March 2, 1984

POLICY ISSUE
(Information)

SECY-84-104

MEMORANDUM FOR: The Commissioners

FROM: William J. Dircks
Executive Director for Operations

SUBJECT: DOCUMENTATION OF A STAFF INSPECTION OF A NUCLEAR SERVICES CORPORATION AUDIT AT DIABLO CANYON

Purpose: To provide the Commissioners with information regarding the circumstances surrounding the documentation of a staff inspection of a 1977 Nuclear Services Corporation (NSC) audit related to the Pullman Power Products Company at Diablo Canyon Nuclear Power Plant.

Background: Diablo Canyon Safety Evaluation Report Supplement No. 21 provided a summary assessment of recent NRC staff activities related to an inspection of a NSC audit of Pullman Power Products Company at Diablo Canyon. The summary assessment (pg. 2-157 of SSER 21) stated that "The details of the staff review are documented in Inspection Report 50-275/83-37". This statement is incorrect in that it leads the reader to conclude that report 50-275/83-37 was a final, issued report. That was not the case. At the time SSER 21 was written and published, report 50-275/83-37 was a draft document. The discussion, which follows, explains the circumstances surrounding staff activities in this area.

Discussion: In early November 1983 (prior to receipt of large numbers of allegations) a Region V management decision was made to perform a mini-team inspection at Diablo Canyon. The NSC audit of the Pullman Power Products Company was selected as the vehicle for this inspection effort. Consistent with routine practice the lead inspector obtained a sequential inspection report control number (no. 50-275/83-37) in advance of the inspection. The inspection was initiated November 14, 1983 and was completed on December 9, 1983. A draft report of the inspection was developed as the inspection progressed.

The draft report of inspection no. 50-275/83-37 is provided as Attachment 1. This is the draft which existed when SSER 21 was issued. This document was typed by a NRC staff secretary at the Diablo Canyon site during the week of December 4, 1983. Typing was done in a piece meal fashion, wherein the inspectors wrote report sections in the evenings and turned them in for typing the next day. The typist typed the individual items in order of receipt. For this reason there are breaks in the page numbering sequence (pages 47 to 49, 65 to 71 and 74 to 119) where the typist was typing subject matter other than that pertaining to the NSC audit. The majority of the handwritten

See ↑

annotations on the typed draft are management review comments. A few of the handwritten annotations are the inspector's (e.g. page 72). It can be noted that pages 72 and 73 represent the inspector's first draft of the SSER 21 summary assessment section pertaining to this subject. The summary assessment erred in implying that the report was issued. This error was not detected in the review of SSER 21.

It should also be noted that during staff's review of the summary assessment on the NSC audit, sloppy draftsmanship was found to have resulted in another potentially misleading statement. It is implied in that summary that the staff had reviewed approximately 70% of the total NSC findings. As is reflected on page 2 of the attached draft report (Attachment 1), the staff's 70% review was of the NSC findings identified in the Joint Intervenor's supplementary motion. This distinction was lost when editing the draft summary assessment (see p. 72 and 73 of Attachment 1).

The final report on this subject was issued on February 29, 1984 and is provided as Attachment 2. The issuance of the final report was delayed in part due to the continued and heavy influx of allegations which were received in December 1983 and January 1984 requiring the inspection staff to perform inspections, in lieu of smoothing final documentation. The report was also delayed due to the need to improve the organization and presentation of the original draft. The major conclusions contained in the final report are consistent with those in the draft report.

Conclusions: The statement in SSER 21 referring to report 50-275/83-37 is misleading. However, the inspection had been, in fact, completed and a draft report prepared. That inspection and the results thereof, together with the draft report was the staff's basis for the statements contained SSER 21. The report had not been finalized and was issued February 29, 1984. The major conclusions drawn in the final report are consistent with those presented or implied in the original draft.

William Dircks
Executive Director for Operations

Attachment 1:
Draft of Report 50-275/83-37
Entitled: "Concern No. 68"

Attachment 2:
NRC Inspection Report 50-275/83-37

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Conclusions: The statement in SSER 21 referring to report 50-275/83-37 is misleading. However, the inspection had been, in fact, completed and a draft report prepared. That inspection and the results thereof, together with the draft report was the staff's basis for the statements contained SSER 21. The report had not been finalized and was issued February 29, 1984. The major conclusions drawn in the final report are consistent with those presented or implied in the original draft.

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Entitled: "Concern No. 68"

Attachment 2:
NRC Inspection Report 50-275/83-37

Concern No. 68

ATTACHMENT (1)

Introduction:

Region V of the Nuclear Regulatory Commission (NRC) has performed an unannounced inspection to evaluate the Joint Intervenor's concern of a major breakdown in the Pullman Power Products (PPP) onsite QA program during a significant period of construction at Diablo Canyon Station. This issue, brought forth by the Joint Intervenors, to reopen the record on construction quality assurance is based upon the results of a Nuclear Services Corporation (NSC) audit completed in SEptember, 1977.

Purpose:

The goal of this inspection effort is threefold:

(a) To develop a basis of confidence by which the NRC can verify previous conclusions that the NSC audit was primarily programmatic in nature and did not represent any findings which would show a significant deficiency in plant construction quality.

(b) To establish a level of assurance that the PPP and PG&E Q.A. program's responses to the NSC audit findings were accurate, appropriate, and effective in resolving all issues pertinent to compliance with codes and regulations.

(c) To provide reasonable assurance in resolving the question of whether PPP Q.A. program onsite, during construction prior to the NSC audit, was

adequate in ensuring work performed in the field can be considered acceptable and conforming to existing requirements.

Scope of Inspection Plan:

First, the NRC inspection effort involved review of all NSC audit findings listed in the report issued October 24, 1977. In conjunction, a face value assessment was performed on the accuracy and completeness of PPP and PG&E's responses (dated April 11, 1978 and June 16, 1978 respectively) to each of the NSC findings. A selection of significant NSC audit findings was generated by the NRC for an indepth onsite review of documentation and interview of responsible personnel.

Those findings selected as the subject of an NRC audit were based on the following rationale:

(a) Audit findings which appeared to have the greatest potential for manifestation of poor quality work in the field.

(b) Audit findings which specifically reference characteristics of poor field work practice.

(c) A reasonable sample of the principal deficiencies alluded to in the Joint Intervenors Supp. A 70% sample selection was made giving priority to those

findings not fundamentally programmatic but which could reasonably impact upon construction quality.

(d) Any findings that appear to be in noncompliance with accepted standards, codes and regulations.

In parallel with the NRC inspection there occurred an examination, by independent consultant, of selected field work and records to verify compliance with code requirements. A sample of twenty five stainless steel welds were examined for delta ferrite. One hundred radiographs were selected to verify field weld and inspection review adequacy. Also, four specific welds from among those identified in the NSC findings were examined, to establish existence of surface preparation acceptability for nondestructive examination and to reperform liquid penetrant testing of field welds in ascertaining degree of actual compliance.

The NRC has reviewed the non-conformance reports and minor variation reports issued by the licensee as a result of an audit conducted by the PG&E Q.A. department of the PPP Q.A. program, issued June 13, 1978. Corrective actions identified by these NCRs and MVRs was evaluated for adequacy and implementation.

Criterion I, NSC Finding No. 3:

allegation
not addressed

"The field Quality Assurance Organization has performed functions other than those described in KFP-1 and KFPS-1; and some functions were outside the quality responsibility, i.e., writing and approving Engineering Specifications, performing welding engineering functions, approving engineering changes. These activities raise the question of the qualification of Quality Assurance personnel to perform these functions and the problem of requiring the Field Quality Assurance Organization to audit its own performance."

NRC Finding: To resolve this issue the inspector's approach was to establish who in Pullman was allowed to write procedures or procedure changes, the review and approval process for such documents and whether sufficient control was exercised by Pullman in the writing, review and approval process. In addition, the validity of the Pullman response was assessed.

The quality assurance program prescribed by the Pullman ASME QA Manual procedure KFP-1, as implemented in part by procedure ESD269, apparently allows anyone to be assigned the task of writing procedures. However, the point of control in this procedure writing process is that the cognizant discipline management is required to review and approve the procedure prior to issuance for use. For example, the Pullman Chief Field Engineer is required to review and approve engineering and construction procedures to assure compliance with code, specification and contract requirements; the QA Manager is required to review and approve QA implementing procedures. In addition, engineering specifications covering QA functions are required to be reviewed and approved by the

contractor's QA Manager and PG&E. Engineering specifications may provide instructions to field QA inspectors, field engineers and foremen. One exception to this is that welding procedures to be used onsite were and are required to be qualified by the Welding Engineer at the Pullman home office, are approved and issued by that office, and are approved by PG&E engineering. Engineering Specifications must also be approved by PG&E.

The inspector examined he work history and qualifications of the Mr. R. Fink referred to in the Pullman response to the above NSC finding and finds that Mr. Fink's work history appeared to qualify him to perform welding procedure revisions and prepare additional procedures. His educational history and work experience documents formal course work in welding applications, significant applications in preparing and implementing ASME QA programs, and formal coursework and experience in all phases of NDE, including qualification as a level II radiographer and interpreter.

Criterion IC, NSC Finding 10.a: "Records of welder qualification prior to 1972 are not available."

NRC Finding: The inspector's approach to resolving this issue was to determine if welder qualification documentation was available prior to 1972 and to assess the validity of the Pullman response to the NSC finding.

The inspector examined welder qualification documentation, including weld coupon test results, for titled "Manufacturer's Record of Welder Performance Qualification Tests on Groove Welds." The inspector found that 20 welders (welder stamp letters A, B, C, D, E, F, G, H, I, J, K, L, N, O, Q, R, S, T, U, and V) were qualified during the period beginning August 4, 1971 and ending December 23, 1971. The inspector did not corroborate the NSC finding.

The 90 day qualified welders log was started at the beginning of 1972 and was continued through the present time, except for the labor between June and November, 1974.

The inspector was not able to determine when the first production welding was performed or on what system the first weld was accomplished. Thus, the inspector was not able to verify the validity of the Pullman response to the NSC audit finding.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.b: "The Ninety-Day Welders' Log was not maintained from August, 1972 to December, 1972. There is no Weekly Qualified-Welders List for that time period to substantiate that the welders were actually qualified."

NRC Findings: The inspectors approach to resolving this issue was to examine the 90 day welders logs to determine whether the gap exists, determine the basis

for establishing the weekly qualified welders list, determine whether the weekly list is available for the above time period and, if not, the reasons for the unavailability.

The inspector examined the 90 day welder's log and found that no void existed between 8/72 and 12/72. While it is true that no weekly qualified welders list exists for that time period, the basis for establishing the weekly list is the 90 day qualified welder's log. The weekly qualified welder's list is not a document requiring retention by the Pullman QA program.

The 90 day welder's log provides documentary evidence of welder qualification in that the bases for the establishement of the 90 day qualified welders log are the record of weld filler metal withdrawal sheets and the welder qualification records.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.c: "The Ninety-Day Welders' Log is not sufficiently detailed to determine if the welder is qualified to perform certain procedures. The Ninety-Day Welders' Log has been revised a number of times, and the detail has improved with each revision. Previous to the latest revision (November, 1974), the log was very poor in giving precise information relative to procedure and thickness ranges to which the welder was qualified." The inspector's approach to resolving this issue was to examine a representative

sample of the early 90 day qualified welder's logs and determine if the information contained was sufficient to conclude that a welder was qualified to perform certain welding procedures.

NRC Findings:

The 90 day qualified welder's logs for the perior from 1972 through 1978 were examined. The log identifies the welder, weld stamp identifier, the procedures which the welder was qualified to perform, and the welding process (i.e., metal-arc, insert, Gas Tungsten Arc for both carbon and stainless steel, and Gas Metal Arc for carbon steel) qualified to perform. Process use in the 90 day log was and still is determined from a review of weld filler metal withdrawal sheets. The inspector discussed the Pullman method of tracking welder qualifications with the Code Authorized Inspector who was onsite during the early construction years. The authorized inspector stated that he reviewed the Pullman methodology for documenting welder qualifications and was satisfied that the Pullman method had been acceptably implemented. The inspector observed that the 90 day qualified welders log had been frequently revised to provide more information; including qualification coupon wall thickness, and specific (versus general) identification of procedure and process as the number of welding procedure specifications in use expanded. In the early days of construction the number of specific welding procedures was small with these procedures being refined and narrowed in applicability as construction progressed and experience dictated.

The inspector finds that the 90 day qualified welder's log was sufficiently detailed to determine whether a welder was qualified to perform certain procedures. Weldment thickness qualified to perform was added to the 90 day log as a result of an NRC concern during the later phases of construction during about 1977.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.d: "No procedure states what the Field Quality Assurance Inspector uses as the primary means to determine welder qualification, the Ninety-Day Welders' Log, the Weekly Qualified-Welders List, or the Welder's Qualification Card."

NRC Findings:

The inspector's approach to resolving this issue was to evaluate the validity of the NSC finding and Pullman response.

The ASME QA Manual, procedure KFP-15 (Welding Qualifications, dated 8/22/72) generally describes the responsibility and methodology used by Pullman in assuring that welders are tested, qualified and issued a stamp. ESD-216 (Welding Performance Qualification) is the implementing procedure for the welder qualification process. Neither procedure describes precisely what the assigned QA Inspector uses to determine whether a welder has used a specific process and

is thus qualified; however, discussions, with the Authorized Inspector and Pullman personnel who have been onsite since the early 1970s, indicate that weld filler metal withdrawal sheets had always been used to determine whether a particular welder had used the specific process during the previous 90 days or whether he had used another process during the extended 6 month period, specified by the ASME Code, immediately prior to the point in time under consideration.

The inspector finds that no Pullman procedure identifies what the field QA inspector uses as a primary means to determine welder qualification, however, the practice utilized by Pullman was generally well known by both personnel and management assigned primary responsibility for tracking welder qualification. Furthermore the inspector considers that the method historically used by Pullman (i.e., weld filler metal withdrawal sheets and welder qualification records) was sufficient and adequate to document and verify welder qualification, as required by the ASME B&PV Code Section IX.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.e: "No procedure specifies who is responsible for the Ninety-Day Welders' Log, the Weekly Qualified-Welers List, or the Welder's Qualification Card; how the information is obtained; how the logs are used; to whom they are distributed; etc."

NRC Findings:

The inspector's approach to resolving this issue was to assess the validity of the NSC finding and Pullman response, examine the applicable procedural requirements and practices employed and assess the adequacy of the findings for compliance to code requirements.

As described in finding 10.e, above, the inspector examined (1) procedures KFP-15 and ESD-216, and (2) the 90 day qualified welder's logs from 1972 through 1978. The inspector found that the 90 day log was continuously maintained, except for the strike during June-November, 1974. All welders who returned following the strike were requalified by performance of test welds to reestablish a basis for the 90 day log. Both procedures (KFP-15 and ESD-216) imply that the assigned QA inspector is to keep and maintain the 90 day qualified welders log, the weekly qualified welders list, and the welder's qualification records. This was apparently the understanding of both the QA inspectors and QA management and was consistently implemented. That the procedures do not specifically assign such responsibility for the maintenance of the above documents is of minimal significance. The inspector finds that the Pullman practice and procedures for documenting and maintaining welder qualification status was and is adequate.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.f: "Procedure KFPS-13 differs from KFP-15 in that it does not permit a six-month extention of welder qualifications if the welder has been actively welding on some other welding process. Procedure KFPS-13 requires the welder to use the specific welding process within a three-month period or be requalified. There is no evidence of adherence to this resuirement for pipe support welding"

NRC Findings:

The inspector's approach to resolving this issue was to examine the NSC referenced procedures, assess the validity of the NSC finding and Pullman response, and evaluate the findings for compliance with the ASME Code.

The inspector reviewed procedure KFPS-13 (Pipe Support Field Procedure - Welding Qualifications - dated 12/3/73) and notes that paragraph 13.2.3 was revised on 11/30/77 to reflect the provision of the ASME Code, Section IX, paragraph QW322 which provide that "Renewal of qualification of a performance specification is required when a welder has not used the specific process, i.e., metal-arc, gas, submerged arc, etc., for a period of 3 months or more except when employed on some other welding process the period may be extended to six months."

The ASME Code prescribes that the most current edition of Section IX be implemented at all times. Discussion with the Pullman QA Manager, the Welding Qualification QA Inspector, and the Authorized Inspector during the early

construction phase, indicated that the current revision of Section IX was consistently implemented and that the apparent omission of the time extension provision of the Code in KFPS-13 was an omission of the relaxed requirements provided in Section IX. Examination of the 90 day Welder Qualification Logs for the years of 1972 through 1979 indicate that adequate welder qualification documentation was maintained. Further, discussions with the above individual indicates that verification of a welders use of another process, as provided by Section IS, was accomplished by review of the weld filler metal withdrawal sheets which issued weld filler metal to the welder. These sheets document the procedure to be employed by the welder in performance of welding with the filler metal issued. The ASME QA manual for code piping (KFP procedures) provided for use of the referenced ASME Section IX option; however, the Pipe Support QA manual (KFPS procedures) were subordinate to the ASME QA manual and, therefore, welder qualifications were accomplished using the option provided by the ASME QA manual and Section IX. The inspector finds that the Pullman practice for welder qualification tracking was consistent with the ASME B&PV Code

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.h: "Procedure ESD-219 requires random sampling of in-process welding, with the sampling to be noted on the Field Process Sheets. In examining Field Process Sheets, it is obvious that the sampling by the area inspectors was not performed."

NRC Findings: The inspector's appraoch to resolving this issue, was to assess the validity of the NSC finding and Pullman response and evaluate the NRC findings for safety significance and/or compliance with the Pullman program.

The inspector examined the revision/change records of procedure ESD-219 (Weld Procedure Monitoring) and observed that paragraph 4.4 was revised on 12/30/77 to prescribe that sampling checks of in process welding may be noted on the process sheet or inspectors daily work sheet. ESD-219 required that welder audits were to be performed on each welder every six weeks and recorded on the welder audit sheet. These audits were done on a sampling basis. The welder audit sheet was upgraded on 12/10/73, 2/4/74, 12/6/74, 6/27/74 and 6/17/76 as experience in the use of the audit sheets identified an upgrading need. The inspector considers that the performance of welder audits of each welder every six weeks was an appropriate method for recording in process welding observations. The fact that the procedure did not require that such observations be recorded on the process sheet is viewed as a finding of no safety significance.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.i: "Procedure ESD-219 requires periodic auditing by the Welding Auditor. These audits were not performed until November 5, 1973; and Pullman Power Products was not in compliance with this procedure for approximately 23 months."

NRC Findings:

The inspector's approach to resolving this issue was to assess the validity of the NSC finding and Pullman response, and evaluate the NRC findings for conformance with the specified Pullman Program.

The inspector examined the records of change/revision to ESD-219. The records show that the procedure was written on 2/14/73; however, the records of the 9/73 revision and 11/73 implemented procedure are not available. As observed above, the record shows that ESD-219 was revised in late 1973, implying that implementation occurred sometime earlier. Examination of the 1973, 1974 and 1975 welder audit sheets indicate that the required welder

audits were performed beginning November 1, 1973. Discrepant findings appear to have been adequately dealt with and resolved.

The welder audit sheets examined indicate that ferrite control measurements were performed on welds by the auditors.

The inspector concurs with the NSC finding that these audits were not performed until early November, 1973, and concurs with the Pullman response that ESD-219 was not written until February, 1973. The procedure implementation appears to

have begun in November 1973. Since the record of the 9/73 reivision is not available the inspector could not determine when the procedure was approved for implementation and, thus, was not able to corroborate the Pullman statement that the September 1973 revision was made to initiate the auditing of welders. However, based on the above, the inspector was not able to corroborate the NSC statement that Pullman was in noncompliance with the procedure for about 23 months.

No items of noncompliance or deviations were identified.

Criterion IX, Finding 10.j: Procedure ESD-219 requires monitoring stainless steel welds for ferrite control. However, the Severin Gauges were not on site until the beginning of 1973; and Pullman Power Products was not in compliance with this procedure for approximately 12 months.

NRC Findings:

The inspector's approach to resolving this issue was to examine the Pullman response to the NSC finding, establish the degree of response validity and have Parameter, Inc., an NRC consultant, independently examine a sample of stainless steel welds in Unit 1 for delta-ferrite and establish the degree of conformance with regulatory requirements.

Document all allegations

By selective examination of stainless steel filler metal certifications and discussion with Pullman personnel, it appears that stainless steel filler metal was purchased with 5 to 15% ferrite requirement.

Ferrite gauges were often used to examine the delta-ferrite level of completed welds. This was established by a review of welding audit documentation.

The inspector chose 25 stainless steel welds at random in Unit 1 and had these welds examined for delta-ferrite by Parameter, Inc. personnel. The results of this examination are listed in Attachement 1 of this report and indicate that all welds examined complied with delta-ferrite acceptance criteria.

Therefore, based on the above the inspector considers that there is a high probability that other stainless steel welds installed in the plant comply with delta-ferrite acceptance criteria.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.1: "The interface of welding to other suppliers' parts and components is not clear. Welding is done to join Westinghouse and Paramount parts and components. The necessity for addressing impact property requirements for those weldments is not clear; in addition, the requirements for addressing impact property requirements for Pullman Power Products field welds are not clear. If impact properties are necessary, the acceptability of each

weld that has been repaired and subjected to more than one stress relief is indeterminate because of the time at temperature limitations within the qualified weld procedure."

NRC Findings:

The NRC approach to resolving this issue was to examine the requirements of the Code in the area of impact testing and evaluate the NSC finding and Pullman response in this area.

The 1971 addenda to ASA B31.7 states, in paragraph 1-723.2.3, that "When the design specification requires impact testing of ferritic steel materials, the tests and acceptance standards shall be in accordance with the requirements of Appendix I." The 1970 edition of B31.7, same paragraph requires evaluation of toughness properties if service is expected to be less than 30°F.

