.





Findings at F.W. 244



NOTE: Average Wall Thickness = .580" to .600"  
Remaining Wall At Groove = .450"  
Punch Marks On The O.D. = .047" Deep  
(Punch Marks are directly on the fusion line of F.W. 244 to  $1/8''$  inside the fusion line .047" deep.)

INTEROFFICE CORRESPONDENCE

ATTACHMENT #1  
DR-3453 Rev. 1

TO J. P. RUNYAN, Q.A./Q.C. MANAGER

DATE AUGUST 31, 1977

FROM D. R. GESKE, NDE SUPERVISOR

SUBJECT LIQUID PENETRANT EXAMINATION, F.W. 244, INSIDE DIAMETER

On August 31, 1977, F.W. 244, Line K16-556, Isometric 1-03-500146, Feedwater piping to Steam Generator 1-4 Nozzle, was liquid penetrant examined on the inside diameter.

The following indications were noted:

1. 2" from top center of nozzle, a small faint transverse linear-nonrelevant due to weld geometry.
2. 7" from top center of nozzle, heavy 1" drop through with roll over.
3. 9" from top center of nozzle, heavy 2" drop through with roll over.
4. 37" from top center of nozzle, heavy 1½" drop through with roll over.
5. 39" from top center of nozzle, heavy 1/2" drop through with wire protrusion.
6. Approximately 1/16" mismatch exists from 7:00 to 9:00 facing the nozzle.

We recommend that the root pass be ground and polished to blend with base metal surfaces. Particular care should be taken to avoid the removal of base material. Then re-examine the I.D. with liquid penetrant, if acceptable, proceed to "Recommended Disposition", Step 7 of D.R. 3453, Revision 1.



Donald R. Geske  
NDE Supervisor

DRG/js

Response to Internal Audit #101, A.A.R. #1


A procedure qualification was performed in order to qualify ESD-247 as well as ESD-246 (ref. Internal Audit #101, A.A.R. #1).

As both ESD-246 and 247 have been withdrawn from use and the equipment listed in both procedures is no longer available for use, the equipment used for these PQR's was the Magnaflux Model P-90 for the coil technique only. All other factors are the same as specified in the procedures.

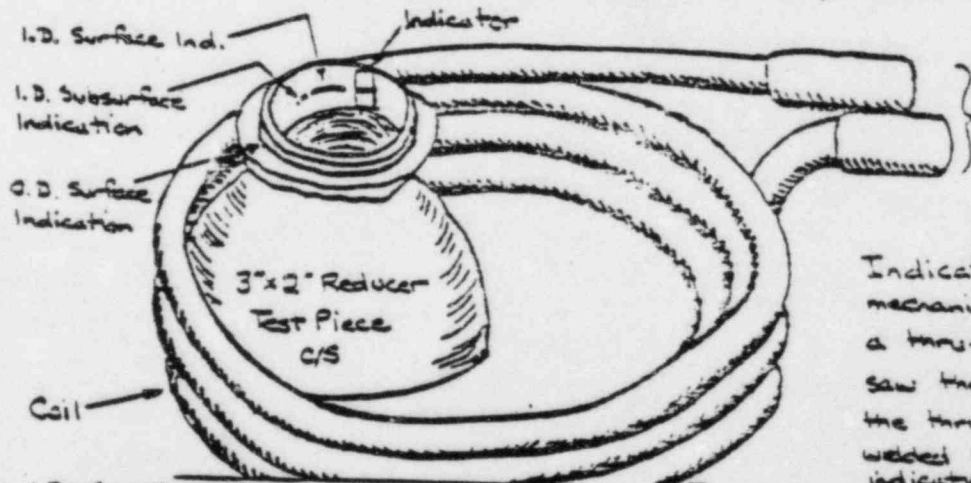
As the Magnaflux Model P-90 puts <sup>out</sup> less amperage than the equipment listed in ESD-246 and ESD-247, and acceptable results were obtained (i.e; I.D. and O.D. surface and I.D. subsurface indications were located), the demonstration of this technique is deemed adequate to approve this method employed by the equipment listed in the above procedures.

A record of the procedure qualification demonstration is hereby submitted along with this response. The originals will be filed with the applicable procedures.

In the event that either or both procedures are re-activated in the future, they will be revised to incorporate the Magnaflux Model P-90 into the list of equipment. As both procedures are currently withdrawn from use, no revision is deemed necessary at this time.



Michael S. MacCrae  
MT Level III  
11-9-82

MAGNETIC PARTICLE  
PROCEDURE QUALIFICATION RECORDProcedure Qualification No. MT-3Method Dry Powder Continuous; Half Wave D.C., CoilEquipment Manufacture Magnaflux Corp.Brand Name MagnafluxModel Number P-90Magnetic Particles: Brand Magnaflux Type Dry Color BA-RedMagnetization Current Half Wave Rectified D.C.Out Put Amperes 1000 Amps.Test Piece Position VerticalTest Material Carbon SteelType Test Piece 3"x2" Reducer with cut fillet weld at socket endSurface Condition Bare MetalPre-Cleaning Method NoneWeather 700 DryBase Metal Color Dark Brown and Shiny MetalContrast of Particles to Base Metal GoodMethod of Particle Application Powder BulbMethod of Removing Excess Particles BlowingDemagnetization NoneProd. Spacing and Amperage: 3 Coil Loops of 5 x Pipe Diameter with 1000 Amps.