The specification number 8711, imposed on Pullman, doesn't require impact testing of qualification welds for procedure qualification; thus, impact testing of procedure qualification weldments was not performed. The inspector further observes that impact testing is not unilaterally required for such weldments by the B31.7 Code. Specification 8711, Change 12, requires compliance to the 1970 Addenda of ASA B31.7.

The inspector finds that Pullman procedures for impact testing of qualification weldments and specification 8711 are consistent with B31.7 Code requirements.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.m: "Some welders do not receive sufficient training. Welders, fabricating the pipe rupture restraints within the containment, are welding heavy plate. While these welders are qualified by virtue of welding heavy wall pipe, the techniques are different. The welders who were already qualified to heavy wall pipe were not given additional on plate."

NRC Findings:

The inspector's approach to resolving this issue was to examine the code requirements in this area and evaluate the validity of the NSC and Pullman response.

The 1974 Edition of the ASME B&PV Code, Section IX, paragraph QW 303.5 states "...qualification on pipe shall qualify for plate, but not vice-versa except that qualification on plate shall qualify for pipe over 24 in. in diameter." Therefore it appears that the Code recognizes that pipe is more difficult to weld than plate. The Code does not require additional training on plate for

welders originally qualified on pipe. These Code requirements are also reflected in the current edition of Section IX, table QW-461.9.

Qualification on heavy wall pipe (wall thickness greater than about 0.75") requires additional qualification by performance of welds on thicker members; so also does qualification to weld heavy plate.

The inspector found that Pullman welder qualification procedures comply with Code Section IX requirements.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.n: There is no procedure for preheating weld joints."

The inspector evaluated the validity of the NSC finding and Pullman response and evaluate the Pullman program for preheat for conformance with specified requirements.

NRC Findings:

Specification 8711 prescribes that preheating may be performed using either the electrical resistance heating method or localized torch method in conjunction with appropriate tempile sticks.

The inspector examined the following welding procedure code numbers and welding procedure specifications and found that each contained an adequate definition of preheat, postweld heat treatment and interpass temperature requirements: Code Nos. 4/5, 7/8, 15/16, 79/80, 86/87, 88/89, 92/93, 105/106, 129, 134, 149, 150, 200, 201, 202, 203 and 208; Welding Procedure Specification Nos. 88-I-4/5-K-12, 90-I-8/4-K-12, 100-III-8/45-OB-1, 408-III-CARP20-OB-1, 409-III-34-OB-1, and 507-I-42-OB-1.

ESD-218 (Postweld Heat and Preheat Treatment Procedure) was revised 12/30/77 to prescribe preheat requirements and indicate preheat applicability.

ESD-264 (Process Planning and Control-Field Process Sheet) was reviewed by the inspector. The Field Process Sheets were revised in early 1978 to indicate preheat requirements.

No items of noncompliance or deviations were identified.

Criterion IX, NSC Finding 10.o: "The initial results of the welding auditing (from November 5, 1973 to February, 1974) indicate that the following problems existed:

(1) The welders did not understand shielding and purging.

(2) Tempil sticks were not used.

(3) Amperages were not within procedure limits (mainly root welds and tack welds).

(4) Weld procedures were not available, and many welders did not know where to obtain them.

(5) The oxygen analyzer was not available or not operative. Also, the time vs. flow rate alternate technique was not used.

(6) Oven rod temperature control was not monitored by the welders.

(7) Many welders did not understand their duties and responsibilities.

Based on a review of the Pullman Power Products welding audit reports and the frequency of the above-noted problem areas, there is no confidence that welding done prior to early 1974 was performed in accordance with welding specification requirements."

NRC Finding:

The inspectors approach was to examine the records of welder audits conducted during the above time period and assess the validity of the NSC finding and Pullman response.

The inspector critically examined the records of welder audits performed between November 1, 1973 and April 1, 1974. A total of 183 welder audit records were examined.

The NSC audit statement was that "The welders did not understand shielding and purging." The inspector observed that 23 of the reviewed audits identified problems regarding compliance with the 20 psi and 20 cfm requirements for gas pressure and flow. In most cases, the regulator pressure was identified to be higher than 20 psi and the flow rates were near 20 cfm however most were lower. The higher pressure would tend to cause the indicated flow rates to be lower than the actual flow rates, and when corrected for pressure, the flow rates were near the 20 cfm requirement. Excessively high flow rates would be manifested in unacceptable porosity in the weld, which would be detected on NDE. The audit findings did not indicate that welders did not understand shielding and purging, rather the findings point out the difficulties which can be experienced when more than one purge/shield line is connected to a gas source and regulator. In all cases, corrective action was taken to return the pressure and flow rate to the required valves.

The NSC audit identified that tempil sticks were not used. Of the 183 audits examined, fourteen of the audits identified that the welders did not have tempil sticks in their possession. In each case action was taken to provide the welder with Tempil sticks. Several of the welders apparently told the auditors that prior to resuming welding they wait until they can touch the weld; thus

providing issuance that interpass temperature requirements and not exceeded. Contrary to the NSC finding, the audits document that Tempil sticks were used by welders in the vast majority of cases.

The NSC audit identified that amperages were not within procedure limits. Of the 183 audits reviewed, four instances were identified wherein amperages was not within welding procedure specification limits. In each case the welder corrected his amperage setting.

The NSC audit identified that weld procedures were not available and many welders did not know where to obtain them. Of the 183 audits examined, five identified cases where the welder did not have a welding procedure of which three cases were identified where the welder did not know where to obtain them. In each case the corrective action was to have the welder obtain a copy of the welding procedure along with an explanation of the location from where they could be obtained. The inspector concludes that the vast majority of welders used welding procedures and knew where to obtain them.

The NSC audit indicates that the oxygen analyzer was not available for operation. Although this was not a required checkpoint, only one finding of the 183 audits reviewed indicated a problem with the oxygen analyzer. This problem was corrected. Thus, the inspector considers that the welder audit records do not support the NSC finding.

The NSC audit indicates that oven rod temperature control was not monitored by the welders. Of the 183 welder audit records reviewed, fourteen of these audits identified instances where the welders rod oven temperatures were lower then and did not meet the 275°F requirement. Most instances observed by the auditors identified deviations up to 35°F, however two audits observed temperatures as low as 150°F. In all cases the welder was required to return the defective oven to the rod room and obtain another. The audits further indicate that a large number of apparently defective findings were due to the thermometer being out of calibration and reading low, thus indicating that the actual temperature of the oven was higher than that indicated on the thermometers. The primary reason that rod ovens are maintained hot is to preclude moisture entry into the welding electrode coating to minimize the potential for inducing underbead cracking. Recent industry findings indicate that when the temperature of the weld rod is maintained significantly in excess of the atmospheric temperature, thus above the due point, the entry of moisture into the coating is effectively precluded. The NSC finding that rod oven temperature was not monitored by the welders is not supported by the inspector's review of the audits, although isolated instances of ovens being below temperature were identified by the audits.

The NSC audit indicated that many welders did not understand their duties and responsibilities of the 183 audits reviewed, five welder audits indicated that the welder in question did not understand their duties and responsibilities. In each case the welder was reinstructed by the QA inspector auditing the welding

activities, including notification and reinstruction of the welders foreman, as applicable.

In summary, the inspector notes that isolated instances of problem areas were identified and corrected by the Pullman welding inspectors. However, the inspector does not consider the aggregate of problem areas to be so pervasive such that support can be given the NSC conclusion that "There is no confidence that welding done prior to early 1974 was performed in accordance with welding specification requirements."

Criterion X, NSC Finding 5 and 6:

Finding 5: "For all inspection processes, there is no mechanism to provide the inspector the particular characteristic to be inspected; the particular acceptance criteria; the particular methods and equipment to be used; and provisions for recording results, other than acceptance for the particular inspection being made. The exceptions to this statement are radiography, where the reader sheet allows the recording of results, and those procedures that specify the use of particular equipment (such as some of the ultrasonic procedures)."

Finding 6: "The inspection process is generally not auditable. The practice of exhibiting an acceptance signature only does not permit auditing to determine if

the individual characteristics were examined, the correct criteria were used for acceptance, and the correct specific measuring devices were used."

NRC Findings:

To resolve this issue the inspector proposed to examine Pullman program procedures in this area, the validity of the NSC findings and Pullman responses and examine field process sheets to verify compliance with the prescribed Pullman program and 10 CFR 50, Appendix , Criterion 10.

The inspector examined ESD-264 (Process Planning and Control - Field Process Sheet) and observed that the field process sheets to identify, and are required to identify, the procedures necessary to perform a particular inspection. The inspector's signature are meant to verify that the required inspections were performed in accordance with the criteria provided by the referenced procedure.

Examination of some of the procedures referenced on the process sheet indicates that each contains numerous inspection requirements and acceptance criteria. These inspection requirements and criteria are so numerous that inclusion of each on the field process sheet would excessively complicate the process sheet, and the inspector considers that inclusion of each inspection requirement and acceptance criteria on the process sheet would decrease the effectiveness and work process continuity afforded by the field process sheet.

Examination of about 100 completed field process sheets indicates that the required procedures were consistently identified on the process sheet, thus identifying the group of inspections and examinations to be performed by field inspectors.

The NSC finding that the inspection process is generally not auditable is true if one defines auditability as the ability to verify, after the inspection, that each inspection requirement and acceptance criteria was considered and so documented by the inspector's signature by each requirement and criteria. However, if one accepts the philosophy that the inspector's signature verifies the conduct of inspection/examination in accordance with the identified procedure, then the inspection process is auditable.

Criterion X, NSC Finding 7: "A large number of welds in Unit 2, System 14 (FW-110, 111, and 112 in isometric package 2-14-31 are examples) were accepted for visual examination and thereafter accepted based on surface NDE inspection (MT or PT). Visual examination of those welds indicates that the surface is not suitable for the performance of surface NDE inspection."

NRC Findings:

The NRC retaiend the services of a certified level II Liquid Penetrant Examiner through Parameter, Incorporated.

That certified examiner was asked to evaluate the surface condition of field welds 110, 111 and 112 on isometric 2-14-83 (Component Cooling Water System-Return Header B) and perform, and interpret the results of, liquid penetrant tests on those welds. The examiner observed an indication in the base metal of the pipe about 3/8" from Field Weld-111. The indication was about 1½" long.

Pullman wrote Discrepancy Report No. 5567 to remove the indication by flapper wheel grinding and conduct further liquid penetrant examinations. The inspector observed these activities. The indication was determined to be shallow surface lap in the metal caused by the rolling operation during pipe fabrication. The indication was removed by grinding. Subsequent liquid penetrant examination verified that the indication was a surface type and not a rejectable indication, even prior to removal of the indication. The grinding operation did not violate minimum wall thickness criteria.

No items of noncompliance or deviations were identified.

Criterion X, NSC Finding 9: "FW-83 (isometric package 1-10-9) was repaired in accordance with a valid Process Sheet. The radiograph of FW-83 does not exhibit the required R1 symbol, but R1 was inked onto the radiograph. There is a surface defect that is questionable for acceptance to visual standards."

NRC Findings:

The NRC retained the services of a qualified radiograph interpreter who examined about 100 radiographs of various welds in several Unit 1 systems.

The results of this examination are contained in the attached Parameter, Inc. report (Attachment 1). This examination included the FW-83 radiograph following repair. The inspector examined the surface of FW-83 in the field and found that the weld does not contain a surface defect. The inspector did observe a gradually sloped grinding line (about 1/8" wide, 2" long and less than 1/64" deep) which may be what the NSC referred to as a "defect". The depth obviously did not violate minimum wall thickness criteria. Discussions with the Parameter, Inc. radiograph interpreter indicated that the observed densities did not vary significantly on the film, thus indicating that the grinding line was not of sufficient depth to significantly decrease wall thickness in the weld area.

Criterion XIII, NSC Finding 5: "Handling procedures do not exist; and the only handling instructions are contained in ESD-222 and a number of other procedures, which contain a caution against the use of carbon steel in handling stainless steel. Procedure ESD-259 has excellent detail as to the handling of Grinnell Snubbers during installation. However, Procedure ESD-259 was issued January 27, 1977; and there is not assurance that materials, parts, and components were properly handled during the period prior to January 27, 1977, when most of the installation activities were occurring."

NRC Findings:

The inspector examined what handling activities were performed by both PG&E and Pullman and establish the validity of the NSC finding and Pullman response.

The inspector discussed, with Pullman and PG&E personnel who were working at the site since the early 1970s, the practices employed regarding receiving, storage and handling of safety related equipment, including which organizations performed such activities and under what circumstances these activities were performed.

The inspector determined that PG&E received, stored, handled, surveilled, and maintained all large class 1 components (including pipe, pipe spools, valves, snubbers, motors, etc). Contractors, such as Pullman, would requisition components when the contractor was ready and required to install the particular component in the plant. The primary reason that PG&E performed the above activities was because warehouse and laydown space was limited at the site. To obtain sufficient area for warehousing and laydown, PG&E used the larger areas available at Pismo Beach, California. Items shipped to PG&E for use at Diablo Canyon were received and stored in the Pismo Beach areas until contractors were ready to install those particular items. The material was then loaded onto trucks, by PG&E, and off loaded at the site, by the contractor under PG&E surveillance, and moved into the plant. The contractor, prior to accepting custody of the component or equipment, would perform receipt inspection

activities, after which the component was moved into the plant. From the time the contractor accepted the material until such time as the system/component was turned over to PG&E, the contractor was responsible to perform necessary surveillance and maintenance activities, as appropriate.

The inspector examined the following procedures detailing the PG&E program for handling of equipment. The requirement for such a program was contained in the PG&E QA Manual, procedure PRC-1 (Receiving Inspection, Storage and Handling). Procedures implementing the required program, for mechanical equipment, were reviewed.

MFI-0-1 (dated 9/17/71): Mechanical Department Procedure - Receiving, Inspection, Handling and Storage of Equipment/Materials.

- The inspector found that this procedure accomplished the following:
  - assigned responsibility for accomplishment
  - provided adequate handling instructions
  - provided detailed inspection requirements
  - provided adequate storage requirements
  - provided adequately for accomplishment of surveillance while in storage
  - provided the mechanism for processing and responding to contractor requests for transfer of the equipment to the plant

- provided for keeping equipment history records from receiving through shipping and storage.

MFI-2-2 (Revisions dated 10/75, 5/72 and 8/70): Mechanical Department Procedure - Instructions to Inspectors - Power Plant Piping

- The inspector found that the procedure accomplished the following:
  - assigned responsibilities for accomplishment
  - adequately addressed inspector qualifications
  - adequately defined inspector duties
  - provided adequate handling instructions
  - provided adequate storage surveillance and installation inspection requirements.

The licensee contracted with Bigge Crane and Regging Company for the conduct of handling activities at the Pismo Beach Yard and transfer of material to the site. The inspector examined the Bigge "Procedure for Receiving, Handling and Storing Nuclear Power Plant Equipment and Material - Pismo Beach Yard." This procedure provided (1) adequate instructions for receiving and unloading, (2) adequate instructions for storage, (3) adequate instructions for preservation, (4) adequate instructions for core and handling of Stainless Steel and Class I items, (5) adequate instructions for load-out and hauling, and (6) adequate

instructions regarding types of handling equipment necessary and inspections necessary for handling gear.

The inspector examiend the following documents which provided handling instructions for Pullman personnel.

Specification 8711 (Specification for Erecting Main Systems Piping and Furnishing, Fabricating and Erecting Balance of Power Plant Piping

- paragraph 6.12 provides definition of responsibility for receipt inspection, including general receipt inspection criteria, and unloading of carrirs.

- paragraph 6.13 addresses storing of material including general contractor requirements such as protecting items in storage from damage by requiring "use of dust proof, fireproof and waterproof tarpaulins, adequate spacing and temporary heaters", as necessary.

- paragraph 6.23 requires that all material be stored on cribbing when in laydown areas.

- paragraph 4.1181 and 82 contain specific requirements for welding electrode receiving, storage and control.

- paragraph 3.211 of Section 4 provides for Quality Assurance Requirements related to handling, storage, packaging shipping and preservation.

ASME QA Manual Procedure KFP-7 (Receiving Inspection)

- provides that inspections be conducted to verify that off-loaded items are to prevent damage, contamination or deterioration.

ESD-215 (dated 9/23/71): Visual Inspection

This procedure provided requirements for handling such as (1) flame cutting of stainless steel was not allowed; (2) weld preparation dressing requirements; (3) examination for and removal of mill scale, oil rust, slag, paint, marking materials and surface oxide and dirt prior to welding; (4) removal of arc strikes and retest liquid penetrant retest; (5) pipe alignment criteria; and (6) cleaning)

QA Instruction 94 (dated 7/29/73): Performing Maintenance Surveillance

This procedure contained criteria for capping of pipe ends, actions required when loose nuts/bolts, missing parts or equipment damage was observed. The instruction provides inspection guidance for both hangers, snubbers and piping

ESD-217 (dated 9/23/71): Receiving Class 1 Procedure

This procedure requires monthly maintenance surveillance reports for items in storage such as Class 1 pipe, Class 1 Pipe Supports, Class 1 valves, Class 1 pipe, valves and supports erected and installed. Protection and maintenance requirements were provided by PG&E.

This procedure requires monthly maintenance surveillance reports for items in storage such as Class 1 pipe, Class 1 Pipe Supports, Class 1 valves, Class 1 pipe, valves and supports erected and installed. Protection and maintenance requirements were provided by PG&E.

ESD-222 (dated 2/23/72): Protection, Installation, Maintenance and Surveillance of Control Valves

This procedure specifies appropriate handling requirements and criteria for pneumatic and motor operated valves and attached devices, manual operated valves, and relief valves, from receipt through installation.

Beginning about April, 1977, PG&E installed a snubber test facility on the upper floor of the fuel handling building, between the Unit 1 and Unit 2 areas. All Grinnell hydraulic snubbers were removed, reworked, refurbished and subjected to dynamic stroke, lockup and load tests on the testing machine. Snubbers determined by test to be acceptable were reinstalled. Unacceptable snubbers were either reworked and retested or replaced with an acceptable snubber. This activity was completed in 1978 and, thus, verified the operability of Grinnell hydraulic snubbers installed prior to the issuance of ESD-259. The information gleaned from this testing program was incorporated into ESD-259 revisions in order to minimize the potential for harm or deterioration of the snubbers. Snubbers installed out of doors were also placed inside a rubber boot to prevent deterioration and corrosion of snubber shafts.

Unit 2 hydraulic snubber maintenance is performed every 6 months on each Unit 2 Grinnell snubber and tracked by Pullman.

The inspector found that while Pullman did not have a procedure set specifically addressing handling instructtions, when all of the Pullman procedures addressing handling of various equipment are considered as an aggregate appropriate handling requirements were addressed considering the more limited scope of equipment handling Pullman was required to exercise. The inspector also finds that the limited addressing of snubber handling requirements prior to the issuance of ESD-259 is of minimal safety significance given the conduct of the 1977-78 testing program and the subsequent issuance and upgrading of ESD-259.

Licensee Response to the NSC Audit and Pullman Response

In order to establish whether the licensee had adequately evaluated the findings of NSC, the response of Pullman and had conducted sufficient examination to determine the safety implications of the NSC audit, the NRC evaluated the scope and findings of the licensee's audit of Pullman (No. 80422).

The licensee conducted an audit of Pullman, during the period of April 2 through June 1, 1978, in response to the NSC audit and the Pullman response. As a result of this audit the licensee identified certain programmatic and hardware discrepancies. In response to the discrepant findings the licensee issued two nonconformance reports and four minor variation reports (NCRs DC-78-RM-004 and 005, MVRs M-3723, 3724, 3725, and 3726). The inspectors examined these documents to evaluate the licensee's specified corrective action and verify, by reviewing selected documentation, that the licensee had completed the required corrective actions. The inspectors found that the licensee had appropriately specified corrective action, had accomplished the corrective actions required, and had verified accomplishment of those corrective actions by additional verification. The inspectors had no further questions.

No items of noncompliance or deviations were identified.

Criteria II - Program

Finding #4 - There is no evidence that upper management has performed scheduled reviews of nonconformance reports, personnel qualificaions, and corrective actions.

NRC Response - Historical records of nine corporate management audits conducted between 9/72-6/77, were reviewed for content. This evidence verifies nonconformances, personnel qualifications, and corrective action were consistently among those activities audited by corporate management. Pullman Power Products has since incorporated an on-site management review system requiring the Q.A./Q.C. manager to submit monthly reports "summarizing all significant Q.A. events, audits, nonconformances including trends noted, and may offer suggestions for Q.A. program improvement." In conclusion, factual records do not support the NSC finding.

Criteria VI - Document Control

Finding #10 - No procedure or requirement prohibits the changing or alteration of the records and documents that are necessary to track the work. Field Process Sheets, Weld Rod Requisitions, inspection records, etc., should not be changed or should be changed only by Quality Assurance supervisory personnel and then signed and dated.

NRC Response - A review of Q.A. program elements, procedures and audits available prior to the NSC audit and the follow-up review previous Pullman corporate audits ~~had~~ identified a problem of document and record changes made without appropriate identification and dating. ~~Existing~~ Instructions existed in ESD-254 which provided the requirement that "all corrections, deletions, or changes are initialed", but this only applied to rod requisitions.

KFP-17 (revision 8/22/72) described program policy concerning "revisions, additions, and deletions, ~~to~~ but applied just to the Q.A. Manual. ~~Field Procedures~~". In response to the NSC finding and Pullman audits, many changes were incorporated by Pullman into the ~~Pullman~~ Q.A. program in recognition that stricter control of document and record changes was warranted.

ESD-254, concerning "Document Review", was revised (12/30/77) to establish for records, process sheets, requisitions, and reports that "corrections, if made, shall be initialed and dated by the responsible individual". The scope of change requirements in KFP-17 (8/31/77) was broadened to also include all field procedures (FSD) and to identify PG&E concurrence is required for changes of either the Q.A. Manual or field procedures. Corrections and/or changes of field process sheets according to ESD-264 (revision 9/15/78) shall be initialed and dated, and limited to specific qualified personnel.