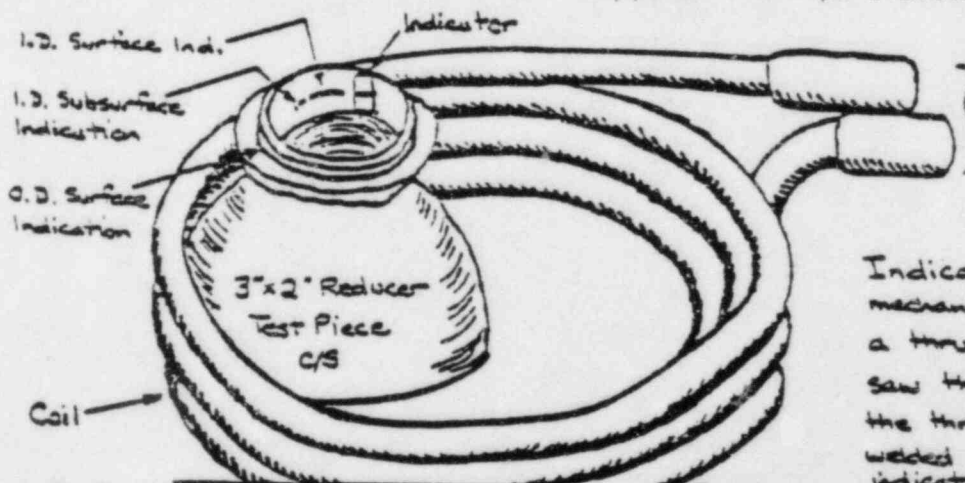
Coil plugged into  
Magnaflux Model P.  
Half-wave Rect. Pie.  
DC Current. (110 Vol.)

Indications are induced  
mechanical defects made by  
a thru-wall cut of a band  
saw then compressed. Part of  
the thru wall cut was back-  
welded to produce sub-surface  
indications.

Evaluation of Procedure Good-Indicator and defect showed well.Procedure: ☐ Approved ☐ Not ApprovedTest Conducted By M. MacCrae 11/9/92M. S. MacCrae  
MT Level IIIPREPARED BY M. MacCraeDATE OF ISSUE 11/9/92PAGE OF

APPROVED BY \_\_\_\_\_

DATE OF REV. \_\_\_\_\_

MAGNETIC PARTICLE  
PROCEDURE QUALIFICATION RECORDProcedure Qualification No. MT-3Method Dry Powder Continuous; Half Wave D.C., CoilEquipment Manufacture Magnaflux Corp.Brand Name MagnafluxModel Number P-90Magnetic Particles: Brand Magnaflux Type Dry Color 8A-RedMagnetization Current Half Wave Rectified D.C.Out Put Amperes 1000 Amps.Test Piece Position VerticalTest Material Carbon SteelType Test Piece 3"x2" Reducer with cut fillet weld at socket endSurface Condition Bare MetalPre-Cleaning Method NoneWeather 700 DryBase Metal Color Dark Brown and Shiny MetalContrast of Particles to Base Metal GoodMethod of Particle Application Powder BulbMethod of Removing Excess Particles BlowingDemagnetization NoneProd. Spacing and Amperage: 3 Coil Loops of 5 x Pipe Diameter with 1000 Amps.Coil plugged  
Magnaflux Model P-  
Half-wave Rectified  
DC Current (110 volt)Indications are induced  
mechanical defects made by  
a thru-wall cut of a band  
saw then compressed. Part of  
the thru wall cut was back-  
welded to produce sub-surface  
indications.Evaluation of Procedure Good-indicator and defect showed well.Procedure: ☐ Approved ☐ Not ApprovedTest Conducted By M. MacCrae 11/1/5M. S. MacCrae  
MT Level IIIPREPARED BY M. MacCraeDATE OF ISSUE 11/9/82PAGE OF

APPROVED BY \_\_\_\_\_

DATE OF REV. \_\_\_\_\_



THE H. K. MASON COMPANY  
A DIVISION OF H. K. MASON CORPORATION  
PERSONNEL TESTING RECORD

EXHIBIT H TO  
ATTACHMENT I

NAME D. R. GESKE

SUBJECT	LEVEL	GRADE	DATE	EXAMINED BY	RE-EXAMINED BY	GRADE	DA
Radiography	III	95%	10/1/50	J. L. Smith			
Magnetic Particle	II	98%	10/1/50	J. L. Smith			
Liquid Penetrant	II	95%	10/1/50	J. L. Smith			
Visual Inspection	II	95%	10/1/50	J. L. Smith			
Welding Inspection							
Radiation Safety							
Ultrasonics	II	95%	10/1/50	J. L. Smith			

EXAMINATION GRADE IN PERCENT

SUBJECT	GENERAL EXAM	SPECIAL EXAM	PRACTICAL EXAM	COMPOS
Radiography	95%	90%	95%	92%
Magnetic Particle	98%	90%	95%	95%
Liquid Penetrant	100%	95%	95%	96%
Visual Inspection	95%	80%	95%	93%
Welding Inspection				
Radiation Safety				
Ultrasonics	95%	95%	95%	95%

PERCENTILE WEIGHT

SUBJECT	GENERAL EXAM	SPECIAL EXAM	PRACTICAL EXAM	LEVEL
Radiography	5	3	2	11
Magnetic Particle	4	3	3	11
Liquid Penetrant	4	3	3	11
Visual Inspection	5	4	1	11
Welding Inspection				
Radiation Safety				
Ultrasonics	5			11

Affidavit

My name is Charles Stokes. I am submitting this affidavit to the Nuclear Regulatory Commission (NRC) to inform them of material false statements and other evidence of activities which could compromise the quality of the Diablo Canyon nuclear power plant, if it should be turned on. The misconduct involves welding, procedure qualification tests, and plant modifications during the hot functional tests. In my professional judgment, if these issues alone are confirmed as examples of general practices, the plant could not possibly be licensed to go critical under the NRC's legal requirements in 10 C.F.R.

In fact, the practices revealed below and others I have disclosed would even flunk Bechtel's own standards. I am enclosing as Exhibit 1 portions of Bechtel's "Field Engineer Pocket Hanger Reference," Diablo Canyon Project, Bechtel Power Corporation. Bechtel's booklet is not a bad document. Although there are a few minor errors, it describes a reasonable design control and quality assurance (QA) program.