Pullman's corrective action is complete and appears to be effective. Previous inadequacy of management policy or written instructions in this area is not considered to have resulted in any adverse impact on quality related activities.

Criteria No. 5 - Instructions, Procedures, and Drawings

Finding #1 - There is no requirement that activities affecting quality shall be prescribed by documented instructions, procedures, and drawings.

NRC Response - Section KFP-8 (revision 8/22/72) of Pullman Quality Assurance Manual ~~Field procedures~~ WAS ~~is~~ used to establish "Process Planning and Control" for on-site work. Described more specifically in paragraph 8.1, "The field process sheet (figure 11) serves as a traveler to identify, in sequence, the field work to be done. It is used both for the field fabrication of piping assemblies and for the erection of lines in the plant." A field process sheet

will list, in a certain sequence to be performed, all significant operations and inspections associated with a particular field activity. If requires Specific written procedures ~~are required~~ to be referenced for each operation and inspection listed, this is to identify those detailed instructions necessary to actually perform the work assignments. Applicable isometric or detailed drawings, and code requirements are also indicated on the field process sheet. KFPS-7 of the Quality Assurance Procedures for Pipe Supports, establishes a similar "Process Planning and Control" system with the Field Support Process Sheet. ESD-264 (issued 9/15/78) provides a specific procedure to implement precisely the Q.A. program elements of KFP-8 and KFPS-7.

This program appears to have effectively prescribed documented instructions, procedures, and drawings for each activity affected by Quality Assurance.

Finding #2 - Many activities affecting quality are not described in procedures. Among those activities are: hanger package review, pre-heating for welding, use of Note-O-Grams, use of Rejection Notices, and maintenance of Field Quality Inspector Daily Logs.

NRC Response - In review of the procedures and program instructions that were available for the specific activities identified above, the following determinations ~~were evolved~~. Hanger package review is described i.a.w. KFPS-12 (issued 12/3/73) which ~~is~~ was concerned with the final documentation of pipe supports, specifying that "all field fabricated and field installed supports have been inspected, and accepted drawings are compiled and indexed as outlined" by the inclusive program instructions. Field procedure ESD-253 provided additional detailed information concerning hangar drawing controls. Supplementary requirements for completeness were subsequently incorporated into ESD-254 (revision 12/30/77) as a document review checklist to establish a "Guide for assembly and review of hangar documentation packages."

start NEW PARAGRAPH

Preheating for welding is prescribed in the applicable code weld procedure specifications, which are specifically referenced by the field process sheet. Later revisions of the field process sheet and ESD-218 (Rev. 10/77) included amplification of preheat temperature range requirements.

Written procedures do not appear to be appropriate for control of Note-O-Grams, Rejection Notices, and Inspector Logs. These documents are implemented internally to aid in application of the quality assurance program by providing administrative tools for status reporting and recording. They do not establish requirements or procedural instructions for quality related activities.

NRC Response

MANY ACTIVITIES AFFECTING QUALITY ARE INSUFFICIENTLY DESCRIBED IN PROCEDURES. AMONG THOSE ACTIVITIES ARE: ISOMETRIC PACKAGE REVIEW, POST WELDING HEAT TREATMENT, NON-CONFORMANCE REPORTING, NINETY DAY WELDERS' LOG AND WEEKLY QUALIFIED-WELDERS LIST, and AUDITING.

Finding #3 - ~~After~~ A review of those specific activities identified ~~as~~ the NSC finding ~~insufficient~~, along with the applicable procedures and QA program instructions resulted in the following ~~determinations were evolved~~ conclusions.

Field procedure ESD-254 (issued 5/6/75) appears to provide an adequate outline guide for review of isometric drawing packages.

Appropriate post weld heat treatment requirements are prescribed by code weld procedure specifications and in ESD-218.

Nonconformance reporting is implemented by ASME certified QA program manual section KFP-10 (revision 1/4/73). A significant rewrite of ESD-240 in 1978 (and subsequent revisions) established detailed instructions to clarify the documentation, specific personnel responsibilities, the functional use, closing-out, and 10 CFR 21 applicability of NCR.

Ninety-Day Welder's Log and Weekly Qualified Welder Lists ~~are~~ were only referenced by KFP-15 (revision 8/22/72) and ESD-216 (revision 6/17/76) to figures appeared in the procedures. There was no amplifying descriptions of these forms to specify

personnel responsibility, functional use, implementation, scope, etc.; until significant revisions were incorporated into ESD-216 (7/10/79). Apparently use of these documents to maintain status of welder qualifications was carried out by experienced personnel under cognizance of the Q.A./Q.C. manager. A review in the application of 90-day welder logs and weekly qualified welder lists (see comments of criteria IX, item 10e) did not reveal any significant evidence of inconsistencies that would have adversely affected quality controlled activities.

Internal and Corporate Management audits of the Pullman onsite Q.A. program were described by Q.A. manual section KFP-18 (revision 8/22/72). The program prescribed in KFP-18 were not complete, and very general in nature. Those areas which appeared particularly deficient were personnel qualifications, scope, scheduling and disposition of records. Corporate audits directed by Williamsport headquarters, used the corporate audit procedure XVIII-1 to provide the necessary instructions for conducting management audits required by KFP-18. A review of corporate management audit records reveals a history of Q.A. program inspections based upon checklists outlined to 10 CFR 50 App. B criteria. This established a comprehensive corporate audit system apparently reviewing all field Q.A. program facets. There did not exist any detailed procedure to implement internal audits performed by on-site Q.A. personnel. Internal audits were insufficiently described by the Q.A. manual, in KFP-18, to adequately perform a field Q.A. program review without a specific procedure.

Internal audit records prior to the NSC audit, indicate that all of the Pullman field Q.A. program were not being addressed. This deficiency was also clearly identified by a PG&E audit of Pullman, and was identified in a nonconformance report DCO-78-RM-004. Subsequently, resolution by Pullman was to rewrite KFP-18 and develop an internal audit procedure (ESD-263 issued 6/26/78).

For program consistency, the corporate audit procedure XVIII-1 was incorporated into a field procedure (ESD-274, issued 2/19/80).

Do we agree or not?

An extensive, complete review of the PPP field Q.A. program was conducted by Pullman corporate management and PG&E following publication of the NSC audit. Both of these reviews included an inspection to evaluate a significant sample of actual hardware installed by Pullman Power Products. With the results from these audits and considering that corporate audits were being performed in conjunction with internal audits, there is no substantiation of any adverse impact on quality related activities due to insufficient description of internal auditing. Adequate corrective action has been implemented to ensure all Q.A. field program elements are scheduled for inspection (as of 6/78). Records of subsequent internal and corporate audits verify that no fundamental breakdown of the Q.A. program ~~of safety significance~~ existed undetected by previous internal auditing.

Criteria XII

Finding #3d - Severin Gauges 2947 and 2971 were received on the site in January, 1973. Initial calibration was August 29, 1973; and the next calibration was November 19, 1974 for gauge 2947 and January 23, 1975 for gauge 2971. Procedure ESD-213 requires annual calibration.

NRC Response - Field Procedure ESD-213, "Gauge and Instrument Control/Calibration", does require an annual calibration check of the two onsite severin gauges (2947 and 2971). There are equipment calibration record cards which document calibration status and provide a historical record of the frequency of calibration checks performed since 8/73 (when the gauges were initially acquired). These records verify the NSC finding and indicate a subsequent history of consistently exceeded the required frequency of calibration checks.

Associated test equipment control records establish, since 1978 (custody log was not maintained prior to this time), that neither gauge was ever used during any out-of-calibration period for material testing. In each case, the instrument was logged out for calibration check and unavailable for testing during the lapsed period. Documentation since 1973 which verify calibration checks performed on-site by PPP personnel ~~and~~ or by Severn Engineering Company provide no evidence that either gauge was discovered to be out-of-tolerance. Test equipment control implementation appears to adequately remove from service any instrument exceeding the required re-calibration date. There is no evidence to indicate Severin gauges 2947 and 2971 were used in ferrite examinations ~~were~~ outside their functional limits.

Finding #3f - There is no documentation available to verify calibration of "Tong Test" amp meters.

NRC response - Tong test amp meters ~~are~~ were contracted off-site for the required periodic calibration checks. An equipment calibration record card exists for each instrument, documenting the frequency of calibration checks performed since the particular tester was acquired. Calibration certificates are on file from the applicable lab verifying completed calibration for each tong tester. These records appear to provide adequate documentation that "Tong Test" amp meters were being calibrated.

Finding #3g - "Tong Test" amp meter TT2527403 was out of calibration for the period December 12, 1976 to January 31, 1977. No DR has been written against that instrument.

A review of the equipment calibration record cards for "Tong Tst" amp meter TT2527403 (200 amp Crompton Parkinson) supports the NSC finding concerning the

period for out-of-calibration. Records also indicate several subsequent time periods where the calibration check frequency had exceeded the ESD-213 annual requirement for this Tong Tester and two others. It would appear the fundamental cause for these apparent lapses in calibration control were due to the transit time necessary to ship instruments back and forth from the contracted calibrating facility. Equipment control records clearly establish that since 1978, none of these Tong testers were used during an out-of-calibration period. Unfortunately, for meter TT2527403 equipment control records were not retained when the instrument was broken and removed from service 4/15/83 (although calibration records are still on file).

Based upon history of PPP implemented test equipment control system and non-essential nature of the welding current parameter (as identified by ASME code) there is no justification that quality-related activities were effected.

Criteria XVIII - Audits

Finding #3 - In response to KFP-18, Paragraph 18.2.1, management audits were performed approximately every six months. Check sheets were employed. Based on the results of this audit and the results of Pacific Gas & Electric Company audits, these management audits appear to have been ineffectual.

NRC Response - Corporate management audits conducted 9/72 thru 2/78 of the PPP on-site Q.A. program were reviewed for content, completeness, and effectiveness. There is a file of ten management audit reports, performed during this time period, indicating comprehensive inspections were conducted by the Pullman Corporate office on approximately a bi-annual frequency. These reports specifically identified deficiencies, provided recommendations for corrective action and required on-site resolution. As appropriate, each report followed

upon the adequacy of corrective action implemented to correct previously identified deficient conditions in the Q.A. program. Although certain deficiencies were noted to recur in subsequent reports, there was no indication that these represented any generic failure in the effect of the corporate audit process. In any regard, to resolve this potential concern KFP-18 was revised (12/30/77) to require direct written response from the resident construction manager and the field Q.A./Q.C. manager for "schedule completion of implementation of corrective action and measures taken to preclude re-occurrence." The field Q.A./Q.C. manager is responsible to monitor audit findings for trends. In conclusion, there is every indication the on-site Q.A. organization was very responsive to corporate management audits and no basis to suggest these audits were ineffectual.

Finding #5 - In response to KFP-18 and KFPS-16, internal audits were performed every six months. Check sheets were not employed.

NRC Response - At the time of the NSC finding, checksheets were not being used by the onsite Q.A. organization to perform internal audits. Corporate audits being performed by Williamsport Headquarters personnel did use checksheets to coordinate their inspections. This inconsistency was resolved when internal auditing became proceduralized in 6/78 by the evolution of field procedure ESD-263. Scheduling of program elements to be audited and use of checksheets is detailed in ESD-263. For the significance of this audit finding, see comments to finding no. 3 of Criteria V.

Criterion IX, Finding No. 3:

"The qualification and certification program for NDE and inspection personnel has been inadequate. The records of the following personnel were examined: D. R. Geske, T. L. Koch, J. E. Cawelti, G. P. Keeler, K. E. Beck, L. Glass, W. R. Johnson, E. Stanton, C. B. Athay, R. G. Sears, D. S. Tutko, J. N. Shiromizu, V. J. Casey, J. A. Brasher, L. F. Myrick, S. R. Stanley, E. Guest, D. E. Bentley,

LIFT FLAP.

R. D. Kincade, K. D. Guy, J. R. Bowlby, E. R. Jennings, A. L. Newton, C. C. Lenzi, J. J. Sisk, L. G. Thomas, A. A. Conques, and R. L. Marks. In virtually all cases, the individuals began performing their duties without fulfilling the specified requirements. The most prevalent discrepancies are: not completing the required training, not having proof of previous experience, insufficient time as Level I, unsigned tests, and insufficient background and experience."

NRC Finding:

The inspector examined the personnel files for 20 of the 28 individuals named in the NSC audit and the procedures for qualification and certification for Non-destructive and inspector personnel that existed in Pullman's program before September 1977.

The inspector examined Engineering Standard-Diablo (ESD) No. 235, "Nondestructive Examination Personnel Qualification and Certification Procedure," dated September 25, 1973, and ESD No. 237, "Quality Assurance Inspector Training Program," dated February 26, 1974. A review of ESD-237 indicated that prior revisions had occurred on May 1, 1969 and September 25, 1973, though no procedure revision could be found which was solely dated September 25, 1973. The September 25, 1973 date becomes important because Pullman inspectors were identified during this inspection as not being certified and qualified in accordance with aforementioned ESD procedures after September 25, 1973. It is the inspector's contention that the requirements for Pullman inspectors were revised or amplified after September 25, 1973, is based on the Pullman response to the above NSC audit finding which states in part, that "All current inspectors have been qualified by test as outlined in ESD-237. Requirement for qualification and certification of field inspector were added in

ESD-237 on September 25, 1973 to relfect the requirements of ANSI N45.2.6, just published. Persons hired before this time were not necessarily tested at time of hire. Subsequent to 1973, the records indicate that all inspection personnel received required training and examination."

Closer scrutiny of ESD-235 indicated that though this procedure is a nondestructive personnel qualification and certification procedure, the procedure also describes levels of qualification for visual examination, including the type of examination, the number of questions and the acceptable grade for the examination. Additionally, a welding test requirement is contained in paragraph 11.2.14 which states that, "A combination of General, Specific, and Practical examinations will be given using the Diablo Canyon Welding Seminar Test Paper, containing 66 questions."

ESD-237 states in paragraph 2.3 that, "All personnel engaged as Field QA Inspectors involved in the inspection of weldments, interpretation of Engineering Specifications and Welding Procedures, and documentation work, shall be required to complete an indoctrination period as described in Section 4 of this specification." Paragraph 4.1 states that, "The indoctrination period for the Field Q.A. Inspectors described in Section 2.3 shall contain as a minimum, but not necessarily limited to, the following courses:

Visual Inspection
Welding Inspection
Basic Q.A.
Welding Procedures
Welding Processes

Other courses offered as optional are:

Welding Steam Power Plant Fundamentals

Basic Power Plant Instruction Welding & Piping Engineering Technology

Introducing Nuclear Power (I.C.S.)

The Visual Inspection and Welding Inspection tests shall be administered and controlled by the N.D.E. Training Officer. All N.D.T. training, qualifications and certifications will be covered by ESD-235."

Paragraph 4.2 states that, tests used for the indoctrination courses for Field Q. A. Inspectors shall be:

1. For Basic Q.A. Test-ESD's.
2. For Weld Procedure Test-Approved Welding Procedures.
3. For the Weld Process Test, Welder Qualification Card and Pipefitter's Manual.
4. For Welding Inspection Qualifications, General Welding Information.
5. Visual Inspection Qualifications-General Dynamics NDT Introduction.

Therefore, it is apparent that Field QA Inspectors were required to be indoctrinated through a program of courses related to their job function, including visual and welding inspection tests administered and controlled by the NDE Training Officer. Discussions with contractor personnel indicated that in the pre-1977 time frame the training officer controlled all personnel certifications, with no distinction made between NDE and welding inspection personnel.

The inspector further examined the personnel files of 20 of the 28 individuals named in the NSC audit finding to compare ~~A comparison of~~ the date these individuals started

employment with Pullman Power Products versus the date these individuals started accepting work. This comparison confirmed the NSC audit finding that in virtually all cases welding Q.A. Inspectors began performing their duties without fulfilling the specified requirements and without completing the required training.

Two examples of the above findings are as follows:

(1) V. J. Casey began employment with Pullman Power Products on November 19, 1973 and began accepting weldments as soon as November, 1973, though he was not certified as a welding inspector until February 27, 1974.

(2) E. R. Jennings began employment with Pullman Power Products on January 16, 1974 and began accepting weldments on January 22, 1974, though he was not certified as a welding inspector until April 21, 1974.

Additionally, two other inspectors were found to have questionable backgrounds which in the inspector's opinion would not warrant their immediate certification as welding inspectors. K. D. Guy had essentially no background in quality control/quality assurance yet within two months was a fully certified inspector accepting weldments. A. L. Newton had some background in the aircraft industry, but a lapse of several years had occurred between the time he had terminated his employment in the aircraft industry and the time he began employment with Pullman, yet within two months he was accepting weldments. Both of these individuals had taken a number of the required welding examination tests, but not all of the required series, specified in ESD-235.

The failure to assure that Quality Control Inspectors are qualified and certified in accordance with the contractor quality procedures is considered an

apparent item of noncompliance with 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." (Noncompliance: 50-275/323/83-37/01)

It should be noted that all personnel files examined, with the two exceptions noted above, all persons appeared to be ~~highly~~ experienced individuals with adequate backgrounds either in welding or in the area of quality control inspection.

No Pullman certified NDE personnel were found to be improperly certified or found to have accepted or performed work prior to being certified in accordance with the procedural or code requirements.

Criterion VI, Finding No. 9a:

"For Isometric 2-14-77: The Process Sheet was changed to show the completion of FW-192 on April 10 and April 11, 1974, approximately 19 months after the work was done."

NRC Finding:

The inspector found that though the NSC audit finding identifies the incorrect isometric package the Pullman response correctly addresses the intended isometric package, i.e., Isometric Package No. 2-14-47. Examination of isometric package no. 2-14-47 indicated that FW-192 was completed on April 11, 1974, as indicated by the signing and dating of the line item by the Pullman welding inspector. The signature and date were in ink and the inspector could not find any evidence that the completion date or signature had been altered or any attempt made to alter the signature and date. The weld was liquid penetrant

examined on December 2, 1975, found acceptable and the line item for the non-destructive examination on the process sheet signed and dated. Examination of the Liquid Penetrant Examination record indicated that both the signatures and dates on the process sheet and the Liquid Penetrant Examination were in ink and no evidence could be found to indicate that there had been an attempt to alter the dates or signatures on both of these documents.

No evidence could be found to corraborate the NSC auditor's finding that the date for completion of FW-192 had changed or backdated. The inspector has no further questions on this item.

Criterion VI, Finding No. 9c:

"Isometric 2-14-53: FW-247 was completed on February 20, 1975. Approximately December 1, 1975, the visual acceptance was signed off and backdated; the Weld Rod Requisition was changed to show that more than the original quantity of one had been burned."

NRC Finding:

Discussion with Pullman representatives indicated that the discrepancy with FW-247 was not found during a formal internal Pullman audit, but rather during the documentation review of the isometric package. A search of internal Pullman audits records did not reveal an audit finding which specifically identified this discrepancy. Therefore, the inspector could not verify the Pullman response or the NSC auditor's finding on the circumstances surrounding when or how the discrepancy with FW-247 was found. However, the inspector did examine the daily work log of the Pullman inspector involved and did verify that the

inspector did perform the final inspection of FW-247 on February 20, 1975, as stated in the Pullman response.

Examination of the Weld Rod Requisition records indicated that the quantity of weld rod was changed on one wled rod slip as stated by the NSC auditor, however the change was initialed by a Pullman inspector. It appears that the discrepancy was an error which was caught by the Pullman inspectors. Examination of approximately one hundred weld rod requisition records contained in isometric packages nos. 2-14-77, 2-14-47, 2-14-8, 2-14-53, 2-14-59, and 2-26-417, did not reveal any similar discrepancies.

Criterion VI, Finding No. 9d:

"Isometric 2-14-59: FW-268 was completed February 5, 1975. On December 2, 1975, the entry on the Process Sheet for removal of dams was signed off and backdated. There is no proof that the dams had been removed."

NRC Finding:

FW-268 is a Code Class 3 weld which the records indicated was made with the use of a backing ring. The signing on the line entry by the Pullman inspector appeared to be an oversight on the part of the Pullman inspector. Examination of Isometric Package No. 2-14-59 indicated that a Warehouse Requisition Record specifying a backing ring for FW-268 was contained in the package. The inspector could not determine how the NSC auditor arrived at the December 2, 1975 when supposedly the backdating occurred.

The inspector did find that apparently in response to the NSC finding, the Pullman inspector did cross out the "Remove Dam" entry, wrote "not applicable",

dated and signed this line entry on December 7, 1977. This same Pullman inspector also found that he had performed the same error for FW-269 which is contained on the same isometric package. The Pullman inspector then crossed out, wrote "not applicable" dated and signed this line entry on December 7, 1977.

Examination of five isometric packages by the NRC inspector, found three other similar cases, wherein a different Pullman inspector had signed the "Remove Dam" line entry, when in fact a backing ring had been used. Isometric package no. 2-14-53 contains FW-246 and FW-247 and Isometric package no. 2-14-47 contains FW-196, which have similar discrepancies.

However, because no safety significance can be attributed to this NRC finding and no purpose would be served by checking all packages for similar discrepancies, this item is considered closed and the inspector has no further questions on this item.

Criterion VI, Finding No. 9e:

"Isometric 2-26-417: FW-144, 145, 196, and 197 were completed on May 14, 1976. The Weld Rod Requisition had been altered to add FW-197. However, the Weld Rod Requisition shows that 14 rods had been burned, which seems improbable for the four welds that were supposedly welded."

NRC Finding:

The inspector verified that the M. W. Kellogg (Pullman) Field Warehouse Requisition record indicates that four 3/4" sockets were issued on May 13, 1976 and welded on May 14, 1976. It is the inspector's opinion that 14 weld rods are

more than enough weld rod to weld four 3/4" socket welds. The examined Pullman procedure ESD-202, dated April 28, 1975, which states in part, in paragraph 3.2 that, "For socket welds, up to four welds may be put one one requisition (weld rod)." The inspector did find that all four socket welds were contained on one weld rod requisition record, although when exactly FW-197 was added to the weld rod slip could not be established. The inspector has no further questions on this item.