Unfortunately it was not issued on-site before I left. I obtained a copy before distribution was stopped. I can understand why Bechtel didn't want the booklet released. The plant wasn't built at all like the system described in Bechtel's own handbook. The handbook will be discussed in more detail below.

(1) In reply to PG&E's letters no. DCL-84-067 and no. DCL-84-078 concerning welding of A-325 bolts. PG&E contends that "10 supports were identified which used welded A-325 bolt design." That is highly misleading. In reality, there are many more cases where bolts have been used.

Because of inadequate documentation, welded bolts have been used and it is impossible to say whether they are A-325 or A-307 or anything else. Even QA Personnel concedes not knowing. In two specific cases, for which I can provide the support numbers, undocumented bolts were used to connect support members to structural steel.

In my opinion, PG&E's reply is so far from complete that it does not provide accurate information to the NRC concerning the use of A-325, A-307 or other bolts. The two specific supports do not even have a weld symbol describing how they were welded on the drawings. The QA inspector was not able to visually inspect the connection.

(2) A second illustration of deficient documentation for welding bolts is inadequate material traceability. Material was not stamped for traceability back to the Certificates of Compliance as required. The significance of stamping for traceability is that without this traceability there existed no methodology to ensure that the material used in many hangers, or other seismic class one structures, complied with the requirements (e.g., proper metallurgical properties).

In ANSI B31.7 chapter 10723, entitled "Materials," it is stated that "all material shall be clearly identified" by "the applicable material specification and grade, heat number, or heat code of the material, and any additional markings required to facilitate traceability of the reports of the results of all tests and examinations performed on the material." ANSI B31.7 also states that "Certificant of Compliance with the material specifications may be provided in lieu of Certified Material Test Reports unless otherwise required by the design specification." (Emphasis added)

Material traceability is only one aspect of the required traceability. In ANSI B31.7 Para. 1-727.5.3 and Para. 1-727.6, weld traceability is also required. "The welder or welding operator shall identify it as his work by applying his assigned symbol for permanent record in a manner specified by his employer. As an alternative, the employer shall keep a record of the joints and of the welders working the joints." This is also true under ASME Section IX QW-301.3, entitled "Identification of Welders and Welding Operations," which states: "Each qualified welder and welding operator shall be assigned an identifying number, letter, or symbol by the manufacturer or contractor, which shall be used to identify the work of that welder or welding operator."

In discussions with Pre-inspection Engineers, QC and QA inspectors, some of whom have worked for as long as ten years at Diablo, it is obvious that neither material nor welder traceability was maintained. All that was required was that the "Certificate of Compliance" be provided. This superficial attempt to comply with the requirements of ANSI B31.7 and ASME Section IX does not satisfy the code requirements. This is evidenced by past and present industry practice at other plants across the United States. The abuse of traceability destroys the foundation of a valid Quality Control Program -- accountability and traceability.

Since many of the pre-inspection engineers and QC, QA personnel have never before Diablo worked at a nuclear plant nor other heavy industry construction site nor read ANSI B31.1, B31.7 or ASME Section IX, they worked at Diablo under the false assumption that the work was being performed correctly, and that management was implementing all the necessary directives for them to do their work. Management did not train personnel, nor did they correct this misconception.



Having worked on other nuclear plants, I know the importance of these sections in ANSI B31.7 and ASME Section IX. At other plants almost everything in Class I systems was stamped and logged, and records were kept to insure that traceability was maintained. Per B31.7, "The marking or marking code shall be transferred to all pieces when material is cut to make more than one piece." In my experience at other plants, this was required for all Class I material except miscellaneous material, such as "gaskets, packing, seals, springs, bearings, retaining rings, washers, fluids for hangers, etc." This was not done at Diablo Canyon. The practice of using "non traceable" steel was widespread throughout the plant. At other plants shim stock was not required to be stamped, and I suppose shim stock was considered to be "etc."

B31.7 states in the case of miscellaneous items that "A list of such materials shall be furnished, and such materials do not require certified materials test reports or certificates of compliance as defined in 1-723.1.2." (Emphasis added) Management at Diablo Canyon have failed to provide the chain of documentation which is necessary under 10 C.F.R. 50 before the plant can be operational. Not only did they fail to provide an "up-to-date heat number log," but also failed to publish a list of material that did not have to meet the scrutiny of ANSI B31.7.

(3) Deficient training reinforced the problems, and perpetuated them. QA inspectors told me that their training consisted of reading ESD 223 for one week and being given a list of suggested reading. This list contained B31.7, B-31.1 and other codes. In one conversation, when I asked if the QC inspectors were required to read the suggested readings, his reply was "no, we only had to know what B31.7 was, not what it says." "I and others thought that these codes had been incorporated into ESD 223 by management." This was, and remains, a wrong assumption. The inspectors undoubtedly performed to the best of their

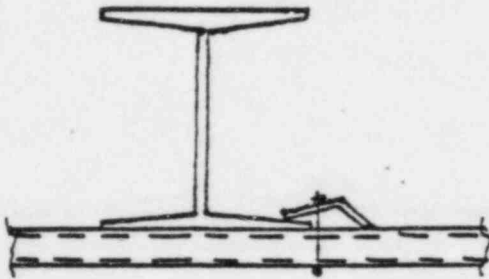


ability. However, the instruction, training, and practices necessary to adequately perform their functions were deficient. The inspectors only discovered their "wrong beliefs" through discussions with better trained, more experienced inspectors from companies other than PG&E.

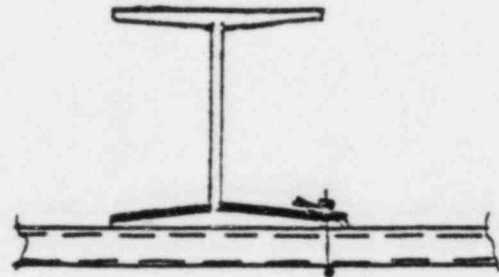
(4) In letter no. DCL-84-094, PG&E states, "Pipe support number 100-111, identified for NRC review by Mr. C. Stokes, resulted in a minor modification . . . This change was made for consistency with Project Standard Practices even though analysis showed the change was not necessary to meet acceptance criteria."

I don't know if PG&E reported other modifications performed during the hot functional testing to the NRC. I do know of at least one other support which was modified during hot functional testing. I can not give the support number here. My informant would be immediately on the "firing" line. I will supply the support number to NRC inspector Isa Yin, if the NRC supplies a list of supports to me for which they know modifications have been performed.

(5) In PG&E's answer to the intervenor's motion to reopen licensing issues on Construction Quality Assurance, "Affidavit of D.A. Rockwell, L.R. Wilson," Paragraph 3 states in part: "Since this contact is provided by the plate of the clamp to the Unistrut, the plate is not necessarily horizontal and may appear 'cockeyed.'" This statement is too incomplete to be meaningful. The use of the term "cockeyed" is not explained or supported nearly enough to support any conclusion that the clamping plates were correctly installed. If incorrectly installed, the clamp will tend to slip off the structural steel to which it is attached. See sketches below of correct installation compared to incorrect installation.



Correct. Notice Line contact at toe and heel of plate. When bolt is tongued properly, clamp should not be easily displaced.



Incorrect. Line contact but not at toe. When tongued, this tends to slip off the steel marker.

In both the examples above, the plate is "cockeyed." One is correct, and if installed correctly, should not be easily moved. On the other hand, the incorrect installation could slip easily. This fact can be checked by consulting engineering manuals from either Unistrut, Superstrut, or other brand names.

(6) In paragraph 5 as a remedy for possible slipping, PG&E states, "For support type S221, U-bolts were torqued and U-bolt nuts tack welded. For other support types, the Unistrut channel was directly welded to the beam flange." (Emphasis added) Based on my experience in the nuclear industry, the proposed fix by PG&E/Foley would do more damage than good. To my knowledge, there are no engineering documents presently available or in use that support the practice of welding Unistrut or similar material. In fact, the material type used in making "Superstrut" and similar products should not be welded. In a phone call on 3/27/84 with a Superstrut Product Engineer, I was told that Superstrut is coated with an electro-plated galvanized chromate coating (an epoxy paint) which burns when welded, giving off toxic gases. Two problems result from welding it. (1) Air quality problems for the welder and (2) the joint corrodes. The Product Engineer said he would never

advise that Superstrut be welded when used as Class I supports in a nuclear plant near the ocean. He said that the material could be destroyed in one year if exposed to adverse conditions.

(7) In reply to intervenor's Petition to reopen Construction Quality Assurance, Affidavit of H.R. Arnold, F.C. Breismesiter and R.K. Rhodes Paragraph 6. "During a planned review of existing brazing procedures for copper and stainless steel by Foley QA Personnel in September 1981, it could not be verified that stainless steel tubing PBS number MD045 had been qualified in all braze flow positions (vertical-up, vertical-down, horizontal and flat) since the procedure qualification tests performed in 1977 did not include the vertical-up flow position. This variation was properly documented on Foley Non-Conformance Report (NCR) #8802-675 in accordance with approved procedures." (Emphasis added) The statement quoted above is in direct contradiction to the first line in Para. 1 and line, Page 1. "This allegation is completely false. The procedures in question were qualified prior to their use." (Emphasis added) To correct this problem, one worker was tested. Under ANSI B31.7 and ASME Section IX, each welder must be qualified to perform the work to which he is assigned. Foley's solution does not correct the use of the procedure from 1977 to 1981 for brazing a vertical-up joint as was originally stated in the procedure. Nor does it resolve the issue as to whether the brazers before 1977 were qualified to perform work. The test of one worker does not satisfy ASME requirements that each worker be qualified unless the worker tested was the only person on-site who was assigned the brazing work. Nor do the present tests qualify old work, since past work could be considered training thus not qualifying as acceptable work. ASME Section IX requires that the welder be qualified first before work is performed. There is a reason for this,

which is to ensure that the work is performed correctly.. The other point not sufficiently covered in Foley's reply is that "Neither the ASME Code nor Foley procedures require documentation of these inspections. Therefore none were documented." Nor in the statement that "ASME Section IX recognizes the function of independent mechanical test contractors such as Central Coast Lab, and does not require them to witness the actual brazing." (Paragraph 3, page 6 and 7) This is an example of Management 's near-sightedness. Can they say that this documentation is not required in B31.1, B31.7, ASME Section IX, AWS D1.1-79 or 10 C.F.R? From my previous experience in the nuclear industry, it has been the practice to test and document results therefrom for welders. This would certify that the weld was made by the specific welder and that the test results were for the welds performed by that individual. These logs and records were controlled and monitored by the QA. The policies at Diablo by PG&E, Pullman, and Foley are at the opposite end of the scale from what has been typical industry practice. Where documentation was in question, other plant owners considered it good engineering practice and a good policy to go ahead and provide documentation to prevent the problem of a future question. At Diablo, just the opposite is true.

(8) In a discussion with a friend, I was shown a Discrepancy Report written against Unit #2. This document listed many anchor and smaller supports which did not have acceptable full penetration welds at the stantion to pipe and were to be reworked. The problem with this work was that there had been no process sheets issued for the removal nor had the pipe been ultrasonically tested to ensure that the minimum wall remained after grinding away the old material. The new stanchions were installed without an ultrasonic test (UT) being performed. The tests were performed seven months later. Per ASME Section IX and ANSI B31.7, the ultrasonic testing should have been conducted

at the time after removal and before new stanshions were welded in place. When ultrasonically testing this type of joint, incorrect readings are possible.