Criterion XI, Finding No. 5

"The B31.1 and B31.7 Codes require that all piping is leak-tested, where practicable. Pullman Power Products is only leak-testing Class A and B piping and that Class C piping specified by Pacific Gas & Electric Company. Classes D, E special, and E piping is not being leak-tested. A letter from Pacific Gas & Electric Company (dated January 13, 1976) does exist, which states that Pacific Gas & Electric Company will assume responsibility for the leak-testing of Class C piping. There is concern that Pullman Power Products is not discharging its contractual obligations (that specify compliance to B31.1 and B31.7) by not performing piping leak-testing to Code requirements for Classes C, D. E special, and E piping systems and, as a result, may be legally vulnerable."

NRC Finding

The inspector examined the referenced licensee letter dated January 13, 1976 and a contractor letter dated January 8, 1976 relieving Pullman Power Products of responsibility for code compliance on Class C components. The inspector also found that the licensee has no piping designated class D piping. ~~Additionally, paragraph 737.4 of ANSI B31.7 was reviewed and found to state as indicated by the contractor. The inspector has no further questions on this subject.~~ Additionally, the inspector found that Class E and Class E special are being hydrotested, though in some cases at less than code requirements. ANSI B31.7 allows in paragraph 737.4 for components to be tested at less than code requirements, because of limiting components within the piping system. The inspector has no further questions on this subject.

Criterion VIII, Finding No. 12

"Procedure ESD-223 does not give adequate instructions for the identification and control of Class I Pipe Supports."

NRC Finding:

The inspector reviewed the historical file for ESD-223 and specifically the extensive revisions that occurred on November 11, 1975 and May 25, 1976. The inspector found that the procedure contained adequate Quality Assurance/Quality Control instructions for the control and identification of Class I pipe supports. Additionally, the inspector found that other existing procedures contained the Pullman Quality Program contained additional or amplifying instructions for the identification and control of Class I pipe supports.

Criterion XIV, Finding No. 1

"The major mechanism that exhibits the status of the work is the Field Process Sheet. The Field Process Sheet provides for performance status of some important fabrication steps and for inspection status. However, many important fabrication steps are not indicated by the Field Process Sheet: erection steps; cleaning prior to installation of insulation; and some critical welding steps as preheating, checking gas flows, and checking for 0_2 content in the backing gas. The Field Process Sheet, as a mechanism to exhibit status, is considered inadequate. The inadequacy of the Field Process Sheet is considered a major weakness in the Pullman Power Products System."

NRC Finding: The inspector examined the process sheets and verified that the process sheets provided specific instructions for weld fitup and inspection as required by the Code and the contractor's procedures. Additionally, the inspector found that a number of other procedures were contained in the Pullman's quality program during the time frame referenced ~~including~~ which provided additional instructions for fabrication and inspection of piping and weldments. These additional procedures included:

(1) Post weld heat treatment, dated 9/23/71

(2) Backing dams for TIG welding, dated 7/27/71

(3) Weld procedure monitoring, dated 2/14/73

(4) Cleaning for fitup, dated 10/15/71

(5) Pipe hot forming and cold bending, dated 11/7/72

(6) Final cleaning for stainless steel piping, dated 6/10/76

What is the conclusion?

The inspector has no further questions on this item.

Criterion XVI, Finding No. 2:

"Based on the results of this audit and the problems encountered in the past, it appears that a corrective action system has not been operative."

NRC Finding:

The inspector examined ~~the~~ corrective actions ~~stated in the Pullman response and by other the licensee or the NRC and~~ taken as a result of items identified have been found that procedures or programs ~~were~~ revised or created when problems were identified. ~~as stated in the response.~~ The pipe support procedure was extensively rewritten in June 25, 1975, Quality Assurance No. 98 was created for the inspection of existing concrete expansion anchors, and in March 13, 1979 the pipe support quality assurance manual was superceded by ESD-223 to provide all the elements of installation, inspection, and as-builting of pipe supports in

one procedure. Additionally, as a result of NRC identified discrepancies with radiographs (Reference: 50-275/77-06 dated May 6, 1977) the licensee committed to requiring that all radiographs would be reviewed by a Level III or a second Level II individual. During this inspection, an NRC consultant reviewed one hundred radiographs, to confirm the licensee's finding on the radiographs, and to confirm that all the radiographs were reviewed by a Level III or a second Level II radiographer. No discrepancies were identified during this review by the NRC consultant.

The inspector has no further questions on this item.

Criterion IX, Finding No. 9b:

"Isometric 2-14-8: FW-1673 was performed to Revision 2 of the isometric, which did not show FW-1673. Revision 3 of the isometric, which included the FW-1673, was generated approximately one week after completion of the weld. It is, therefore concluded that FW-1673 was performed without the normal controls of a Process Sheet, a weld procedure call out and a call-out of NDE requirements."

NRC Finding

The inspector examined the various contractor procedures and documents that existed during the time frame in question to determine whether the usual design change controls were circumvented by the Pullman Q.A. Inspector which allowed or directed the welding of a valve to a capped pipe, seemingly without the usual design change controls. The inspector examined Isometric No. 2-14-8 which in Revision 2, dated December 11, 1972, shows a capped pipe (termed a nipple) and in Revision 3 dated May 29, 1974, the required valve and vent (actually a capped pipe) are depicted. A review of the weld process sheet indicated that the weld (FW-1673) was completed on May 24, 1974, five days before the issuance of revision 3 to the isometric drawing.

The inspector examined Pullman Quality Assurance Instruction No. 52, dated December 13, 1973 which states that, "Due to a shortage of valves used for vents and drains at this complex, it has become necessary to install twelve inch nipples, capped on end, to facilitate flushing." Subsequent to this instruction on March 8, 1974 an apparently generic discrepancy report (Discrepancy Report No. DR 2100) was written in an effort to expedite the installation of vents and drains in erected pipe. Item No. 3 of the approved disposition of the discrepancy report states that, "All welds added for this change will be recorded on the process sheet and isometric. All added weld number selection will be coordinated between drafting, Q.A. Inspector, and Engineering." Item No. 4 states that, "Engineering is to notify area Q.A. Inspector prior to starting installation of standard vents and drains." Therefore, it appears that the Q. A. Inspector was in contact with Engineering for the installation of vents and drains and welds were required to be recorded on process sheets. A process sheet for field weld, FW-1673 is contained in Isometric No. 2-14-8, as required.

Further, Pullman Engineering Standard-Diablo (ESD) No. 239, dated April 2, 1974 states in paragraph 2.1 that "Piping systems shall be closed out by Q. A. Inspectors. Piping shall be checked when necessary against PG&E area drawings, Section 3 of Specification 8711 and the PG&E flow diagrams. All missing or incorrect items shall be recorded on a punch list and D.R., (a discrepancy report written) if required." ESD-239 further states, in part, in paragraph 3.1 that, "The following is a guide for Q.A. Inspectors when closing out piping systems" and proceeds to state in paragraph 3.1.2 to, "Check field run pipe and fittings for correct materials, rating and specifications when so identified," and in paragraph 3.1.15 to, "Check that instrument connections, vents, drains and plugs are installed per the Isometric and Flow Sheets." Therefore, it appears that Q. A. Inspectors were required to verify conformance PG&E design drawing (Flow Sheets), and to record any discrepancies.

A comparison of Isometric No. 2-14-8 to the PG&E Flow Sheet (PG&E Drawing No. 108014) indicated that the required valve and vent were depicted on the line referenced on Isometric No. 2-14-8. It appears that the valve and vent were not installed on the line due to the originally stated shortage of valves, as stated in the aforementioned C.A. Instruction No. 52. However, provisions had been made for the subsequent installation of the valve, as shown by the installation of the nipple and cap depicted in Revision 2 of the isometric. A check of one other line with a similar configuration (there are four similar lines with valves and vents in the same area) confirmed that a similar situation had occurred for Isometric No. 2-14-6, Line No. 1759-6, i.e., the weld had been made and completed before the revision to the isometric depicted the weld.

Additionally, the inspector verified that in the time frame in question, a method existed to assure that the proper welding procedure was used for the pipe to valve weld in question. The inspector found ESD-227 dated December 20, 1973 provided a chart indicating the proper weld procedure for different materials and configurations required. For this case, a socket weld was required, and ~~was~~ the materials to be joined were carbon steel to carbon steel procedure no. 92/93 was the weld procedure needed ~~and~~ to be used. A review of the process sheet for FW-1673 confirmed that weld procedure 92/93 was used.

Finally, the inspector verified that contractor originated drawings (for example, isometric drawings) are reviewed by the Engineer (PG&E) for conformance with the PG&E design drawings. Pacific Gas and Electric Company, Diablo Canyon Site, Drawing Control Procedure, dated September 11, 1972, paragraph 3.11, "Contractor's Field Drawings and Procedures", states that, "Drawings that are drawn by the contractors onsite (Lift drawings, piping isometric, hanger drawing, etc) are submitted to PG&E onsite office for approval. These drawings are checked by PG&E drawings. They are returned to the contractor with the stamp (no. 6) below noting the appropriate condition of the drawing." Isometric

No. 2-14-8 were stamped as approved, therefore indicating review by the licensee.

In conclusion, because it appears that though it was not the usual practice, under certain conditions welds could be added (through coordination with the QA Inspector and the Engineer) which did not circumvent the then existing design change control system. The inspector has no further questions on this item.

Pullman NUR P53

Task: Allegation or Concern No. 68

Characterization

A 1977 Nuclear Services Corporation (NSC) Audit of Pullman Power Products. (Pullman Power Products is the prime piping contractor for the Diablo Canyon site).

Implied Significance to Design, Construction or Operation

The conclusion of the audit is highly inflammatory and implies a breakdown in most, if not in all programmatic aspects of Pullman's Quality Assurance Program prior to September 1977.

Assessment of Safety Significance

An NRC examination of the NSC Audit Findings has been ongoing since the NSC audit was presented by the Joint Intervenors to the Atomic Safety and Licensing Appeals Board (ASLAB) on September ~~8~~ 9, 1983. On October 4, 1983 the NRC: Region V staff provided to the ASLAB a staff response which concluded that Pullman Power Products did not suffer a major breakdown of their Quality Assurance Program during the audit referenced period. Additionally, while items of noncompliance have been identified as a result of NRC conducted inspections, which specifically examined 70% of the ~~NSC audit findings~~ NSC audit findings, the NRC staff found no evidence to change the ~~the conclusion of the NRC staff is that the NSC Audit Findings and the resultant NRC findings, have no safety significance on the ability of the equipment or components to perform their intended function.~~ staff conclusion provided to the ASLAB on October 4, 1983.

Further information on the individual items of the NSC Audit examined is provided in NRC Inspection No. 50-275/83-37.

Staff Position

The NRC staff found no evidence to conclude that Pullman Power Products suffered wide ranging defects in their quality program or installed physical work during the NSC Audit referenced period (of 1971 through September 1977).

Action Required

No further action is warranted in this area. However, the licensee's response to the NRC ~~issued~~ item of noncompliance issued as a result of the investigation of the NSC audit findings, will be pursued and resolved as part of the regular NRC inspection program.

Criterion IX, Finding No. 10K:

"Hangers ar enot welded in accordance with Pacific Gas and Electric Company requirement. Hangers 2023-IV and 2039-2V are two examples of a number of hangers observed that are welded to the structural steel on the wrong side of the bracket."

NRC Finding:

The inspector examined Hangers No. 2039-2V, the related hanger drawing, and determined that the hanger is Class II/E hanger which received no quality control inspection hence no field weld process sheets were generated or available for review. Examination of the hanger drawing determined the drawing called out a 1/4" fillet weld on the front and back of the beam attachment. The beam attachment is the only component specified on the drawing as requiring welding, and the inspector found the beam attachment to be welded as specified on the drawing.

Examination of Hanger No. 2023-1V (a Class I hanger) and the related hanger drawing indicated the beam attachment was welded as specified on the hanger drawing.

Both of these hangers are located in Unit No. 2

During the field examination of the above noted hangers the inspector selected eight additional hangers from the same general area with similar configurations. The inspector noted that all hangers chosen were similar to Hanger Nos. 2039-2V and 2023-1V, that is a welded beam attachment supporting a spring hanger. All of these hangers are located at approximately the 130' elevation in the general

area where the main steam lines exit Containment No. 2. The following hangers and their related hanger drawings were examined and found to conform to the specified drawing requirements.

Hanger No.	Class Designation
2040-1V	Class II/E
2023-7V	Class II/E
2023-6V	Class II/E
2021-4V	Class I
2023-5V	Class II/E
2021-3V	Class I
2037-1V	Class I
2021-1V	Class II/E

Conclusion ?

The inspector has no further questions on this item.

ATTACHMENT 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CALIFORNIA 94596

FEB 29 1984

Docket Nos. 50-275 and 50-323

Pacific Gas and Electric Company
77 Beale Street, Room 1435
San Francisco, California 94106

Attention: Mr. J. O. Schuyler, Vice President
Nuclear Power Generation

Gentlemen:

Subject: NRC Inspection of Diablo Canyon Units Nos. 1 and 2

This refers to the special inspection conducted by Messrs. D. F. Kirsch, T. M. Ross, and G. H. Hernandez of this office on November 14-18 and November 28 - December 9, 1983, of activities authorized by NRC License No. DPR-76 and Construction Permit No. CPPR-69, and to the discussion of our findings held with Mr. D. A. Rockwell and other members of your staff at the conclusion of the inspection.

Areas examined during this inspection are described in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector.

Based on the results of this inspection, it appears that one of your activities was not conducted in full compliance with NRC requirements, as set forth in the Notice of Violation, enclosed herewith as Appendix A.

Your response to this Notice is to be submitted in accordance with the provisions of 10 CFR 2.201 as stated in Appendix A, Notice of Violation.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosures will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1).

Should you have any questions concerning this inspection, we will be glad to discuss them with you.

The responses directed by this letter and the accompanying Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

Sincerely,

T. W. Bishop

T. W. Bishop, Director
Division of Reactor Safety and
Projects

Enclosures:
A. Notice of Violation
B. Inspection Report
Nos. 50-275/83-37 and 50-323/83-25 with Attachment 1

cc w/enclosures:
P. A. Crane, PG&E
W. A. Raymond, PG&E
S. M. Skidmore, PG&E
R. D. Etzler, PG&E (Diablo Canyon)
R. C. Thornberry, PG&E (Diablo Canyon)

APPENDIX A

NOTICE OF VIOLATION

Pacific Gas and Electric Company
77 Beale Street
Room 1435
San Francisco, California 94106

Docket No. 50-275
License No. DPR-76
Docket No. 50-323
Construction Permit No. CPPR-69

As a result of the inspection conducted on November 14-18 and November 28 - December 9, 1983, and in accordance with NRC Enforcement Policy, 10 CFR Part 2, Appendix C, the following violation was identified:

Section 17.1.5 of the FSAR (dated October 1978) and the Pacific Gas and Electric Company Quality Assurance Manual Section V (dated August 15, 1978) states, in part, that, "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings...and shall be accomplished in accordance with these instructions, procedures, or drawings...."

Engineering Standard Diablo (ESD) No. 237, "Quality Assurance Inspector Training Program," dated February 26, 1974, states in paragraph 2.3 that, "All personnel engaged as Field QA Inspectors involved in the inspection of weldments, interpretation of Engineering Specifications and Welding Procedures, and documentation work, shall be required to complete an indoctrination period as described in Section 4 of this specification." Paragraph 4.1 states that, "The indoctrination period for the Field Q.A. Inspectors described in Section 2.3 shall contain as a minimum, but not necessarily limited to, the following courses:

Visual Inspection	Welding Procedures
Welding Inspection	Welding Processes
Basic Q.A.	

Other courses offered as optional are:

Welding	Steam Power Plant Fundamentals
Basic Power Plant Instruction	Welding & Piping Engineer. Technology
Introducing Nuclear Power	(I.C.S.)

The Visual Inspection and Welding Inspection tests shall be administered and controlled by the N.D.E. Training Officer. All N.D.T. training, qualifications and certifications will be covered by ESD-235."

Paragraph 4.2 states that, "Tests used for the indoctrination courses for Field Q. A. Inspectors shall be:

1. For Basic Q.A. Test-ESD's.
2. For Weld Procedure Test-Approved Welding Procedures.
3. For the Weld Process Test, Welder Qualification Card and Pipefitter's Manual.
4. For Welding Inspection Qualifications, General Welding Information.
5. Visual Inspection Qualifications-General Dynamics NDT Introduction."

A Nuclear Services Corporation (NSC) Audit dated October 27, 1977, identified in Criterion IX, Finding No. 3 (of the audit) twenty-eight individuals which were alleged to have begun performing their duties without fulfilling the Pullman Power Products procedural requirements for certification and qualification of Quality Assurance (Welding) Inspectors.

Contrary to the above requirements of the FSAR and Pullman procedures, the inspector identified on November 15, 1983 that in virtually all cases the individuals hired after September 25, 1973, named in the NSC audit finding (who were assigned to perform welding inspections), began inspecting and accepting weldments, before completing the required training, taking the required examinations, and before being certified as a welding inspector. It is noted that the Pullman Power Products response to this Nuclear Services Corporation finding states, in part that, "All current inspectors have been qualified by test as outlined in ESD-237. The requirement for qualification and certification of field inspector were added in ESD-237 on September 25, 1973 to reflect the requirements of ANSI N45.2.6, just published. Persons hired before this time were not necessarily tested at time of hire. Subsequent to 1973, the records indicate that all inspection personnel received required training and examination." However, the Pullman response is silent with regards to inspectors performing inspections prior to certification.

This is a Severity Level IV Violation (Supplement II).

Pursuant to the provisions of 10 CFR 2.201, Pacific Gas and Electric Company is hereby required to submit to this office within thirty days of the date of this notice a written statement or explanation in reply, including: (1) the corrective steps which have been taken and the results achieved; (2) corrective steps which will be taken to avoid further items of noncompliance; and (3) the date when full compliance will be achieved. Consideration may be given to extending your response time for good cause shown.

2/29/84
Date

H. L. Canter, Chief
Reactor Projects Section No. 3

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-275/83-37 and 50-323/83-25

Docket Nos. 50-275 and 50-323

License No. DPR-76 and Construction Permit No. CPPR-69

Licensee: Pacific Gas and Electric Company
77 Beale Street, Room 1435
San Francisco, California 94106

Facility Name: Diablo Canyon Units 1 and 2

Inspection at: Diablo Canyon Site, San Luis Obispo County, California

Inspection conducted: November 14-18 and November 28 - December 9, 1983

Inspectors: G. H. Hernandez — 2/29/84
G. H. Hernandez, Reactor Inspector — Date Signed

T. M. Ross — 2/29/84
T. M. Ross, Reactor Inspector — Date Signed

D. F. Kirsch — 2/29/84
D. F. Kirsch, Chief, Reactor Safety Branch — Date Signed

Approved by: H. L. Canter — 2/29/84
H. L. Canter, Chief — Date Signed
Reactor Projects Section No. 3

Inspection During the Period of November 14-18 and November 28 - December 9, 1983 (NRC Inspection Report Nos. 50-275/83-37 and 50-323/83-25).

Areas Inspected: A special, unannounced inspection by regional-based inspectors to perform an in-depth review of selected findings contained in an audit of the Pullman Power Products Quality Assurance Program conducted by Nuclear Services Corporation (NSC), during August - September 1977. Concurrently, the licensee and contractor responses were evaluated to establish whether the outstanding issues identified by NSC were resolved or corrected.

The inspection involved 402 inspection-hours by three NRC inspectors.

Results: Of the areas examined one item of noncompliance was identified (failure to assure that welding inspectors are qualified and certified in accordance with procedural requirements, paragraph No. 17).

DETAILS

1. Individuals Contacted

a. Pacific Gas and Electric Company (PG&E)

R. D. Etzler, Project Superintendent
*D. A. Rockwell, Project Field Engineer
*M. E. Leppke, Onsite Project Engineer
*C. L. Eldridge, Quality Control Manager (Nuclear Operations)
*W. K. Glenn, Quality Control Supervisor
*T. E. Pierce, Quality Control Engineer
*M. N. Norem, Lead Startup Engineer
*J. Arnold, Resident Mechanical Engineer
*R. Taylor, Quality Assurance Engineer

b. Pullman Power Products Corporation (PPP)

*H. W. Karner, Quality Assurance/Quality Control Manager
*F. J. Lyautey, Assistant Quality Assurance/Quality Control Manager
*J. Guyler, Internal Auditor

* Denotes attendees at the NRC exit management meeting on November 18, 1983.

No NRC Management Meeting was held with the licensee at the conclusion of the NRC inspection which ended on December 9, 1983.

In addition, Mr. M. M. Mendonca, the NRC Senior Resident Inspector, and Mr. T. Polich, NRC Reactor Inspector, were present at the exit management meeting.

2. Introduction:

The Nuclear Regulatory Commission (NRC) staff performed an unannounced in-depth inspection to review the validity of the NSC audit findings and evaluate the adequacy of the Pullman and PG&E responses to the NSC audit findings.

Licensee and contractor actions in response to the NSC audit findings had been previously reviewed by the staff. Inspection Report 50-275/83-34 documented this inspection and concluded that problems identified in the NSC audit were properly addressed and resolved by the licensee's Quality Assurance Program. This previous inspection did not include an in-depth review of each and every NSC audit finding; but instead evaluated the results of the licensee's and PPP's response and specifically addressed three particular NSC findings that required further clarification. Based upon Inspection Report 83-34 and other reviews conducted by the NRC inspection program, the staff (in October 1983) provided an affidavit to the Atomic Safety and Licensing Appeal Board concluding that the PPP Quality Assurance Program did not suffer major breakdowns which could have significant adverse impact on construction activities.