A worker who was familiar with this Discrepancy Report (DR) on Unit 2 realized the same problem might have occurred on Unit 1. I was shown a copy of a Preliminary Discrepancy Report listing about 15 supports in Unit 1 which the worker had determined had the same problem as the Unit 2 problem narrated above. I can supply the DR number on Unit 2 and the author of the Unit 1 DR. This will be suppld under similar conditions listed on a previous issue to Isa Yin.

(9) In closing and as the only exhibit to this affidavit, I have a copy of a document which was scheduled to be issued to all field engineers to aid them in their work at Diablo. It was prepared by Bechtel Power Corporation. The title of this document is Field Engineer Pocket Hanger Reference. This document was sent to the field for issuing, but was recalled under the excuse that it contained errors which needed to be corrected. I and other engineers at Diablo had copies of this document. It contains valuable information to which an engineer could refer and rely upon during his work. In truth, this document represents Bechtel policy at previous jobs. Much of it is in direct contradiction to the procedures used to build Diablo. Had it been issued many problems would have surfaced in a relatively short time. Why is this true? The document puts at finger tip location contradictory guides, providing typical industry practice in many areas, to the procedures and management directives issued at Diablo. There are minor errors in this document. However, I have reviewed it and have found it to be a valuable and handy document to have when working in the field. It should have been checked, corrected, issued and used.



Enclosed are pages 1-10 and 1-11, "Notes: Pipe Insulation Chart." In reading these two pages several points are evident which were not complied with at Diablo: (1) vapor barrier requirements; and (2) the application of a double layer of insulation on high thermal lines. In PG&E's answers to the staff concerning stress walkdown, they tried to explain away interferences by local crushing of calcium silicate. Note, this is not acceptable on Page 1-10.

Also enclosed is a copy of page 1-13, "Insulation Removal Request Flow Chart" and page 1-14, "Request for Insulation Removal." I am not aware of either of these procedures being followed at Diablo.

Also enclosed is a copy of Section 7, "Welding Instruction." On page 7-2, item 15, it is stated that there are no dihedral angle limitations for skewed T-joints. I feel this policy will cause problems by design personnel failing to consider welds shown as fillet as partial penetration groove welds unless a note specifically stated that it should be considered otherwise. I personally know many engineers will assume a fully effective throat for any weld indicated as a fillet. I suggest a test at site on this point before a decision is made on how to represent a skewed T-joint.

Also on page 7-5, see "attachment I." Either I don't understand this table or no allowance was added for the throat deduction for inadequage penetration. This last conclusion was also that of a pre-inspect engineer at Diablo Canyon.

Lastly, on pages 7-7 thru 7-10, I would like to point out the concise clarification of weld symbol terminology. Had this part of the book been in effect at Diablo, many questions would have been resolved (although many

other questionable practices would have become evident to many field personnel).

I have read the above 11-page statement and it is true and correct to the best of my knowledge and belief.

Charles C. Stokes 4/12/84  
Charles Stokes

## LINE DESIGNATIONS (NOTES 1) THROUGH (16)

[illegible]

ARMOR SPEC.	CLASS 750 500.1	CLASS 750 500.1	SEW 10 500.1	STG 10 500.1	SEW 10 500.1	SEW 100 500.1	SEW 100 500.1	SEW 100 500.1	SEW 100 500.1	SEW 100 500.1	SEW 100 500.1	SEW 100 500.1	SEW 100 500.1
0	5.10	10.00											
1			1.0 >										
2			75.10	12.0 >									
03			4.00	12.0 >									
4			75.10	12.0 >		1.0 <							
5			75.10	12.0 >		1.0 <							
6			75.10	12.0 >		1.0 <							
07			75.10	12.0 >		1.0 <							
08			75.0		5.00	1.0 <							
09			4.0			75.0							
112			75.10	12.10		1.0 <							
113			10.0.30						10.00				
113			75.10	12.0 >		1.0 <							
130			75.0		5.00	1.0 <							
135			4.0			75.0							
135			75.0		5.00	1.0 <							
135			4.0			75.0							
135						1.0 <							
140						75.00	30						
147									5.10				
15												7.0 <	
15												75.0 >	
16												1.0 <	
17												75.0 >	
18												7.0 <	
19												75.0 >	
20												7.0 <	
21												75.0 >	
22												7.0 <	
23												75.0 >	
24												7.0 <	
25												75.0 >	
26												7.0 <	
27												75.0 >	
28												7.0 <	
29												75.0 >	
30												7.0 <	
31												75.0 >	
32												7.0 <	
33												75.0 >	
34												7.0 <	
35												75.0 >	
36													

- A - DESIGN TO ANSI 831.1-1967; MATERIAL, N.D.E., FABRICATION AND ERECTION TO ANSI 831.7 CLASS I-1969 EDITION PLUS 1970 ADD., PG&E DESIGN CLASS I
- B - ANSI 831.7 CLASS II, 1969 EDITION PLUS 1970 ADD., PG&E DESIGN CLASS I
- C - ANSI 831.7 CLASS III, 1969 EDITION PLUS 1970 ADD., PG&E DESIGN CLASS I
- E - ANSI 831.1-1967, PG&E DESIGN CLASS II
- E1 - CLASS E, MODIFIED TO REQUIRE "FILE 44" - DESIGN EARTH-QUAKE ANALYSIS
- G - NFPA; ALSO COMPLIES WITH ANSI 831.1
- G1 - NFPA STANDARDS, PG&E DESIGN CLASS II (TO CFR 50 APPENDIX 8 QUALITY ASSURANCE PROVISION APPLIES TO THIS PG&E DESIGN CLASS II SYSTEM)
- - DESIGN TO ANSI 831.1-1967, FABRICATION, ERECTION AND INSPECTION TO ASME BOILER AND PRESSURE VESSEL CODE SECTION I, 1968 EDITION, PG&E DESIGN CLASS I.  
(EXCEPTION: LINES No. 1 THROUGH No. 12 AND No. 18 ARE ASSIGNED TO THE 1955 EDITION OF ANSI 831.1 AND APPLICABLE NUCLEAR CODE CASES.)

Generally, pipe insulation is furnished in 3-foot half sections for pipe sizes up to 24-inch in calcium silicate and up to 14-inch pipe size for 35 percent magnesite and diatomaceous earth. Insulation for pipe sizes larger than those mentioned is usually furnished in 3-foot long segments or curved blocks.

## 15





WELDING INSTRUCTIONS  
(EXCERPTED FROM ESD-223 REV. 7)

1. WELDS SHALL NOT BE PEENED.
2. FULL PENETRATION WELDS SHALL BE FIT IN ACCORDANCE WITH THE WELD PROCEDURES DESIGNATED BY THE FIELD ENGINEER. ROOT OPENINGS USING BACKING STRAPS SHOULD BE  $1/4"$  PLUS OR MINUS  $1/16"$ . ROOT OPENING REQUIREMENTS FOR STAY WELD PROCEDURES ARE  $1/8"$  PLUS OR MINUS  $1/32"$ .
3. PARTIAL PENETRATION GROOVE WELDS SHALL BE FIT IN ACCORDANCE WITH THE WELD PROCEDURE DESIGNATED BY THE FIELD ENGINEER. THE JOINT SHALL BE BROUGHT INTO AS CLOSE CONTACT AS POSSIBLE. THE GAP BETWEEN PARTS SHALL NOT EXCEED  $3/16"$ .
4. SQUARE GROOVE WELDS SHALL BE FIT IN ACCORDANCE WITH THE WELD PROCEDURE DESIGNATED BY THE FIELD ENGINEER. ROOT OPENING SHALL BE  $2"$  TO  $1/16"$  MAXIMUM.
5. FILLET WELDS SHALL BE FIT IN ACCORDANCE WITH THE WELD PROCEDURE DESIGNATED BY THE FIELD ENGINEER. PARTS TO BE JOINED SHALL BE BROUGHT INTO AS CLOSE CONTACT AS POSSIBLE. NO PACKING, SHIMMING, OR WELDING WILL BE PERMITTED TO CORRECT POOR FIT-UP OF JOINTS. IF THE DEFORMATION IS  $1/16"$  OR GREATER, THE LEG OF THE FILLET WELD SHALL BE INCREASED BY THE AMOUNT OF THE DEFORMATION. THE GAP SHALL NOT EXCEED  $1/32"$ .
6. ALL MEMBERS SHALL BE VISUALLY PLUMB, TRUE TO LINE, AND SUBSTANTIALLY FREE FROM BENDS, TWISTS, OR EXCESSIVE GAPS.
7. ALL WELD PREPARATION SURFACES SHALL BE FREE FROM FOUNDRY OR MILL SCALE, OIL, RUST, SAND, SLAG, PAINT, AND ANY TYPE OF SURFACE OXIDE OR DIRT.
8. WELD PREPARATION SHALL BE SMOOTH AND UNIFORM. IF WELD PREPARATIONS ARE FORMED BY FLAME CUTTING, THEY SHALL BE GROUND AND DRESSED BEFORE WELDING.
9. UNDERCUT, EXTENDING THE LENGTH OF THE WELD, SHALL NOT EXCEED  $1/32"$  IN DEPTH. LOCAL UNDERCUT SHALL NOT EXCEED  $1/16"$  WHEN THE LENGTH OF A LOCAL UNDERCUT AREA DOES NOT EXCEED  $1/2"$  IN ANY  $6"$  LENGTH OF WELD.
10. FOR GROOVE AND FILLET WELDS, THE SUM OF THE DIAMETERS OF POROSITY SHALL NOT EXCEED  $1/8"$  IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED  $3/4"$  IN ANY  $12"$  LENGTH OF WELD.
11. MINOR ARC STRIKES ON SUPPORT MEMBERS SHALL BE MINIMIZED. SERIOUS ARC STRIKES ON SUPPORT MEMBERS SHALL BE REMOVED AND/OR REPAIRED PRIOR TO QC ACCEPTANCE. NO ARC STRIKES ON PIPE SHALL BE PERMITTED. ARC STRIKES ON PIPE AND SEISMIC LIMITERS SHALL BE REPORTED ON A DEFICIENT CONDITION NOTICE FOR DISPOSITION PER ESD-268.
12. THE FILLET WELD SIZE SHALL BE AS SPECIFIED ON THE DRAWING. WHERE THE SIZE IS NOT SPECIFIED, THE FILLET SHALL BE OF THE SAME SIZE AS THE THICKNESS OF THE THINNER OF THE TWO MEMBERS BEING JOINED. AS-BUILT IS REQUIRED TO SHOW WELD SIZE.

13. OVERWELD: FOR EXISTING WELDS ANY AMOUNT OF OVERWELD IS ACCEPTABLE, PROVIDED DISTORTION IS NOT EXCESSIVE. FOR NEW WELDS THE MAXIMUM OVERWELD SHALL BE 50 PERCENT OR  $1/8"$ , WHICHEVER IS GREATER, PROVIDED THAT DISTORTION IS NOT EXCESSIVE. (SEE PARAGRAPH 8.8.2.4.A.) AS-BUILT IS NOT REQUIRED.