The staff inspection effort documented in this report represents a much more in-depth examination of specific NSC audit findings and their impact on PPP construction quality assurance.

3. Purpose:

The goal of this inspection effort was threefold:

(a) To assess whether the NSC audit findings represented a major defect in the Pullman or PG&E management of quality programs.

(b) To establish an additional level of assurance that Pullman Power Products and the licensee's responses to the NSC audit findings were accurate, appropriate, and effective in resolving all issues pertinent to compliance with codes and regulations.

(c) To assess any NSC audit findings which appeared to identify noncompliance with accepted standards, codes and regulations.

4. Scope of Inspection Plan:

The NRC inspection effort involved a review of all NSC audit findings listed in the NSC report issued October 24, 1977. In conjunction, a face value assessment was performed to assess the adequacy and completeness of the responses provided by Pullman Power Products and the licensee (dated April 11, 1978 and June 16, 1978, respectively) to each of the NSC findings. A selection of the more significant NSC audit findings was generated by the NRC. These selected items formed the basis for the NRC's on-site examinations.

The NSC audit identified 175 total findings. The staff considered that 110 of these audit findings could be interpreted as apparent deficiencies. The NRC had previously examined three of the NSC audit findings. Those findings are documented in NRC Inspection Report 50-275/83-34. Of the 110 apparent deficiencies, the NRC staff selected 47 of the most significant items, giving priority to those findings which could reasonably impact upon construction quality. Thus, about 45% of the NSC identified deficiencies were examined in an in-depth manner by the staff. (This examination represents about 70% of the principal deficiencies cited by the Joint Intervenors in their supplementary motion to reopen the record on construction quality assurance based upon the results of the NSC audit).

Those NSC findings selected as high priority topics for the NRC inspection were based on the following rationale:

(a) Audit findings which appeared to have the greatest potential for manifestation in poor quality work in the field.

(b) Audit findings which specifically reference characteristics of poor field work practice.

(c) Those findings that appear to be in noncompliance with accepted standards, codes and regulations.

Where the NSC findings involved a potential for disputes over NDE results, the NRC contracted with an independent consultant to examine the field work and records for compliance with code requirements. To establish whether adequate control over weld delta ferrite content had been implemented in the shop and field, a sample of twenty-five stainless steel welds was chosen and examined for delta ferrite content. These welds was chosen from small bore piping which contain both field and shop welds. To establish whether inking of numbers onto radiographs was a wide-spread practice or if the NSC finding represented an isolated instance, 102 field weld radiographs were selected to verify field weld and radiographic interpretation adequacy. The 102 welds examined were selected from several of the more important safety systems; including the Reactor Coolant System (system 7), safety injection system (system 9), containment spray system (system 12), main steam system (system 4), chemical and volume control system (system 8) and residual heat removal system (system 10). In addition, four specific welds, from among those identified in the NSC findings, were examined to establish whether the surface preparation was acceptable for nondestructive examination. Liquid penetrant testing of these four field welds was performed to ascertain the degree of actual compliance with acceptance standards. The above items were selected to provide an independent feel of the Pullman work, rather than solely relying on information provided by licensee records.

The NRC also reviewed the non-conformance reports (NCR's) and minor variation reports (MVR's) issued by the licensee as a result of an audit, conducted by the PG&E Q.A. department, of the PPP Q.A. program, issued June 13, 1978. Corrective actions identified by these NCRs and MVRs were evaluated for adequacy and implementation, and appeared acceptable.

The NSC Audit Findings selected by the NRC for in-depth examination and the NRC findings are detailed in the following paragraphs.

5. Criterion I, NSC Audit Finding No. 3:

"The field Quality Assurance Organization has performed functions other than those described in KFP-1 and KFPS-1; and some functions were outside the quality responsibility, i.e., writing and approving Engineering Specifications, performing welding engineering functions, approving engineering changes. These activities raise the question of the qualification of Quality Assurance personnel to perform these functions and the problem of requiring the Field Quality Assurance Organization to audit its own performance."

NRC Finding:

To resolve this issue the inspector's approach was to establish who in the Pullman organization was allowed to write procedures or procedure changes, perform the review and approval process for such documents and whether sufficient control was exercised by Pullman in the writing, review and approval process. In addition, the validity of the Pullman response was assessed.

The quality assurance program prescribed by the Pullman ASME Quality Assurance Manual procedure KFP-1, and as implemented in part by procedure ESD 269, apparently allows anyone to be assigned the task of writing procedures. However, the point of control in this procedure writing process is that the cognizant discipline management is required to review and approve the procedure prior to issuance for use. For example, the Pullman Chief Field Engineer is required to review and approve engineering and construction procedures to assure compliance with code, specification and contract requirements and the Quality Assurance Manager is required to review and approve quality assurance implementing procedures. In addition, engineering specifications covering quality assurance functions are required to be reviewed and approved by the contractor's Quality Assurance Manager and the licensee. Engineering specifications may provide instructions to field Quality Assurance inspectors, field engineers and foremen. One exception to this is that welding procedures to be used onsite were, and are, required to be qualified by the Welding Engineer at the Pullman home office, approved and issued by that office, and approved by the licensee's engineering. Engineering Specifications must also be approved by the licensee.

While the inspector concludes that adequate controls were applied in the procedure review and approval process to assure procedure adequacy, a stated concern was whether QA would be involved in auditing for adequacy a procedure which QA authored, thus potentially auditing their own performance. Quality Assurance normally audits to assure that the QA program requirements are properly implemented by quality effecting procedures and to assure that contract specification and code requirements are adequately implemented in the field. The inspector further concludes that while QA and QC may audit or inspect for implementation of these procedures such action is not considered to be an auditing of their own performance because program implementation is the responsibility of production oriented organizations.

The inspector concludes that there is no regulatory or procedural requirements which provide limits as to whom may write procedures. The inspector further concludes that Pullman has provided adequate controls to assure procedures are reviewed and approved by appropriate discipline and managerial authority prior to issuance and use of a new procedure.

No items of noncompliance or deviations were identified.

6. Criterion II, NSC Audit Finding No. 4

"There is no evidence that upper management has performed scheduled reviews of nonconformance reports, personnel qualifications, and corrective actions."

NRC Finding:

The inspector examined the historical records of nine corporate management audits conducted between September 1972 and June 1977. This examination verified that nonconformances, personnel qualifications, and corrective action were consistently among those activities audited by corporate management.

In addition, Pullman Power Products has since provided programmatic improvements and incorporated an on-site management review system requiring that the Quality Assurance/Quality Control Manager submit monthly reports "Summarizing all significant Quality Assurance events, audits, nonconformances including trends noted, and may offer suggestions for Q. A. program improvement."

The inspector concludes the historical records of corporate management audits do provide evidence that reviews of nonconformance reports, personnel qualifications and corrective actions were performed.

No items of noncompliance or deviations were identified.

7. Criterion V, NSC Audit Finding No. 1:

"There is no requirement that activities affecting quality shall be prescribed by documented instructions, procedures, and drawings."

NRC Finding:

The inspector determined that Section KFP-8 (revision dated August 22, 1972) of the Pullman Quality Assurance Manual contains procedures to be used to establish "Process Planning and Control" for on-site work. Specifically KFP-8, in paragraph 8.1, requires that "The field process sheet (Figure No. 11) serves as a traveler to identify, in sequence, the field work to be done. It is used both for the field fabrication of piping assemblies and for the erection of pipe in the plant." A field process sheet will list in sequence all significant operations and inspections associated with a particular field activity. Specific written procedures are required to be referenced, for each operation and inspection listed, to identify those detailed instructions necessary to actually perform the work assignments. Applicable isometric or detailed drawings and code requirements are also indicated on the field process sheet. Procedure KFPS-7 (issued December 3, 1973), of the Quality Assurance Procedures for Pipe Supports, establishes a similar "Process Planning and Control" system using the Field Support Process Sheet.

The inspector concludes the program elements of KFP-8 and KFPS-7 did establish that documented instructions and procedures were required to be prescribed for control of Pullman's quality related construction activities.

No items of noncompliance or deviations were identified.

8. Criterion V, NSC Audit Finding No. 2:

"Many activities affecting quality are not described in procedures. Among those activities are: hanger package review, pre-heating for welding, use of Note-O-Grams, use of Rejection Notices, and maintenance of Field Quality Inspector Daily Logs."

NRC Finding:

The inspector examined the procedures and program instructions that were available for the specific activities identified.

The inspector determined that hanger package review is described in KFPS-12 (dated December 3, 1973), which is concerned with the final documentation of pipe supports. KFPS-12 requires that "all field fabricated and field installed supports have been inspected, and accepted drawings are compiled and indexed as outlined" by the inclusive program instructions. Supplementary requirements were subsequently incorporated into ESD-254 (dated December 30, 1977) in the form of a document review checklist to establish a "Guide for assembly and review of hanger documentation packages."

Preheating for welding is prescribed in the applicable Pullman "code weld procedure specifications," which are specifically referenced by the field process sheet. Later revisions of the field process sheet and ESD-218 (dated October 1977) included amplification of preheat temperature range requirements.

The inspector does not consider it necessary that documents such as Note-O-Grams, Rejection Notices, and Inspector Logs be controlled and prescribed by written procedures. These documents are implemented internally as an aid to the quality assurance program management and provide administrative tools for status reporting and recording. The inspector determined that these documents do not establish requirements, procedural instructions, or final acceptance documentation for quality related activities. Pullman's Quality Assurance Program delineates those procedures required to be used for the inspection and documentation of quality related activities.

In conclusion, the inspector found the Q.A. program elements describing hangar package review and weld preheat were adequate and met the applicable code requirements. Note-O-Grams, Rejection Notices and Inspector Logs are not required, by applicable codes, to be prescribed in procedures. The Pullman and PG&E responses were consistent with these conclusions.

No items of noncompliance or deviations were identified.

9. Criterion V, NSC Audit Finding No. 3:

"Many activities affecting quality are insufficiently described in procedures. Among these activities are isometric package review, post welding heat treatment, non-conformance reporting, ninety-day welder's log and weekly qualified welder's list, and auditing."

NRC Finding:

The inspector examined Pullman's Quality Assurance Program to determine if the specific activities identified in the NSC Audit Finding were adequately and sufficiently described. The inspector's findings are as follows:

- Field procedure ESD-254 (dated May 6, 1975) appears to provide an adequate outline guide for review of isometric drawing packages. May 6, 1975 was the earliest date that could be found for ESD-254. While most piping installations had been completed prior to May 1975, the inspector found that the final complete document review of isometric drawing packages were performed after ESD-254 was in effect.

- Appropriate post weld heat treatment requirements were always prescribed by weld procedure specifications. These were further amplified in ESD-218 (October 1977), as a program improvement subsequent to the NSC audit.

- Nonconformance reporting requirements prescribed by the Pullman ASME certified Quality Assurance Program Manual Section KFP-10 (dated January 4, 1973) and procedure ESD-240 (dated December 6, 1973) were consistent with Appendix B criteria. A significant rewrite of ESD-240 in 1978, and subsequent revisions, established additional detailed instructions to clarify nonconformance reporting aspects such as documentation, specific personnel responsibilities, the functional use, closing-out, and 10 CFR 21 applicability. Pullman Power Products calls their nonconformance reports Discrepancy Reports, the terms are synonymous.

- Ninety-Day Welder's Log and Weekly Qualified Welder Lists are only referenced, by KFP-15 (dated August 22, 1972) and ESD-216 (dated June 17, 1976), to figures appended in the procedures. Although desirable, there were no amplifying descriptions on these forms to specify personnel responsibility, functional use, implementation, scope, etc., until significant revisions were incorporated into ESD-216 (dated July 10, 1979). These documents were used to maintain welder qualification status and were maintained by experienced personnel under the cognizance of the Quality Assurance/Quality Control Manager. A review of the application of 90-day welder logs and weekly qualified welder lists did not identify any evidence of inconsistencies that would have adversely affected quality control activities. The Code merely requires that a contractor assure that welders are qualified but doesn't prescribe methods effecting administrative control of this activity. Thus, the inspector finds that Pullman did adequately track welder qualification to assure Code compliance. This subject is further examined in paragraph 21 of this report.

- Internal and Corporate Management audits of the Pullman onsite Q.A. program were described by Q.A. manual section KFP-18 (revision 8/22/72). The program elements prescribed by KFP-18 were not complete and very general in nature. Those areas which appeared particularly deficient were audit personnel qualifications, audit scope, audit scheduling and disposition of audit records.

  A corporate procedure (no. XVIII-1) prescribed further instructions for corporate management audits, directed and conducted by Williamsport headquarters management personnel. Corporate audit procedure No. XVIII-1, provided the detailed instructions for

conducting the management audits required by KFP-18. A review of corporate management audits, performed in accordance with Procedure XVIII-1, reveals a history of Quality Assurance Program audits based upon checklists following 10 CFR 50 Appendix B criteria. This established a comprehensive corporate audit system which appeared to review all field Q.A. program facets. Thus, for performing corporate management audits, Procedure XVIII-1 did provide effective amplifying instructions to implement the general elements of KFP-18.

There did not exist any comparable detailed procedure to implement "internal" audits required to be performed by on-site Quality Assurance personnel. A staff review of internal audit records prior to the NSC audit indicates that all aspects of the Pullman field Quality Assurance program were not being addressed. This deficiency was also clearly identified by a licensee audit of Pullman and subsequently documented on nonconformance report No. DCO-78-RM-004 (dated October 1978). Pullman's resolution included a rewrite of KFP-18 and development of an internal audit procedure, issued as ESD-263, dated June 26, 1978. To further provide for audit program consistency, the corporate audit procedure XVIII-1 was incorporated into field procedure ESD-274, dated February 19, 1980. Adequate corrective action was implemented to assure that all Q. A. field program elements were scheduled for internal auditing (as of June 1978). Records of subsequent internal and corporate audits verify that no major breakdown of the Quality Assurance program had occurred, nor had any significant problems gone undetected, due to the deficiencies identified with the internal auditing program.

In conclusion, the inspector determined there were adequate controls which prescribed requirements for isometric package review, post welding heat treatment and nonconformance reporting. Further, the practices used by Pullman in implementing the ninety-day welders log and weekly qualified welders list effectively accomplished the intent of these activities even though specifics regarding how these activities were to be performed were not prescribed in detail by procedures until July 10, 1979. Even though the internal audit program, implemented by on-site personnel, (prior to 1978) was determined to be of a marginal quality, a redundant program of comprehensive corporate audits was performed concurrently. Based upon an examination of the findings identified in corporate and internal audits, there did not appear to be any adverse impact on quality related activities as a result of the inadequate description of the internal auditing program. The inspector concludes that, with both programs operating simultaneously, sufficient records are available to assure the necessary criteria of Appendix B were being audited periodically. This conclusion is based, in part, on the absence of recurring significant audit findings.

No items of noncompliance or deviations were identified.

10. Criterion VI, NSC Audit Finding No. 9a:

"For Isometric 2-14-77: The Process Sheet was changed to show the completion of FW-192 on April 10 and April 11, 1974, approximately 19 months after the work was done."

NRC Finding:

The inspector found that even though the NSC audit finding identifies the incorrect isometric package, presumably due to typographical error, the Pullman response correctly addresses the intended isometric package, i.e., Isometric Package No. 2-14-47. Examination of isometric package no. 2-14-47 indicated that FW-192 was completed on April 11, 1974, as indicated by the signing and dating of the line item by the Pullman welding inspector. The signature and date were in ink and the inspector could not find any evidence to indicate that the completion date or signature had been altered or that any attempt had been made to alter the signature and date. The weld was liquid penetrant examined on December 2, 1975, found acceptable, and the line item for the non-destructive examination on the process sheet was then signed and dated. Examination of the Liquid Penetrant Examination record indicated that both the signatures and dates on the process sheet and the Liquid Penetrant Examination Record were in ink and no evidence could be found to indicate that there had been an attempt to alter the dates or signatures on either or both of these documents.

Therefore, the inspector could not corraborate the NSC auditor's finding that the date for completion of FW-192 had been changed or backdated.

No items of noncompliance or deviations were identified.

11. Criterion VI, NSC Audit Finding No. 9b:

"Isometric 2-14-8: FW-1673 was performed to Revision 2 of the isometric, which did not show FW-1673. Revision 3 of the isometric, which included the FW-1673, was generated approximately one week after completion of the weld. It is therefore concluded that FW-1673 was performed without the normal controls of a Process Sheet, a weld procedure call out and a call-out of NDE requirements."

NRC Finding:

The inspector examined the various contractor procedures and documents that existed during the time frame in question to determine whether the design change control system was circumvented by the Pullman Quality Assurance Inspector which allowed or directed the welding of a valve to a capped pipe. The inspector examined Isometric No. 2-14-8 which in Revision 2, dated December 11, 1972, shows a capped pipe (termed a nipple) and in Revision 3, dated May 29, 1974, the required valve and vent (actually a capped pipe) are depicted. Revision 2 of the isometric drawing did not show FW-1673. A review of the weld process sheet indicated that the weld (FW-1673) was completed on May 24, 1974, five days before the issuance of revision 3 to the isometric drawing. Thus, the inspector concludes that FW-1673 was made prior to the issuance of revision 3 to the isometric drawing. However, it appears that the installation of FW-1673 was accomplished in a controlled manner as described below.

The inspector examined Pullman Quality Assurance Instruction No. 52, dated December 13, 1973 which states that, "Due to a shortage of valves

used for vents and drains at this complex, it has become necessary to install twelve inch nipples, capped on end, to facilitate flushing." Subsequent to instruction no. 52, on March 8, 1974 an apparently generic discrepancy report (Discrepancy Report No. DR 2100) was written in an effort to expedite the installation of vents and drains in erected pipe. Item No. 3 of the approved disposition of the discrepancy report states that, "All welds added for this change will be recorded on the process sheet and isometric. All added weld number selection will be coordinated between drafting, Quality Assurance Inspector, and Engineering." Item No. 4 states that, "Engineering is to notify the area Quality Assurance Inspector prior to starting installation of standard vents and drains." Therefore, it appears that the Quality Assurance Inspector was in contact with Engineering for the installation of vents and drains and welds were required to be recorded on process sheets. Thus, the inspector concludes that the licensee and Pullman adequately controlled and documented the installation of nipples, in place of the required vents and drains. Furthermore, the inspector concludes that the licensee and Pullman adequately controlled the restoration of the system to design configuration by adding the required vents and drains when valves became available.

A process sheet for field weld, FW-1673 is contained in Isometric No. 2-14-8, as required. Therefore, the inspector concludes that FW-1673 was performed using the normal controls of a process sheet.

Further, Pullman procedure ESD-239, dated April 2, 1974, states in paragraph 2.1 that "Piping systems shall be closed out by Quality Assurance Inspectors. Piping shall be checked when necessary against PG&E area drawings, Section 3 of Specification 8711 and the PG&E flow diagrams. All missing or incorrect items shall be recorded on a punch list and D.R. (discrepancy report) written if required." ESD-239 further states in paragraph 3.1 that "The following is a guide for Quality Assurance Inspectors when closing out piping systems" and proceeds to state in paragraph 3.1.2 to "Check field run pipe and fittings for correct materials, rating and specifications when so identified," and in paragraph 3.1.15 to, "Check that instrument connections, vents, drains and plugs are installed per the Isometric and Flow Sheets." Therefore, it appears that Quality Assurance Inspectors were required to verify conformance to PG&E design drawing (Flow Sheets), and to record any discrepancies. The field QC inspector, in conjunction with Pullman Engineering, had apparently accepted the installation of FW-1673 knowing that the next isometric revision would be updated to correspond to Flow Sheet requiements.

A comparison of the contractor operated Isometric No. 2-14-8 to the PG&E Flow Sheet (PG&E Drawing No. 108014) indicated that the required valve and vent were depicted on the line referenced on Isometric No. 2-14-8. Therefore, the weld (FW-1673) attaching the valve and vent was, at least implicitly, required on the PG&E Flow Sheet (No. 108014). It appears that the valve and vent were not installed on the line due to the shortage of valves, as stated in the aforementioned Quality Assurance Instruction No. 52. However, adequate provisions had been made for the subsequent installation of the valve, as shown by the installation of the nipple and cap depicted in Revision 2 of the isometric. A check of one

other line with a similar configuration (there are four similar lines with valves and vents in the same area) confirmed that a similar situation had occurred for Isometric No. 2-14-6, Line No. 1759-6 (i.e., the weld had been made and completed before the revision to the isometric depicted the weld).

Additionally, the inspector verified that, in the time frame in question, a method existed to assure that the proper welding procedure was used for the pipe to valve weld in question. The inspector found that ESD-227, dated December 20, 1973 provided a chart indicating the proper weld procedure for different materials and configurations required. For this case, a socket weld was required and weld procedure no. 92/93 was the weld procedure needed and used. A review of the process sheet for FW-1673 confirmed that weld procedure 92/93 was used.

Finally, the inspector verified that contractor originated drawings (for example, isometric drawings) are reviewed by the Engineer (PG&E) for conformance with the PG&E design drawings. The PG&E Drawing Control Procedure, dated September 11, 1972, paragraph 3.11 (Contractor's Field Drawings and Procedures) states that "Drawings that are drawn by the contractors onsite (Lift drawings, piping isometric, hanger drawing, etc.) are submitted to PG&E onsite office for approval. These drawings are checked by PG&E drawings. They are returned to the contractor with the stamp (no. 6) below noting the appropriate condition of the drawing." Isometric No. 2-14-8 was stamped as approved, therefore indicating review and acceptance by the licensee.

In conclusion, it appears that under certain conditions welds could be added (through coordination with the Quality Assurance Inspector and the Engineer) which did not circumvent the then existing design change control system. Furthermore, these additions were accomplished in a controlled, orderly and proper manner.

FW-1673 was completed using a weld process sheet, a welding procedure was specified, including identification of necessary nondestructive examinations. Further, while FW-1673 was not depicted on the contractor generated isometric drawing, revision 2, the weld was implied to be necessary by the PG&E generated and approved Flow Sheet (Drawing No. 108014) and the inclusion of FW-1673 was accomplished and documented in a controlled manner.