14. UNDERWELD: FOR EXISTING WELDS, ANY UNDERWELD IS ACCEPTABLE PROVIDED THAT THE AISC RECOMMENDED MINIMUM WELD SIZE FOR THE MATERIAL BEING WELDED IS MET. A NEW FILLET WELD IN ANY SINGULAR CONTINUOUS WELD SHALL BE PERMITTED TO UNDERRUN THE NOMINAL FILLET WELD SIZE REQUIRED BY  $1/16"$  WITHOUT CORRECTION, PROVIDED THAT THE UNDERSIZED PORTION OF THE WELD DOES NOT EXCEED 10% OF THE LENGTH OF THE WELD.

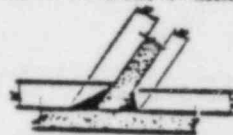
AS-BUILT IS REQUIRED TO SHOW EXISTING WELDS WHICH ARE MORE THAN 25 PERCENT UNDERSIZED AND/OR UNDERSIZE FOR MORE THAN 20 PERCENT OF THE TOTAL LENGTH OF THE WELD.

FILLET WELD SIZE TABLE

MATERIAL THICKNESS OF THICKER PART JOINED	MINIMUM SIZE OF FILLET WELD
UP TO AND INCLUDING $1/4"$	$1/8"$
OVER $1/4"$ THROUGH $1/2"$	$3/16"$
OVER $1/2"$ THROUGH $3/4"$	$1/4"$
OVER $3/4"$ THROUGH $1-1/2"$	$5/16"$
OVER $1-1/2"$ THROUGH $2-1/4"$	$3/8"$
OVER $2-1/4"$ THROUGH $6"$	$1/2"$
OVER $6"$	$5/8"$

15. FILLET WELDS ON SKEWED T-JOINTS

- a. THERE ARE NO DIRECTIONAL ANGLE LIMITATIONS.
- b. THE SIZE OF FILLET WELDS ON SKEWED T-JOINTS SHALL BE DETERMINED BY MEASURING THE NOMINAL LEG, AS FOLLOWS:

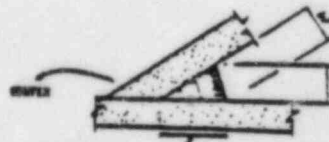


W = NOMINAL WELD LEG

NOTE: WELD SURFACES MUST BE FLAT OR CONVEY.

16. PARTIAL PENETRATION WELDS

- a. WHEN VERIFYING THE SIZE OF PARTIAL PENETRATION BEVEL WELDS, THE FACE MUST BE AT LEAST FLUSH WITH THE FACE OF THE BEVELED PIECE.
- b. ON FIT-UP INSPECTION IS REQUIRED ON PARTIAL PENETRATION GROOVE WELDS DESIGNED AT SKEWED T-JOINTS. THE SIZE OF PARTIAL PENETRATION GROOVE WELDS, WHICH HAVE BEEN DESIGNED TO BE INSTALLED AT SKEWED T-JOINTS, SHALL BE DETERMINED BY MEASURING THE FACE OF THE WELD, AS FOLLOWS:



W = NOMINAL WELD LEG

S = SPECIFIED SIZE

USE W MINIMUM IN DETERMINING WELD SIZE.

THE ACCEPTABILITY OF THE WELD SIZE SHALL BE DETERMINED BY USING THE CHART IN ATTACHMENT I.

17. FLARE-BEVEL WELDS WHICH ARE FORMED BY AT LEAST ONE PIECE OF TUBE STEEL SHALL HAVE THE SIZE DETERMINED AS FOLLOWS:

- a. WHEN NO SIZE IS SPECIFIED ON THE DRAWING, THE FACE OF THE WELD SHALL BE AT LEAST FLUSH WITH THE FACE OF THE TUBE STEEL BEING WELDED.
- b. WHEN THE SIZE OF THE WELD IS SPECIFIED ON THE DRAWING, THE SIZE OF THE WELD SHALL BE DETERMINED BY MEASURING THE FACE OF THE WELD AS FOLLOWS:



W = NOMINAL WELD FACE

S = SPECIFIED SIZE

THE ACCEPTABILITY OF THE WELD SIZE SHALL BE DETERMINED BY USING THE CHART IN ATTACHMENT I.

## 1.6. PREPLAY AND INTERPASS

- \* THE FOLLOWING PREHEAT AND INTERPASS TEMPERATURES SHALL BE USED FOR THE WELDING OF CARBON STEEL SUPPORT MEMBERS TO EXISTING STRUCTURAL STEEL AND RUPTURE RESTRAINTS (EXCLUDING INSERTS):

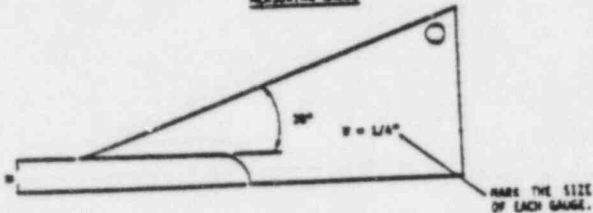
MATERIAL THICKNESS (INCHES)	PROXELAT (IN)	INTERPASS (IN)
UP TO 3/4	90"	800
OVER 3/4 - 1-1/2	150	800
OVER 1-1/2 - 2-1/2	225	800

NOTE: FOR WELDING OF DISSIMILAR METALS, THE MINIMUM PREHEAT TEMPERATURE AND MAXIMUM INTERPASS TEMPERATURE SHALL BE IN ACCORDANCE WITH THE WELD PROCEDURE

MATERIAL TO BE PLANE DRIED WHEN BELOW 70°F.

- PREHEAT REQUIREMENTS SHALL BE DETERMINED BY THE WANGER FIELD ENGINEER DURING INITIATION OF THE REQUIRED PROCESS SHEETS PRIOR TO RELEASE OF WORK. THE PREHEAT SHALL BE A GC HOLD POINT ON THE GENERAL FIELD PROCESS SHEET.

ATTACHMENT H  
MEASURING GAIN

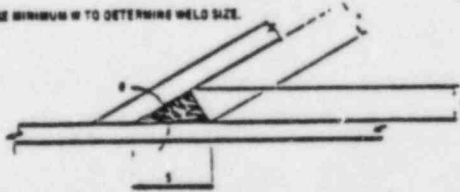


Q - 3/16"  
1/4"  
5/16"  
3/8"  
7/16"  
1/2"  
5/8"  
3/4"  
7/8"

- ONE SET

## ATTACHMENT 1

\* USE MINIMUM W TO DETERMINE WELD SIZE.



IF MINIMUM W MEASURED IS GREATER THAN OR EQUAL TO S SPECIFIED, NO MORE SIZE CHECKING IS NEEDED.

IF MINIMUM W MEASURED IS LESS THAN S SPECIFIED, CONSULT THE TABLE BELOW TO VERIFY THAT W MEASURED IS GREATER THAN OR EQUAL TO W REQUIRED.

IF MINIMUM W MEASURED IS LESS THAN W REQUIRED, WELD IS UNDERSIZE.

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
--	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

EQUIVALENT WELD SIZE "W" FOR PARTIAL PENETRATION BEVEL WELDS (SEE PARAGRAPH 6.2.2.6.2).

**ATTACHMENT J**



IF NO MEASUREMENT IS GREATER THAN OR EQUAL TO 0.5-TIMEPER, NO MORE SIZE IMPROVEMENT IS NEEDED.

IF W MEASURED IS LESS THAN S SPECIFIED, CONSULT THE TABLES BELOW TO VERIFY THAT W MEASURED IS GREATER THAN OR EQUAL TO W REQUIRED.

IF WEIGHED IS LESS THAN IS REQUIRED, WELD IS UNDERWELD.

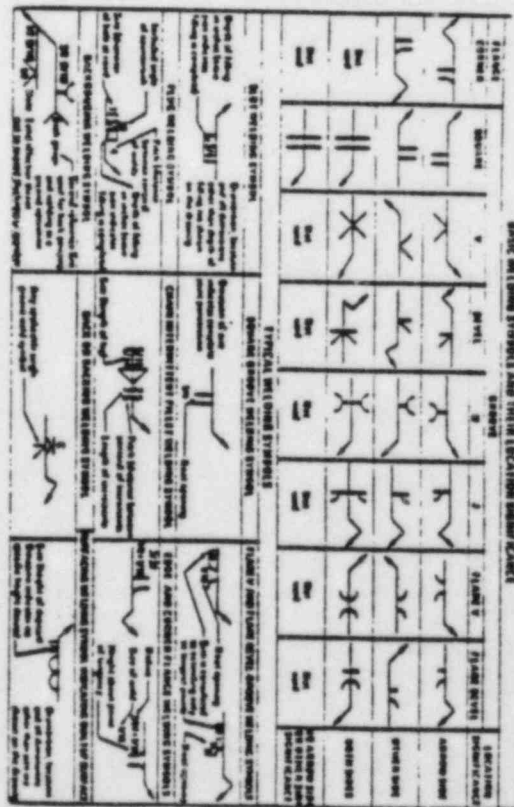
THIN STEEL PERMITTERS LISTED ARE EQUAL TO OR HIGHER  
ALL DIMENSIONS ARE IN INCHES


















[illegible]

TWO STEEL MEMBERS OF GREATER THAN 24 INCHES  
ALL DIMENSIONS ARE IN INCHES



















TABLE 1. SUMMARY OF DATA FOR THE 1970-1971 SEASON													
STATION	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
100	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
100 < 2.100	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
200 < 4.200	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
300 < 6.300	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
400 < 8.400	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
500 < 10.500	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
600 < 12.600	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
700 < 14.700	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
800 < 16.800	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
900 < 18.900	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15
1000 < 21.000	1/10	1/15	1/20	1/25	1/30	2/5	2/10	2/15	2/20	2/25	3/5	3/10	3/15













IMMEDIATE WELD SIZE "B" FOR FLARE BEVEL WELDS SEE PARAGRAPH 4.2.2. LACING



STANDARD SYMBOLS FOR AIRBORNE FORCE		STANDARD SYMBOLS FOR AIRBORNE FORCE	
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force

7-10

STANDARD SYMBOLS FOR AIRBORNE FORCE		STANDARD SYMBOLS FOR AIRBORNE FORCE	
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force

STANDARD SYMBOLS FOR AIRBORNE FORCE		STANDARD SYMBOLS FOR AIRBORNE FORCE	
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force
	Airborne Force		Airborne Force

7-8

7-8

GOVERNMENT ACCOUNTABILITY PROJECT

Institute for Policy Studies  
1901 Que Street, N.W., Washington, D.C. 20009

ATTACHMENT

3

(202) 234-9382

March 2, 1984

Mr. Thomas Bishop  
Division Director  
U.S. N.R.C.  
Region Five  
1450 Maria Lane, Ste 210  
Walnut Creek California 94596

Re: PACIFIC GAS AND ELECTRIC (Diablo Canyon Nuclear Power  
Plant, Unit 1), Dkt. No. 50-275

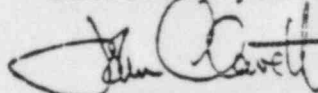
Dear Mr. Bishop:

Enclosed with this letter is a copy of a petition filed with the Commission pursuant to 10 C.F.R. 2.206 on March 1, 1984, together with Attachments 1 through 17 thereto.

Also enclosed for your use, bound separately in this package, are three documents that were not included in the petition filed on February 2, 1984: Exhibit 4 to Attachment 2, and two Discrepancy Reports inadvertently omitted from Attachment 7.

Best wishes in your continuing investigation.

Sincerely yours,



John Clewett

Enclosures: A/S

~~8444030427~~