No items of noncompliance or deviations were identified.

12. Criterion VI, NSC Audit Finding No. 9c:

"Isometric 2-14-53: FW-247 was completed on February 20, 1975. Approximately December 1, 1975, the visual acceptance was signed off and backdated; the Weld Rod Requisition was changed to show that more than the original quantity of one had been burned."

NRC Finding:

The inspector examined the daily work log of the Pullman inspector who performed the inspection on FW-247. The daily work log records indicate

that the inspector did perform the final inspection of FW-247 on February 20, 1975, as stated in the Pullman response. Therefore, the inspector does not consider this to be an unauthorized, or improper, backdating because the signature reflects the actual conduct of inspections.

Examination of the Weld Rod Requisition records indicated that the quantity of weld rod was changed on one weld rod slip as stated by the NSC auditor, however the change was initialed by a Pullman inspector. The change to the Weld Rod Requisition slip was apparently made because the Pullman inspector entered the number of weld rod returned on the wrong line item and subsequently changed the line item to reflect the correct conditions. It appears that the condition was caused by an error, which was later caught by the Pullman inspectors. The inspector considers this acceptable in that the record was apparently modified to reflect the actual conditions existing. NRC examination of approximately one hundred weld rod requisition records contained in isometric packages Nos. 2-14-77, 2-14-47, 2-14-8, 2-14-53, 2-14-59, and 2-26-417, did not identify any similar conditions.

The inspector concludes that this item does not represent an instance of unauthorized changing of quality related documents and that the changes made had been made with adequate basis and reason.

As a side issue, it was reported (in Pullman's response to this audit finding) that this problem had been found as a result of an internal Pullman audit. The inspector reviewed Pullman's internal audits and could not verify the Pullman audit response. It appears that the discrepancy was found by Pullman as a result of the documentation review of the isometric package. This minor inconsistency in the Pullman response is not considered to be significant.

No items of noncompliance or deviations were identified.

13. Criterion VI, NSC Audit Finding No. 9d:

"Isometric 2-14-59: FW-268 was completed February 5, 1975. On December 2, 1975, the entry on the Process Sheet for removal of dams was signed off and backdated. There is no proof that the dams had been removed."

NRC Finding:

The inspector found that FW-268 is a Code Class 3 weld which the records indicate was made with the use of a backing ring, thus, no dams were to be used. The signing on the line entry for dam removal, by the Pullman inspector, appeared to be an oversight on the part of the Pullman inspector. Examination of Isometric Package No. 2-14-59 indicated that a Warehouse Requisition Record specifying a backing ring for FW-268 was contained in the package. The inspector could not verify the December 2, 1975 date, when supposedly the backdating occurred.

The inspector did find that, apparently in response to the NSC finding, the Pullman inspector did cross out the "Remove Dam" entry, wrote "not applicable", dated and signed this line entry on December 7, 1977. This same Pullman inspector also found that he had performed the same error on

FW-269, which is contained on the same isometric package. The Pullman inspector then crossed out, wrote "not applicable", and dated and signed this line entry on December 7, 1977.

Examination of five isometric packages, by the NRC inspector, identified three other similar cases wherein a different Pullman inspector had signed the "Remove Dam" line entry, when in fact a backing ring had been used. Isometric package no. 2-14-53 contains FW-246 and FW-247 and Isometric package no. 2-14-47 contains FW-196, which have similar discrepancies.

The inspector concludes that no safety significance can be attributed to this NSC finding and no purpose would be served by reviewing and correcting any other similar record discrepancies. The NSC finding appears to be the result of errors by Pullman inspectors, who subsequently corrected these errors to indicate the actual state of activities. The inspector does not consider this to be a QA program deficiency; rather, these appear to be instances where inspection personnel were trying to show that no dam was installed as opposed to actually removing a dam.

No items of noncompliance or deviations were identified.

14. Criterion VI, NSC Audit Finding No. 9e:

"Isometric 2-26-417: FW-144, 145, 196, and 197 were completed on May 14, 1976. The Weld Rod Requisition had been altered to add FW-197. However, the Weld Rod Requisition shows that 14 rods had been burned, which seems improbable for the four welds that were supposedly welded."

NRC Finding:

The inspector verified that the M.W. Kellogg (Pullman) Field Warehouse Requisition record indicated that four 3/4" sockets were issued on May 13, 1976 and welded on May 14, 1976. It is the inspector's opinion that 14 weld rods provide sufficient weld rod to weld the four 3/4" socket welds referred to by the NSC finding. The inspector examined Pullman procedure ESD-202, dated April 28, 1975, which states in part, in paragraph 3.2, that "For socket welds, up to four welds may be put on one requisition (weld rod requisition slip)." The inspector did find that all four socket welds were documented on one weld rod requisition slip.

The inspector concluded that this NSC finding has no safety significance and was in accordance with existing procedures.

No items of noncompliance or deviations were identified.

15. Criterion VI, NSC Audit Finding No. 10:

"No procedure or requirement prohibits the changing or alteration of the records and documents that are necessary to track the work. Field Process Sheets, Weld Rod Requisitions, inspection records, etc., should not be changed or should be changed only by Quality Assurance supervisory personnel and then signed and dated."

NRC Finding:

A review, by the inspector, of historical procedures indicates the NSC audit finding is substantiated in part. Prior to 1977, insufficient requirements existed to control the changing or alteration of quality records and documents specified in the NSC finding. The ASME certified PPP Q.A. manual program elements describing field process sheets, weld rod requisitions, and inspection records did specify the qualified personnel responsible for filling out or revising these documents; however, there was no concise administrative Q.A. program instructions written to control how changes to Q.A. field documents would be implemented. This concern had been previously addressed by Pullman's own corporate management audits, which identified a few findings of editorial changes made to Q.A. field documents without adequate administrative controls.

In response to the NSC and Pullman corporate audits, several on-site Pullman QA procedures were revised to provide more explicit administrative controls. ESD-254, entitled "Document Review", was revised on December 30, 1977 to establish for records, process sheets, requisitions, and reports that "corrections, if made, shall be initialed and dated by the responsible individual". The scope of change requirements in KFP-17 (dated August 31, 1977), the QA Manual chapter on revisions and deletions, was broadened to also include all field procedures (ESDs). Corrections and/or changes of field process sheets, according to ESD-264 (dated September 15, 1978), titled "Process Planning and Control," shall be initialed and dated, and limited to specific qualified personnel.

Neither the NSC nor the Pullman corporate audit findings, nor the staff review, identified any unapproved technical changes or other substantive changes which would have adversely affected construction quality. Rather, the issue of concern merely involves editorial field changes made to Q.A. documents and records completed prior to 1977 and the NRC finds that this concern has only minimal safety significance.

Therefore, the inspector concludes that Pullman Q.A. took effective corrective action to correct the programmatic concern identified by the NSC audit and previous Pullman corporate audits.

In conclusion, the inspector determined that Pullman Q.A. took effective corrective action in addressing the programmatic concern identified by the NSC audit and previous Pullman corporate audits. Furthermore, there is no evidence in the NSC, PG&E and Pullman corporate audits to suspect that any field changes made to pre-1977 documents and records impacted adversely on the quality of field construction.

No items of noncompliance or deviations were identified.

16. Criterion VIII, NSC Audit Finding No. 12:

"Procedure ESD-223 does not give adequate instructions for the identification and control of Class I Pipe Supports."

NRC Finding:

The inspector reviewed the historical file for ESD-223, "Installation and Inspection of Pipe Supports" and, specifically, the extensive revisions that occurred on November 11, 1975 and May 25, 1976. The inspector found that the procedure revisions contained adequate Quality Assurance/Quality Control instructions for the control and identification of Class I pipe supports. Additionally, the inspector found that other existing procedures, contained in the Pullman Quality Program, provided additional or amplifying instructions for the identification and control of Class I pipe supports.

No items of noncompliance or deviations were identified.

17. Criterion IX, NSC Audit Finding No. 3:

"The qualification and certification program for NDE and inspection personnel has been inadequate. The records of the following personnel were examined: D. R. Geske, T. L. Koch, J. E. Cawelti, G. P. Keeler, K. E. Beck, L. Glass, W. R. Johnson, E. Stanton, C. B. Athay, R. G. Sears, D. S. Tutkc, J. N. Shiromizu, V. J. Casey, J. A. Brasher, L. F. Myrick, S. R. Stanley, H. Guest, D. E. Bentley, R. D. Kincade, K. D. Guy, J. R. Bowlby, E. R. Jennings, A. L. Newton, C. C. Lenzi, J. J. Sisk, L. K. Thomas, A. A. Conques, and R. L. Marks. In virtually all cases, the individuals began performing their duties without fulfilling the specified requirements. The most prevalent discrepancies are: not completing the required training, not having proof of previous experience, insufficient time as Level I, unsigned tests, and insufficient background and experience."

NRC Finding:

The inspector examined the procedures for qualification and certification of non-destructive examination and inspection personnel that existed in Pullman's program before September 1977. These are Engineering Standard-Diablo (ESD) No. 235, "Nondestructive Examination Personnel Qualification and Certification Procedure," dated September 25, 1973, and ESD No. 237, "Quality Assurance Inspector Training Program," dated February 26, 1974.

The requirements for qualification of Pullman inspectors must have been revised or amplified on or after September 25, 1973. This is based on the Pullman response, to the above NSC audit finding, which states in part, that "All current inspectors have been qualified by test as outlined in ESD-237. Requirements for qualification and certification of field inspectors were added in ESD-237 on September 25, 1973 to reflect the requirements of ANSI N45.2.6, just published. Persons hired before this time were not necessarily tested at time of hire. Subsequent to 1973, the records indicate that all inspection personnel received required training and examination." A review of the ESD-237 historical file indicated that a prior revision had occurred on May 1, 1969, however, no procedure revision could be found which was specifically dated September 25, 1973.

ESD-237, dated February 26, 1974, states in paragraph 2.3 that, "All personnel engaged as Field QA Inspectors involved in the inspection of weldments, interpretation of Engineering Specifications and Welding Procedures, and documentation work, shall be required to complete an indoctrination period as described in Section 4 of this specification." Paragraph 4.1 states that, "The indoctrination period for the Field Q.A. Inspectors described in Section 2.3 shall contain as a minimum, but not necessarily limited to, the following courses:

Visual Inspection	Welding Procedures
Welding Inspection	Welding Processes
Basic Q.A.	

Other courses offered as optional are:

Welding	Steam Power Plant Fundamentals
Basic Power Plant Instruc.	Welding & Piping Eng. Technology
Introducing Nuclear Power	(I.C.S.)

The Visual Inspection and Welding Inspection tests shall be administered and controlled by the N.D.E. Training Officer. All N.D.T. training, qualifications and certifications will be covered by ESD-235." The terms NDE and NDT are synonymous and refer to nondestructive examination.

Paragraph 4.2 states that tests used for the indoctrination courses for Field Q. A. Inspectors shall be:

1. For Basic Q.A. Test-ESD's.
2. For Weld Procedure Test-Approved Welding Procedures.
3. For the Weld Process Test, Welder Qualification Card and Pipefitter's Manual.
4. For Welding Inspection Qualifications, General Welding Information.
5. Visual Inspection Qualifications-General Dynamics NDT Introduction.

Examination of ESD-235 indicated that although this procedure is a nondestructive personnel qualification and certification procedure, the procedure also describes levels of qualification for visual inspection personnel, the type of examination, the number of questions, and the acceptable grade for the examination. Additionally, a welding test requirement is contained in paragraph 11.2.14 which states that, "A combination of General, Specific, and Practical examinations will be given using the Diablo Canyon Welding Seminar Test Paper, containing 66 questions."

Therefore, it is apparent that Field QA Inspectors were required to be indoctrinated through a program of courses related to their job function, including visual and welding inspection tests administered and controlled by the NDE Training Officer. Discussions with contractor personnel indicated that, in the pre-1977 time frame, the training officer controlled all personnel certifications, with no distinction being made between NDE and welding inspection personnel.

The inspector examined the personnel files of 20 of the 28 individuals named in the NSC audit, comparing the date when each individual started

employment with Pullman Power Products versus the date each individual started accepting work. This examination confirmed the NSC audit finding that in virtually all cases, welding Quality Assurance Inspectors began performing their duties without fulfilling the specified requirements and without completing the required training. Two examples are as follows:

- V. J. Casey began employment with Pullman Power Products on November 19, 1973 and began accepting weldments in November, 1973. He was not certified as a welding inspector until February 27, 1974.

- E. R. Jennings began employment with Pullman Power Products on January 16, 1974 and began accepting weldments on January 22, 1974. He was not certified as a welding inspector until April 21, 1974.

Additionally, two other inspectors were found to have questionable backgrounds which, in the inspector's opinion, would not warrant their immediate certification as welding inspectors. K. D. Guy had essentially no background in quality control/quality assurance, yet within two months was a fully certified inspector accepting weldments. A. L. Newton had some background in the aircraft industry, but a lapse of several years had occurred between the time he had terminated his employment in the aircraft industry and the time he began employment with Pullman. Yet within two months Newton was accepting weldments. Both of these individuals had taken several, but not all, of the required welding examination tests specified in ESD-237. Therefore, both of these individuals also began performing their duties without fulfilling the specified requirements and without completing the required training.

The failure to assure that Quality Assurance Inspectors were qualified and certified in accordance with the contractor quality procedures is considered an apparent item of noncompliance (50-275/323/83-37/01).

It should be noted that for all personnel files examined, with the exception of Messrs. Guy and Newton, all individuals appeared to be experienced, with adequate backgrounds either in welding or in the area of quality control inspection.

The inspectors review of personnel files further concluded that Pullman NDE personnel were properly certified and had not accepted or performed work prior to being certified in accordance with Pullman procedures or codes.

The inspector concurs with the NSC audit finding that welding inspection personnel performed inspections prior to being certified. The inspector does not concur with the NSC finding that NDE personnel performed nondestructive examinations prior to being certified.

18. Criterion IX, NSC Audit Finding No. 10b:

"The Ninety-Day Welders' Log was not maintained from August, 1972 to December, 1972. There is no Weekly Qualified-Welders List for that time period to substantiate that the welders were actually qualified."

NRC Finding:

The inspectors approach to resolving this issue was to examine the 90 day welders logs to determine whether the alleged gap in the log exists, to determine the basis for establishing the weekly qualified welders list, to determine whether the weekly list is available for the above time period and, if not, the reasons for the unavailability.

The inspector examined the 90 day welder's log and found that no void existed between 8/72 and 12/72. While it is true that no weekly qualified welders list exists for that time period, the basis for establishing the weekly list is the 90 day qualified welder's log. However, the inspector notes that the weekly qualified welder's list is not a document requiring retention by the Pullman Quality Assurance program. The 90 day welder's log provides documentary evidence of welder performance during a specific period, to assure qualification within code requirements. This log is based upon weld filler metal withdrawal sheets and the welder qualification records. Therefore, the inspector concludes that, based upon the records available, no code or procedural violation can be determined because the 90 day welders log existed for the time period referenced by the NSC audit and the weekly qualified welders list is not required to be retained. The NRC considers this practice acceptable.

No items of noncompliance or deviations were identified.

19. Criterion IX, NSC Audit Finding 10c:

"The Ninety-Day Welders' Log is not sufficiently detailed to determine if the welder is qualified to perform certain procedures. The Ninety-Day Welders' Log has been revised a number of times, and the detail has improved with each revision. Previous to the latest revision (November, 1974), the log was very poor in giving precise information relative to procedure and thickness ranges to which the welder was qualified."

NRC Finding:

The inspector's approach to resolving this issue was to examine a representative sample of the early 90 day qualified welder's logs and determine if the information contained was sufficient to conclude that a welder was qualified to perform certain welding procedures.

The 90 day qualified welder's logs for the period from 1972 through 1978 were examined. The log identifies the welder, weld stamp identifier, the procedures which the welder was qualified to perform, and the welding process (i.e., metal-arc, insert, Gas Tungsten Arc for both carbon and stainless steel, and Gas Metal Arc for carbon steel) qualified to perform. Process use in the 90 day log was, and still is, determined from a review of weld filler metal withdrawal sheets.

The inspector discussed the Pullman method of tracking welder qualifications with the Code Authorized Inspector who was onsite during the early construction years. The former Authorized Inspector stated that he reviewed the Pullman methodology for documenting welder

qualifications and was satisfied that the Pullman method had been acceptably implemented.

The inspector observed that the 90 day qualified welders log form had been frequently revised to provide more information; including qualification coupon wall thickness, and specific (versus general) identification of procedure and process as the number of welding procedure specifications in use expanded. In the early days of construction the number of specific welding procedures was small with these procedures being refined and narrowed in applicability as construction progressed and experience dictated.

The inspector finds that the 90 day qualified welder's log was sufficiently detailed to determine whether a welder was qualified to perform certain procedures and complied with applicable code requirements. Weldment thickness a welder was qualified to perform was added to the 90 day log as a result of an NRC concern during the later phases of construction, in order to clarify welder's qualification to make welds on limited or unlimited thickness sections. This was not a critical addition since other means existed to establish each welder's thickness qualification (ie: the original qualification record).

No items of noncompliance or deviations were identified.

20. Criterion IX, NSC Audit Finding 10d:

"No procedure states what the Field Quality Assurance Inspector uses as the primary means to determine welder qualification, the Ninety-Day Welders' Log, the Weekly Qualified Welders List, or the Welder's Qualification Card."

NRC Finding:

The inspector's approach to resolving this issue was to evaluate the validity of the NSC finding and Pullman response.

The ASME QA Manual, procedure KFP-15 (Welding Qualifications, dated August 22, 1972) generally describes the responsibility and methodology used by Pullman in assuring that welders are tested, qualified and issued a stamp. ESD-216 (Welding Performance Qualification) is the implementing procedure for the welder qualification process. Neither procedure describes precisely what the assigned Quality Assurance Inspector uses to determine whether a welder has used a specific process and is thus qualified; however, discussions with the former Authorized Inspector and Pullman personnel who have been onsite since the early 1970, indicate that weld filler metal withdrawal sheets had always been used to determine whether a particular welder had used the specific process during the previous 90 days or whether he had used another process during the extended 6 month period, specified by the ASME Code, immediately prior to the point in time under consideration.

The inspector finds that no Pullman procedure identifies what the field Quality Assurance inspector uses as a primary means to determine welder qualification, however, the practice utilized by Pullman was generally

well known by both personnel and management assigned primary responsibility for tracking welder qualification. Furthermore, the inspector considers that the method historically used by Pullman (i.e., weld filler metal withdrawal sheets and welder qualification records) was sufficient and adequate to document and verify welder qualification, as required by the ASME B&PV Code, Section IX.

No items of noncompliance or deviations were identified.

21. Criterion IX, NSC Audit Finding 10e:

"No procedure specifies who is responsible for the Ninety-Day Welders' Log, the Weekly Qualified Welder's List, or the Welder's Qualification Card; how the information is obtained; how the logs are used; to whom they are distributed; etc."

NRC Finding:

The inspector's approach to resolving this issue was to assess the validity of the NSC finding and Pullman response, examine the applicable procedural requirements and practices employed and assess the adequacy of the findings for compliance with code requirements.

As described in finding 10.d, above, the inspector examined (1) procedures KFP-15 and ESD-216, and (2) the 90 day qualified welder's logs from 1972 through 1978. The inspector found that the 90 day log was continuously maintained, except for the strike during June-November, 1974. All welders who returned following the strike were requalified by performance of test welds to reestablish a basis for the 90 day log. Both procedures (KFP-15 and ESD-216) imply that the assigned QA inspector is to keep and maintain the 90 day qualified welder's log, the weekly qualified welder's list, and the welder's qualification records. This was apparently the understanding of both the Quality Assurance inspectors and Quality Assurance management and appeared to be consistently implemented. That the procedures do not specifically assign such responsibility for the maintenance of the above documents is of minimal significance. The inspector finds that the Pullman practice and procedures for documenting and maintaining welder qualification status was and is adequate.

No items of noncompliance or deviations were identified.

22. Criterion IX, NSC Audit Finding 10f:

"Procedure KFPS-13 differs from KFP-15 in that it does not permit a six-month extention of welder qualifications if the welder has been actively welding on some other welding process. Procedure KFPS-13 requires the welder to use the specific welding process within a three-month period or be requalified. There is no evidence of adherence to this requirement for pipe support welding."

NRC Finding:

The inspector's approach to resolving this issue was to examine the NSC referenced procedures, assess the validity of the NSC finding and Pullman response, and evaluate the findings for compliance with the ASME Code.

The 1971 edition of the ASME Boiler and Pressure Vessel Code, Section IX provided, in paragraph Q-26, that "Renewal of qualification of a performance specification is required...when a welder...has not used the specific process...to weld either ferrous or nonferrous materials for a period of three months or more...." This paragraph was revised in the Winter 1971 Addenda to read "Renewal of qualification of a performance specification is required...when a welder...has not used the specific process...to weld either ferrous or nonferrous material for a period of three months or more except when employed on some other welding process the period may be extended to six months...." The inspector found that Pullman had not revised procedure KFPS-13 to reflect the revised requirements of the Winter 1971 Addenda and that, up to November 30, 1977, KFPS-13 reflected the original, more conservative, requirement of the 1971 Edition, Section IX, paragraph Q-26. The inspector also found that Pullman's welder qualification program implemented the appropriate Code requirements regarding renewal of qualification in compliance with the code preamble requiring that "Any requalifications or new qualifications shall be made in accordance with the test requirements of the current edition." Thus, the inspector finds that Pullman complied with the revised welder requalification provisions of the ASME B&PV Code, after the revision, although Pullman was slow in revising KFPS-13 to reflect the revised code requirements.

The inspector reviewed procedure KFPS-13 (Pipe Support Field Procedure - Welding Qualifications - dated December 3, 1973) and notes that paragraph 13.2.3 was revised on November 30, 1977 to reflect the applicable provision of the ASME Code, Section IX regarding renewal of qualification.

The ASME Code prescribes that the most current edition of Section IX be implemented at all times. Discussion with the Pullman Quality Assurance Manager, the Welding Qualification Quality Assurance Inspector, and the Authorized Inspector during the early construction phase, indicated that the current revision of Section IX was consistently implemented and that the apparent omission of the time extension provision of the Code in KFPS-13 was an omission of the relaxed requirements provided in Section IX. Examination of the 90 day Welder Qualification Logs for the years of 1972 through 1977 indicate that adequate welder qualification documentation was maintained. Further, discussions with the above individuals indicate that verification of a welders use of another process, as provided by Section IX, was accomplished by review of the weld filler metal withdrawal sheets which issued weld filler metal to the welder. These sheets document the procedure to be employed by the welder in performance of welding with the filler metal issued. The ASME Quality Assurance manual for code piping (KFP procedures) provided for use of the referenced ASME Section IX option; however, the Pipe Support Quality Assurance manual (KFPS procedures) were subordinate to the ASME Quality Assurance manual and, therefore, welder qualifications were accomplished using the option provided by the ASME Quality Assurance manual and

Section IX. The inspector finds that the Pullman practice for welder qualification tracking was consistent with the ASME B&PV Code.

No items of noncompliance or deviations were identified.

23. Criterion IX, NSC Audit Finding 10h:

"Procedure ESD-219 requires random sampling of in-process welding, with the sampling to be noted on the Field Process Sheets. In examining Field Process Sheets, it is obvious that the sampling by the area inspectors was not performed."

NRC Finding:

The inspector's approach to resolving this issue, was to assess the validity of the NSC finding and Pullman response and evaluate the NRC findings for safety significance and/or compliance with the Pullman program.

ESD-219 required that welder audits were to be performed on each welder every six weeks and recorded on the welder audit sheet. The procedure ESD-219 did not require that welder audits be recorded on the Field Process Sheets. The audits are a Pullman program requirement in excess of the ASME Code requirements and were performed on a sampling basis and recorded on the welder audit sheets. The welder audit sheet format was upgraded on 12/10/73, 2/4/74, 12/6/74, 6/27/74 and 6/17/76 as experience in the use of the audit sheets identified an upgrading need. The inspector examined welder audit sheets and observed that activities monitored were recorded on these welder audit sheets. The inspector considers that the performance of welder audits of each welder every six weeks was an appropriate method for recording in process welding observations. The fact that the procedure did not require that such observations be recorded on the process sheet is viewed as a finding of no safety significance since this activity is over and above the ASME Code requirements.

The inspector examined the revision/change records of procedure ESD-219 (Weld Procedure Monitoring) and observed that paragraph 4.4 was revised on December 30, 1977, apparently in response to the NSC audit finding, to prescribe that sampling checks of in process welding may be noted on the process sheet or inspectors daily work sheet.

No items of noncompliance or deviations were identified.

24. Criterion IX, NSC Audit Finding 10i:

"Procedure ESD-219 requires periodic auditing by the Welding Auditor. These audits were not performed until November 5, 1973; and Pullman Power Products was not in compliance with this procedure for approximately 23 months."

NRC Finding:

The inspector's approach to resolving this issue was to assess the validity of the NSC finding and Pullman response, and evaluate the NRC findings for conformance with the specified Pullman program.

The inspector examined the records of change/revision to ESD-219. The records show that the procedure was written in draft form on February 14, 1973. The November 1973 revision apparently was issued and implemented beginning in November 1973. Examination of the 1973, 1974 and 1975 welder audit sheets indicate that the required welder audits were performed beginning November 1, 1973. Discrepant findings appear to have been adequately dealt with and resolved.

The ASME Code does not contain any requirements for performance of welding audits. The Pullman program for conducting welder audits appears to be in excess of ASME Code or AWS D1.1 requirements and the NRC finds no irregularities in the Pullman implementation of this welder audit program.

The inspector concurs with the NSC finding that these audits were not performed until early November 1973, and concurs with the Pullman response that ESD-219 was not written until February, 1973. The procedure implementation appears to have begun in November 1973.

Based on the above, the inspector was not able to corroborate the NSC statement that Pullman was in noncompliance with the procedure for about 23 months.

The inspector concludes that Pullman did implement a program of periodic welder audits in 1973 shortly after procedure ESD-219 was issued. Pullman apparently exceeded the requirements of the ASME Code and AWS D1.1 in the area of welder auditing and had implemented a program consistent with industry practice of the time in the area of welder auditing.

No items of noncompliance or deviations were identified.

25. Criterion IX, NSC Audit Finding 10j:

Procedure ESD-219 requires monitoring stainless steel welds for ferrite control. However, the Severin Gauges were not on site until the beginning of 1973; and Pullman Power Products was not in compliance with this procedure for approximately 12 months.

NRC Finding:

The inspector's approach to resolving this issue was to examine the Pullman response to the NSC finding, establish the degree of response validity and have Parameter, Inc., an NRC consultant, independently examine a sample of stainless steel welds in Unit 1 for delta-ferrite and establish the degree of conformance with regulatory requirements.

Based on discussions with PG&E personnel it appears that stainless steel welding on site began in early 1973. Indications are that the early stainless steel on-site welding was performed on radioactive waste

systems, a non-safety related activity. Prior to this time stainless steel welding was performed on prefabricated pipe spools at the Kellogg-Pullman shop in Paramount, California. Procedure ESD-219 was issued for implementation in November 1973, shortly after the beginning of site stainless steel welding. The first Severin gauge was received on-site about December 20, 1972 and the second was received about January 30, 1973. Thus, the inspector was not able to corroborate that Pullman was in noncompliance with this procedure requirement for 12 months.

As an additional check the inspector chose a random sample of 25 stainless steel welds in Unit 1 and had these welds examined for delta-ferrite by Parameter, Inc. personnel. The results of this examination are listed in Attachment 1 of this report and indicate that all welds examined complied with delta-ferrite acceptance criteria.

No items of noncompliance or deviations were identified.

26. Criterion IX, NSC Audit Finding No. 10k:

"Hangers are not welded in accordance with Pacific Gas and Electric Company requirement. Hangers 2023-IV and 2039-2V are two examples of a number of hangers observed that are welded to the structural steel on the wrong side of the bracket."

NRC Finding:

The inspector examined Hanger No. 2039-2V, the related hanger drawing, and determined that the hanger is Class II/E hanger which received no quality control inspection hence no field weld process sheets were generated or available for review nor were they required. Class II/E components are not safety related and, hence, not included in the quality assurance/control program. NRC examination of the hanger drawing established that the drawing called out a 1/4" fillet weld on the front and back of the beam attachment. The beam attachment is the only component specified on the drawing as requiring welding. The inspector found the beam attachment to be welded as specified on the drawing. NRC examination of Hanger No. 2023-1V (a Class I hanger) and the related hanger drawing established that the beam attachment was welded as specified on the hanger drawing. Both of these hangers are located in Unit No. 2.

The inspector concludes that the Pullman response to the NSC finding is accurate and that the NSC finding was in error.

During the field examination of the above noted hangers the inspector selected eight additional hangers from the same general area with similar configurations. The inspector noted that all hangers chosen were similar to Hanger Nos. 2039-2V and 2023-1V; that is, a welded beam attachment supporting a spring hanger. All of these hangers are located at approximately the 130' elevation in the general area where the main steam lines exit Containment No. 2. The following hangers and their related hanger drawings were examined and found to conform to the specified drawing requirements.

Hanger No.	Class Designation
2040-1V	Class II/E
2023-7V	Class II/E
2023-6V	Class II/E
2021-4V	Class I
2023-5V	Class II/E
2021-3V	Class I
2037-1V	Class I
2021-1V	Class II/E

No items of noncompliance or deviations were identified.

27. Criterion IX, NSC Audit Finding 101:

"The interface of welding to other suppliers' parts and components is not clear. Welding is done to join Westinghouse and Paramount parts and components. The necessity for addressing impact property requirements for those weldments is not clear; in addition, the requirements for addressing impact property requirements for Pullman Power Products field welds are not clear. If impact properties are necessary, the acceptability of each weld that has been repaired and subjected to more than one stress relief is indeterminate because of the time at temperature limitations within the qualified weld procedure."

NRC Finding:

The NRC approach to resolving this issue was to examine the requirements of the Code in the area of impact testing and evaluate the NSC finding and Pullman response in this area.

The 1971 addenda to ASA B31.7 states, in paragraph 1-723.2.3, that "When the design specification requires impact testing of ferritic steel materials, the tests and acceptance standards shall be in accordance with the requirements of Appendix I." The 1970 edition of B31.7, same paragraph, requires evaluation of toughness properties if service is expected to be less than 30°F.

PG&E specification number 8711, imposed on Pullman, doesn't require impact testing of qualification welds for procedure qualification; thus, impact testing of procedure qualification weldments was not performed. The inspector further observes that impact testing is not unilaterally required for such weldments by the B31.7 Code. Specification 8711, Change 12, requires compliance to the 1970 Addenda of ASA B31.7.

The inspector finds that Pullman procedures for impact testing of qualification weldments and specification 8711 are consistent with B31.7 Code requirements.

No items of noncompliance or deviations were identified.

28. Criterion IX, NSC Audit Finding 10m:

"Some welders do not receive sufficient training. Welders, fabricating the pipe rupture restraints within the containment, are welding heavy plate. While these welders are qualified by virtue of welding heavy wall pipe, the techniques are diffe ent. The welders who were already qualified to heavy wall pipe were not given additional training on plate."

NRC Finding:

The inspector's approach to resolving this issue was to examine the code requirements in this area and evaluate the validity of the NSC and Pullman response.

The 1974 Edition of the ASME B&PV Code, Section IX, paragraph QW 303.5 states "...qualification on pipe shall qualify for plate, but not vice-versa except that qualification on plate shall qualify for pipe over 24 inches in diameter." Therefore, it appears that the Code recognizes pipe as more difficult to weld than plate. The Code does not require additional training on plate for welders originally qualified on pipe. These Code requirements are also reflected in the current edition of Section IX, table QW-461.9.

Qualification on heavy wall pipe (wall thickness greater than about 0.75") requires additional qualification by performance of welds on thicker members; so also does qualification to weld heavy plate.

The inspector found that Pullman welder qualification procedures comply with Code Section IX requirements. The NSC audit finding appears to apply an interpretation which is not supported by Code requirements.

No items of noncompliance or deviations were identified.

29. Criterion IX, NSC Audit Finding 10n:

"There is no procedure for preheating weld joints."

NRC Finding:

The inspector evaluated the validity of the NSC finding and Pullman response and evaluated the Pullman preheat program for conformance with specified requirements.

Specification 8711 prescribes that preheating may be performed using either the electrical resistance heating method or localized torch method in conjunction with appropriate tempil sticks.

The inspector examined the following welding procedure code numbers and welding procedure specifications and found that each contained an adequate definition of preheat, postweld heat treatment and interpass temperature requirements: Code Nos. 4/5, 7/8, 15/16, 79/80, 86/87, 88/89, 92/93, 105/106, 129, 134, 149, 150, 200, 201, 202, 203 and 208; Welding Procedure Specification Nos. 88-I-4/5-K-12, 90-I-8/4-K-12, 100-III-8/45-OB-1, 408-III-CARP20-OB-1, 409-III-34-OB-1, and 507-I-42-OB-1.

ESD-218 (Postweld Heat and Preheat Treatment Procedure) was revised and improved December 30, 1977 to prescribe preheat requirements and indicate preheat applicability, in addition to the information prescribed on the Welding Procedure Specifications.

ESD-264 (Process Planning and Control-Field Process Sheet) was reviewed by the inspector. The Field Process Sheets were revised in early 1978 to indicate preheat requirements. Prior to early 1978, compliance with the preheat requirement was dependent on the welder's knowledge of and compliance with the welding procedure specification and was indicated on the process sheet by the craftsman and QC signature in the welding block, which specified the welding procedure to be used. The philosophy used was that when each signed a block, the signature meant that all applicable procedure requirements had been accomplished.

The inspector concludes that, while no separate and specific procedure for preheating of weld joints existed prior to December 30, 1977, preheating requirements were adequately prescribed by the welding procedure specifications and documented by signature on the welding block of the process sheet, which specified the applicable welding procedure.

No items of noncompliance or deviations were identified.

30. Criterion IX, NSC Audit Finding 10o:

"The initial results of the welding auditing (from November 5, 1973 to February, 1974) indicate that the following problems existed:

(1) The welders did not understand shielding and purging.

(2) Tempil sticks were not used.

(3) Amperages were not within procedure limits (mainly root welds and tack welds).

(4) Weld procedures were not available, and many welders did not know where to obtain them.

(5) The oxygen analyzer was not available or not operative. Also, the time vs. flow rate alternate technique was not used.

(6) Oven rod temperature control was not monitored by the welders.

(7) Many welders did not understand their duties and responsibilities.

Based on a review of the Pullman Power Products welding audit reports and the frequency of the above-noted problem areas, there is no confidence that welding done prior to early 1974 was performed in accordance with welding specification requirements."

NRC Finding:

The inspector's approach was to examine the records of welder audits conducted during the above time period and assess the validity of the NSC

finding and Pullman response. The welder audit program is an example of extra effort, not required by the Code, to provide assurance of a quality welding program implementation and effect prompt corrective action for identified discrepancies.

The inspector critically examined the records of welder audits performed between November 1, 1973 and April 1, 1974. A total of 183 welder audit records were examined. Each of the above NSC audit statements are addressed below.

The NSC audit statement was that "The welders did not understand shielding and purging." The inspector observed that 23 of the reviewed audits identified problems regarding compliance with the 20 psi and 20 cfm requirements for gas pressure and flow. Weld quality problems could occur if the gas flow rates are excessively high or low. The vast majority of safety-related stainless steel welds were radiographically examined and the film was reviewed and accepted by a qualified interpreter for code compliance. The audit findings did not indicate that welders did not understand shielding and purging, rather the findings point out the difficulties which can be experienced when more than one purge/shield line is connected to a single gas source and regulator. In all cases, corrective action was taken to return the pressure and flow rate to the required values.

The NSC audit identified that tempil sticks were not used. The purpose of Tempil sticks is to verify proper preheat and assure that the interpass temperature was low enough to begin welding the next weld pass. Of the 183 audits examined, fourteen of the audits identified that the welders did not have tempil sticks in their possession. In each case action was taken to provide the welder with Tempil sticks. Several of the welders apparently told the auditors that prior to resuming welding they wait until they can touch the weld; thus providing assurance that interpass temperature requirements are not exceeded. This is an acceptable practice.

The NSC audit identified that amperages were not within procedure limits. Of the 183 audits reviewed, four instances were identified wherein amperages were not within welding procedure specification limits. In each case the welder corrected his amperage setting. A lower than acceptable amperage would result in lack of adequate root penetration or lack of acceptable heat affected zone fusion, which would be seen in a radiograph and may be detectable by surface examination methods, such as the liquid penetrant or magnetic particle techniques. High amperage would result in excessive spatter, a condition which qualified welders would not weld under because welding is quite difficult under high amperage conditions. Further, amperage is not an essential variable specified by the ASME Code, Section IX and is only a supplementary essential variable for material with notch toughness requirements.

The NSC audit identified that weld procedures were not available and many welders did not know where to obtain them. Welders are required to have a copy of the welding procedure at the job location. Of the 183 audits examined, five audits identified cases where the welder did not have a welding procedure. Three of the five cases identified that the welder

did not know where to obtain them. In each case the corrective action was to have the welder obtain a copy of the welding procedure along with an explanation of the location from where they could be obtained. The inspector concludes that the vast majority of welders used welding procedures and knew where to obtain them and that this NSC finding has only minor technical significance.

The NSC audit indicates that the oxygen analyzer was not available or operational. Although this was not a required checkpoint, only one finding of the 183 audits reviewed indicated a problem with the oxygen analyzer. This problem was corrected. Thus, the inspector considers that the welder audit records do not support the NSC conclusion.

The NSC audit indicates that oven rod temperature control was not monitored by the welders. Of the 183 welder audit records reviewed, fourteen of these audits identified instances where the welders rod oven temperatures were lower than the 225°F required by Pullman procedure, and did not meet the 225°F requirement. Most instances observed by the auditors identified deviations up to 35°F, however, two audits observed temperatures as low as 150°F. In all cases the welder was required to return the defective oven to the rod room and obtain another. The audits further indicate that a large number of the apparently discrepant findings were due to the thermometer being out of calibration and reading low, thus indicating that the actual temperature of the oven was higher than that indicated on the thermometers. The primary reason that rod ovens are maintained hot is to preclude moisture entry into the welding electrode coating and, thus, minimize the potential for inducing underbead cracking. Recent industry findings indicate that when the temperature of the weld rod is maintained significantly in excess of the atmospheric temperature, thus above the dew point, the entry of moisture into the coating is effectively precluded. The NSC finding that rod oven temperature was not monitored by the welders is not supported by the inspector's review of the audits, although isolated instances of ovens being below temperature were identified by the audits. In addition, this should not be a technical problem because rod is removed from a hermatically sealed shipping container and immediately put into an oven with temperatures of sufficient value to preclude moisture intrusion.

The NSC audit indicated that many welders did not understand their duties and responsibilities. The NRC considers that the reason these welder audits were done was to identify such instances and provide corrective action. Of the 183 audits reviewed, five welder audits indicated that the welder in question did not understand their duties and responsibilities. In each case the welder was reinstructed by the Quality Assurance inspector auditing the welding activities, including notification and reinstruction of the welder's foreman, as applicable.

It is important to recognize that none of these were NSC findings, but were instead findings of the Pullman welder audit program, which was designed to detect program weaknesses and provide prompt corrective action during the early phases of site welding activity.

In summary, the inspector notes that isolated instances of problem areas were identified and corrected by the Pullman welding inspectors.

However, the inspector does not consider the aggregate of problem areas to be so pervasive such that support can be given the NSC conclusion that "There is no confidence that welding done prior to early 1974 was performed in accordance with welding specification requirements."

No items of noncompliance or deviations were identified.

31. Criterion X, NSC Audit Finding Nos. 5 and 6:

Finding 5: "For all inspection processes, there is no mechanism to provide the inspector the particular characteristic to be inspected; the particular acceptance criteria; the particular methods and equipment to be used; and provisions for recording results, other than acceptance for the particular inspection being made. The exceptions to this statement are radiography, where the reader sheet allows the recording of results, and those procedures that specify the use of particular equipment (such as some of the ultrasonic procedures)."

Finding 6: "The inspection process is generally not auditable. The practice of exhibiting an acceptance signature only does not permit auditing to determine if the individual characteristics were examined, the correct criteria were used for acceptance, and the correct specific measuring devices were used."

NRC Finding:

To resolve this issue the inspector examined the Pullman program procedures in this area, the validity of the NSC findings and Pullman responses and examined field process sheets to verify compliance with the prescribed Pullman program and 10 CFR 50, Appendix B, Criterion X.

The inspector examined ESD-264 (Process Planning and Control - Field Process Sheet) and observed that the field process sheets do identify, and are required to identify, the procedures necessary to perform a particular inspection. The inspector's signature is meant to verify that the required inspections were performed in accordance with the referenced procedure.

Examination of some of the procedures referenced on the process sheet indicates that each contains numerous inspection requirements and acceptance criteria. These inspection requirements and criteria are so numerous that inclusion of each on the field process sheet would excessively complicate the process sheet. The inspector considers that inclusion of each inspection requirement and acceptance criteria on the process sheet would decrease the effectiveness, and work process continuity, afforded by the field process sheet.

Examination of about 100 completed field process sheets indicates that the required procedures were consistently identified on the process sheet, thus identifying the group of inspections and examinations to be performed by field inspectors.

The NSC finding that the inspection process is generally not auditable is true if one defines auditability as the ability to verify, after the

inspection, that each inspection requirement and acceptance criteria was considered and so documented by the inspector's signature by each requirement and criteria. However, if one accepts the philosophy that the inspector's signature verifies the conduct of inspection/examination in accordance with the identified procedure, then the inspection process is auditable. The inspector considers the Pullman practice acceptable, in accordance with standard industry practice, and in compliance with ASME code requirements, which do not provide specific rules and guidance in this area.

No items of noncompliance or deviations were identified.

32. Criterion X, NSC Audit Finding No. 7:

"A large number of welds in Unit 2, System 14 (FW-110, 111, and 112 in isometric package 2-14-31 are examples) were accepted for visual examination and thereafter accepted based on surface NDE inspection (MT or PT). Visual examination of those welds indicates that the surface is not suitable for the performance of surface NDE inspection."

NRC Finding:

The NRC retained the services of a certified level II Liquid Penetrant Examiner through Parameter, Incorporated.

The certified examiner was directed to evaluate the surface condition of field welds 110, 111 and 112 on isometric 2-14-31 (Component Cooling Water System-Return Header B) and perform, and interpret the results of, liquid penetrant tests on those welds. The NRC consultant determined that the surface condition of those welds was acceptable for surface NDE inspection. All welds examined, except for an indication near FW-111, were found to be acceptable. The examiner observed an indication approximately 1½ inches long in the base metal of the pipe about 3/8" from Field Weld-111. The examiner's findings are detailed in Attachment 1 to this report.

Pullman wrote Discrepancy Report No. 5567 to remove the indication by flapper wheel grinding and conduct further liquid penetrant examinations. The inspector observed these activities. The indication was determined to be a shallow surface lap in the metal caused by the rolling operation during pipe fabrication. The indication was removed by grinding. Subsequent liquid penetrant examination verified that the indication was a surface type and not a rejectable indication, even prior to removal of the indication. The grinding operation did not violate minimum wall thickness criteria.

The inspector concludes that the NSC finding (that the surface of the welds was not acceptable for surface NDE inspection) was in error.

No items of noncompliance or deviations were identified.

33. Criterion X NSC Audit Finding No. 9:

"FW-83 (isometric package 1-10-9) was repaired in accordance with a valid Process Sheet. The radiograph of FW-83 does not exhibit the required R1 symbol, but R1 was inked onto the radiograph. There is a surface defect that is questionable for acceptance to visual standards."

NRC Finding:

The NRC retained the services of a qualified radiograph interpreter who examined 102 radiographs of various welds in several Unit 1 systems. The results of this examination are contained in the attached Parameter, Inc. report (Attachment 1). This examination included the FW-83 radiograph following repair.

The Parameter consultant examined both the original radiograph, and the radiograph following repair, of FW-83 and concluded that both radiographs were of the same weld. Further, the Parameter Consultant informed the inspector that while inking of numbers onto a film is not desirable, it is sometimes done because the lead labels may have fallen off or were positioned outside the film area. This isolated instance would not make a radiograph unusable. The code prohibits marking of radiographs in the area to be examined. Thus, the inspector finds that the fact that R1 was inked onto the repair radiograph outside of the area to be examined, has no safety significance and is not a violation of code or regulatory requirements.

The inspector examined the surface of FW-83 in the field and found that the weld does not contain a surface defect. The inspector did observe a gradually sloped grinding line (about 1/8" wide, 2" long and less than 1/64" deep) which may be what the NSC referred to as a "defect". The depth obviously did not violate minimum wall thickness criteria. Discussions with the Parameter, Inc. radiograph interpreter indicated that the observed densities did not vary significantly on the film, thus indicating that the grinding line was not of sufficient depth to significantly decrease wall thickness in the weld area.

No items of noncompliance or deviations were identified.

34. Criterion X, NSC Audit Finding 10a:

"Records of welder qualification prior to 1972 are not available."

NRC Finding:

The inspector's approach to resolving this issue was to determine if welder qualification documentation was available prior to 1972 and to assess the validity of the Pullman response to the NSC finding.

The inspector examined welder qualification documentation, including weld coupon test results; form titled "Manufacturer's Record of Welder Performance Qualification Tests on Groove Welds." The inspector found that 20 welders (welder stamp letters A, B, C, D, E, F, G, H, I, J, K, L, N, O, Q, R, S, T, U, and V) were qualified during the period beginning August 4, 1971 and ending December 23, 1971. There are no indications

that safety related welding was performed prior to August 4, 1971. The inspector did not corroborate the NSC finding.

The 90 day qualified welders log was started at the beginning of 1972 and was continued through the present time, except for the labor dispute between June and November, 1974.

The inspector concludes that records of welder qualification prior to 1972 were available and were in acceptable order.

No items of noncompliance or deviations were identified.

35. Criterion XI, NSC Audit Finding No. 5:

"The B31.1 and B31.7 Codes required that all piping is leak-tested, where practicable. Pullman Power Products is only leak-testing Class A and B piping and that Class C piping specified by Pacific Gas & Electric Company. Classes D, E special, and E piping is not being leak-tested. A letter from Pacific Gas & Electric Company (dated January 13, 1976) does exist, which states that Pacific Gas & Electric Company will assume responsibility for the leak-testing of Class C piping. There is concern that Pullman Power Products is not discharging its contractual obligations (that specify compliance to B31.1 and B31.7) by not performing piping leak-testing to Code requirements for Classes C, D, E special, and E piping systems and, as a result, may be legally vulnerable."

NRC Finding:

The inspector examined the referenced licensee letter dated January 13, 1976 and a contractor letter dated January 8, 1976 relieving Pullman Power Products of responsibility for code compliance on Class C components. The inspector also found that the licensee did not have a piping class designated as Class D. Additionally, the inspector found that Class E and Class E special are (were) being hydrotested, though (in some cases) at less than code requirements. ANSI B31.7 allows, in paragraph 737.4, for components to be tested at less than code requirements, because of limiting components within the piping system. The inspector has no further questions on this subject.

The inspector concluded that Pullman appeared to be properly discharging their contractural requirements in this area.

No items of noncompliance or deviations were identified.

36. Criterion XII, NSC Audit Finding No. 3d:

"Severin Gauges 2947 and 2971 were received on the site in January, 1973. Initial calibration was August 29, 1973; and the next calibration was November 19, 1974 for gauge 2947 and January 23, 1975 for gauge 2971. Procedure ESD-213 requires annual calibration."

NRC Finding:

Field Procedure ESD-213, "Gauge and Instrument Control/Calibration", does require an annual calibration check of the two onsite severin gauges (2947 and 2971). There are equipment calibration record cards which document calibration status and provide a historical record of the frequency of calibration checks performed since August 1973. These records verify the NSC finding and indicate a subsequent history of consistently exceeding the required frequency of calibration checks.

Associated test equipment control records establish, since 1978 (the custody log was not maintained prior to this time), that neither gauge was ever used during any out-of-calibration period for material testing. In each case, the instrument was logged out for calibration check and unavailable for testing during the lapsed period. Documentation since 1973, which verify calibration checks performed on-site by PPP personnel or by Severin Engineering Company, provide no evidence that either gauge was discovered to be out-of-tolerance. Test equipment control implementation appears to adequately remove from service any instrument exceeding the required re-calibration date. There is no evidence to indicate that Severin gauges 2947 and 2971 were used in ferrite examinations when these gauges were outside of their calibration limits.

In conclusion, the NSC audit finding was substantiated but determined to have no safety significance. Evidence indicates test equipment control was adequately implemented since August of 1973 and was under control.

No items of noncompliance or deviations were identified.

37. Criterion XII, NSC Audit Finding No. 3f:

"There is no documentation available to verify calibration of "Tong Test" amp meters."

NRC Finding:

Tong test amp meters were contracted off-site for the required periodic calibration checks. An equipment calibration record card exists for each instrument, documenting the frequency of calibration checks performed since the particular tester was acquired. Calibration certificates are on file from the applicable lab verifying completed calibration for each tong tester. These records appear to provide adequate documentation that "Tong Test" amp meters were being calibrated.

No items of noncompliance or deviations were identified.

38. Criterion XII, NSC Audit Finding No. 3g:

"Tong Test amp meter TT2527403 was out of calibration for the period December 12, 1976 to January 31, 1977. No DR has been written against that instrument."

NRC Finding:

NRC review of the equipment calibration record cards for "Tong Test" amp meter TT2527403 (200 amp Crompton Parkinson) supports the NSC finding concerning the period out-of-calibration. Records also indicate several subsequent time periods where the calibration check frequency had exceeded the ESD-213 annual requirement for this Tong Tester and two others. It would appear the fundamental cause for these apparent lapses in calibration control were due to the transit time necessary to ship instruments back and forth from the contracted calibrating facility. Equipment control records clearly establish that, since 1978 (prior records were not kept), none of the other Tong testers examined were ever used during an out-of-calibration period. Unfortunately, for meter TT2527403 equipment control records were not retained when the instrument was broken and removed from service April 15, 1983 (although calibration records are still on file).

Based upon PPP past history of adequate test equipment control and the non-essential nature of the welding current parameter (as identified by ASME code) the inspector considers this item to have no safety significance. This activity was under control.

No items of noncompliance or deviations were identified.

39. Criterion XIII, NSC Audit Finding 5:

"Handling procedures do not exist; and the only handling instructions are contained in ESD-222 and a number of other procedures, which contain a caution against the use of carbon steel in handling stainless steel. Procedure ESD-259 has excellent detail as to the handling of Grinnell Snubbers during installation. However, Procedure ESD-259 was issued January 27, 1977; and there is not assurance that materials, parts, and components were properly handled during the period prior to January 27, 1977, when most of the installation activities were occurring."

NRC Finding:

The inspector examined those handling activities which were performed by both the licensee and Pullman to establish the validity of the NSC finding and Pullman response.

The inspector discussed, with Pullman and licensee personnel who were working at the site since the early 1970s, the practices employed regarding receiving, storage and handling of safety related equipment, including which organizations performed such activities and under what circumstances these activities were performed.

The inspector determined that PG&E received, stored, handled, surveilled, and maintained all large class 1 components (including pipe, pipe spools, valves, snubbers, motors, etc). Contractors, such as Pullman, would requisition components when the contractor was ready and required to install the particular component in the plant. The primary reason that the licensee performed the above activities was because warehouse and laydown space was limited at the site. To obtain sufficient area for warehousing and laydown, the licensee used the larger areas available at Pismo Beach, California. Items shipped to PG&E for use at Diablo Canyon

were received and stored in the Pismo Beach areas until contractors were ready to install those particular items. The material was then loaded onto trucks, by the licensee, and off loaded at the site, by the contractor under licensee surveillance, and moved into the plant. The contractor, prior to accepting custody of the component or equipment, would perform receipt inspection activities, after which the component was moved into the plant. From the time the contractor accepted the material until such time as the system/component was turned over to the licensee, the contractor was responsible to perform necessary surveillance and maintenance activities, as appropriate.

The inspector examined the following procedures detailing the licensee's program for handling of equipment. The requirement for such a program was contained in the licensee's Quality Assurance Manual, procedure PRC-1 (Receiving Inspection, Storage and Handling). Procedures implementing the required program, for mechanical equipment, were reviewed.

MFI-0-1 (dated September 17, 1971): Mechanical Department Procedure - Receiving, Inspection, Handling and Storage of Equipment/Materials.

- The inspector found that this procedure accomplished the following:
  - assigned responsibility for accomplishment
  - provided adequate handling instructions
  - provided detailed inspection requirements
  - provided adequate storage requirements
  - provided adequately for accomplishment of surveillance while in storage
  - provided the mechanism for processing and responding to contractor requests for transfer of the equipment to the plant
  - provided for keeping equipment history records from receiving through shipping and storage.

MFI-2-2 (Revisions dated 10/75, 5/72 and 8/70): Mechanical Department Procedure - Instructions to Inspectors - Power Plant Piping

- The inspector found that the procedure accomplished the following:
  - assigned responsibilities for accomplishment
  - adequately addressed inspector qualifications
  - adequately defined inspector duties
  - provided adequate handling instructions
  - provided adequate storage surveillance and installation inspection requirements.

The licensee contracted with Bigge Crane and Rigging Company for the conduct of handling activities at the Pismo Beach Yard and transfer of material to the site. The inspector examined the Bigge "Procedure for Receiving, Handling and Storing Nuclear Power Plant Equipment and Material - Pismo Beach Yard." This procedure provided (1) adequate instructions for receiving and unloading, (2) adequate instructions for storage, (3) adequate instructions for preservation, (4) adequate instructions for care and handling of Stainless Steel and Class I items, (5) adequate instructions for load-out and hauling, and (6) adequate

instructions regarding types of handling equipment necessary and inspections necessary for handling gear.

The inspector examined the following documents which provided handling instructions for Pullman personnel.

Specification 8711 (Specification for Erecting Main Systems Piping and Furnishing, Fabricating and Erecting Balance of Power Plant Piping

- paragraph 6.12 provides definition of responsibility for receipt inspection, including general receipt inspection criteria, and unloading of carriers.

- paragraph 6.13 addresses storing of material including general contractor requirements such as protecting items in storage from damage by requiring "use of dust proof, fireproof and waterproof tarpaulins, adequate spacing and temporary heaters", as necessary.

- paragraph 6.23 requires that all material be stored on cribbing when in laydown areas.

- paragraph 4.1181 and 82 contain specific requirements for welding electrode receiving, storage and control.

- paragraph 3.211 of Section 4 provides for Quality Assurance requirements related to handling, storage, packaging, shipping and preservation.

ASME QA Manual Procedure KFP-7 (Receiving Inspection)

- provides that inspections be conducted to verify that off-loaded items are to prevent damage, contamination or deterioration.

ESD-215 (dated September 23, 1971): Visual Inspection

This procedure provided requirements for handling such as (1) flame cutting of stainless steel was not allowed; (2) weld preparation dressing requirements; (3) examination for and removal of mill scale, oil, rust, slag, paint, marking materials and surface oxide and dirt prior to welding; (4) removal of arc strikes and subsequent liquid penetrant retest; (5) pipe alignment criteria; and (6) cleaning.

Quality Assurance Instruction 94 (dated July 29, 1973): Performing Maintenance Surveillance

This procedure contained criteria for capping of pipe ends, actions required when loose nuts/bolts, missing parts or equipment damage was observed. The instruction provides inspection guidance for both hangers, snubbers and piping.

ESD-217 (dated September 23, 1971): Receiving Class 1 Procedure

This procedure requires monthly maintenance surveillance reports for items in storage such as Class 1 pipe, Class 1 Pipe Supports, Class 1

valves, and Class 1 pipe, valves and supports erected and installed. Protection and maintenance requirements were provided by PG&E.

ESD-222 (dated February 23, 1972): Protection, Installation, Maintenance and Surveillance of Control Valves

This procedure specifies appropriate handling requirements and criteria for pneumatic and motor operated valves and attached devices, manual operated valves, and relief valves, from receipt through installation.

Beginning about April, 1977, PG&E installed a snubber test facility on the upper floor of the fuel handling building, between the Unit 1 and Unit 2 areas. All Grinnell hydraulic snubbers were removed, reworked, refurbished and subjected to dynamic stroke, lockup and load tests on the testing machine. Snubbers determined by test to be acceptable were reinstalled. Unacceptable snubbers were either reworked and retested or replaced with an acceptable snubber. This activity was completed in 1978 and, thus, verified the operability of Grinnell hydraulic snubbers installed prior to the issuance of ESD-259. The information gleaned from this testing program was incorporated into ESD-259 revisions in order to minimize the potential for harm or deterioration of the snubbers. Snubbers installed out of doors were also placed inside a rubber boot to prevent deterioration and corrosion of snubber shafts.

Unit 2 hydraulic snubber maintenance is performed every 6 months on each Unit 2 Grinnell snubber and this activity tracked by Pullman.

It is correct, that Pullman did not have a procedure specifically addressing handling instructions. However, viewing in the aggregate all of the Pullman procedures applicable to Pullman equipment handling and considering the limited scope of equipment handling Pullman was required to exercise, the inspector concludes that appropriate and adequate handling requirements were in place. The inspector also finds that the limited addressing of snubber handling requirements prior to the issuance of ESD-259 is of minimal safety significance given the conduct of the 1977-78 testing program and the subsequent issuance and upgrading of ESD-259.

No items of noncompliance or deviations were identified.

40. Criterion XIV, NSC Audit Finding No. 1

"The major mechanism that exhibits the status of the work is the Field Process Sheet. The Field Process Sheet provides for performance status of some important fabrication steps and for inspection status. However, many important fabrication steps are not indicated by the Field Process Sheet: erection steps; cleaning prior to installation of insulation; and some critical welding steps as preheating, checking gas flows, and checking for 0_2 content in the backing gas. The Field Process Sheet, as a mechanism to exhibit status, is considered inadequate. The inadequacy of the Field Process Sheet is considered a major weakness in the Pullman Power Products System."

NRC Finding: The NRC findings relative to Field Process Sheets are contained in paragraphs 7 and 31 of this report.

Based upon the discussions contained in these paragraphs the inspector concludes that the use of the field process sheet adequately controlled and specified required work activities. Specific steps for fabrication, erection, welding, etc. are not required to be listed on the Field Process Sheet. Status of these activities can be ascertained by reviewing the actual field procedure. The Field Process sheet sequences, by procedure, the required construction events. It is not a mechanism to maintain status of specific work steps.

No items of noncompliance or deviations were identified.

41. Criterion XVI, NSC Audit Finding No. 2:

"Based on the results of this audit and the problems encountered in the past, it appears that a corrective action system has not been operative."

NRC Finding:

The inspector examined corrective actions taken as a result of items identified by licensee audits, Pullman Management audits and the NRC, and found corrective actions had been taken, as appropriate, when problems were identified. For example each of the following represent corrective actions taken in response to audit findings: the pipe support procedure was extensively rewritten in June 25, 1975; Quality Assurance Instruction No. 98 was created for the inspection of existing concrete expansion anchors; and in March 13, 1979 the pipe suport quality assurance manual was superceded by ESD-223 to provide all the elements of installation, inspection, and as-builting of pipe supports in one procedure. Additionally, as a result of NRC identified discrepancies with radiographs (Reference: Inspection Report No. 50-275/77-06 dated May 6, 1977) the licensee committed to requiring that all radiographs would be reviewed by a Level III or a second Level II individual.

During this inspection, an NRC consultant reviewed 102 radiographs, to confirm the corrective action on the radiographs, and to confirm that all the radiographs were reviewed by a Level III or a second Level II radiographer. No discrepancies were identified during this review by the NRC consultant.

The discussion in paragraph 42, below, is particularly germain to this issue.

The inspector concludes that the Pullman corrective action system has been operative.

No items of noncompliance or deviations were identified.

42. Criterion XVIII, NSC Audit Finding No. 3:

"In response to KFP-18, Paragraph 18.2.1, management audits were performed approximately every six months. Check sheets were employed.

Based on the results of this audit and the results of Pacific Gas & Electric Company audits, these management audits appear to have been ineffectual."

NRC Finding:

Corporate management audits, conducted from September 1972 through February 1978, of the Pullman on-site Quality Assurance program were reviewed for content, completeness, and effectiveness. There is a file of ten management audit reports, performed during this time period, indicating that comprehensive inspections were conducted by the Pullman Corporate office on approximately a semi-annual frequency. In accordance with Q.A. program element KFP-18 (dated January 4, 1973) these audit reports specifically identified deficiencies, provided recommendations for corrective action and required on-site resolution by the responsible supervisor. As appropriate, each report followed up on the adequacy of corrective action implemented to correct and improve previously identified deficient conditions in the Quality Assurance program.

As a further significant improvement to their program Pullman revised KFP-18 on December 30, 1977 to require direct written response from the resident construction manager and the field Quality Assurance/Quality Control manager for "Schedule completion of implementation of corrective action and measures taken to preclude re-occurrence." The field Quality Assurance/Quality Control manager is responsible to monitor audit findings for trends.

In conclusion, there is every indication the on-site PPP Quality Assurance organization was responsive to corporate management audits and there is no basis to suggest these audits were ineffectual.

No items of noncompliance or deviations were identified.

43. Criterion XVIII, NSC Audit Finding No. 5:

"In response to KFP-18 and KFPS-16, internal audits were performed every six months. Check sheets were not employed."

NRC Finding:

At the time of the NSC finding, checksheets were not being used by the onsite Quality Assurance organization to perform internal audits. Corporate audits, being performed by Williamsport Headquarters personnel, did use checksheets to coordinate their inspections. This inconsistency was resolved when internal auditing became proceduralized in June 1978, by the evolution of field procedure ESD-263. The scheduling of program elements to be audited and use of checksheets is detailed in ESD-263.

The inspector concludes that, while the NSC finding is factual, the finding is of minimal safety significance, because adequate corporate audits had been performed using checklists and subsequent audits, both internal and corporate, indicate that no fundamental QA program breakdown occurred as a result of the inadequately described internal auditing

program. (The Pullman internal audit program is further discussed in paragraph no. 9 of this report).

No items of noncompliance or deviations were identified.

44. Conclusion

The NSC audit contains a total of 175 documented findings, of which 110 were findings of apparent discrepancies or program weakness by NSC.

The NRC has completed an examination of 50 of the NSC findings identified as apparent weaknesses or discrepancies. The criteria used to select those findings for NRC examination are provided in paragraph 4 of this report. Of the 50 findings examined by the NRC, three of these were examined prior to this inspection and are documented in NRC Inspection Report No. 50-275/83-34.

Although, the NRC has identified a potential violation (paragraph 17) during this inspection, regarding the qualification of Pullman visual welding inspectors, this item is of reduced significance since all but two of the inspectors had adequate backgrounds and experience in the areas of welding or quality control inspection. It does not appear that this problem was chronic or widespread.

It is the staff's opinion that the NSC audit findings do not provide a basis for concluding that the Pullman-Kellogg Quality Assurance Program suffered a major breakdown during the time period prior to the NSC audit. Furthermore, based on this significant sample of the most important NSC findings it is concluded that examination of the remaining items is not warranted.

45. Management Meeting

On November 18, 1983, the inspectors met with licensee representatives denoted in paragraph 1. The inspection scope, observations, and findings were discussed. The licensee acknowledged the potential item of noncompliance identified in paragraph 17.

Parameter, Inc.
CONSULTING ENGINEERS
ELM GROVE, WISCONSIN

Subject

1. Independent delta-ferrite measurements on 25 selected stainless steel welds to verify compliance with Code and Regulatory Guide 1.31 requirements.

2. Visual and liquid penetrant examination of field welds FW110-111-112 in isometric package 2-14-31.

3. Examination of radiographs of 102 weld joints for compliance with Code, verification of adequacy of reader sheets and evaluation of overall quality of radiographs.

References

1. Outline of nondestructive examination work to be performed at Diablo Canyon, November 14-18, 1983 by NRC contract personnel (Exhibit 1).

2. Contract No. NRC-05-82-249
   Task Order No. 56

3. PAR: NRC/IE-82/83

Writer of Report

Kenneth A. Ristau, PARAMETER, Inc., NDT Level III, MT, PT, RT and UT

Contract Personnel Assigned

Daniel J. Hunt, Wisconsin Industrial Testing, Inc., Level II, MT, PT, UT

Introduction

The NRC outline of work (Exhibit 1) designates 3 welds to be liquid penetrant tested and visually examined.

The 25 stainless pipe welds to be tested for delta-ferrite measurements were designated by Mr. Dennis Kirsch, NRC Section Chief. For a list of the welds and results of the inspection, see WIT report (Exhibit 3). Also see WIT report for results of visual and penetrant inspection (Exhibit 4).

Mr. Kirsch also indicated the 102 welds of which radiographs were to be viewed (Exhibit 2).

Parameter, Inc.
CONSULTING ENGINEERS
ELM GROVE, WISCONSIN

Record of Activities

November 15 and 16 inspections were made by Dan Hunt and films were viewed by Ken Ristau.

In a short meeting with Dennis Kirsch, day end November 16, the results of our findings were conveyed verbally, as follows:

1. The delta-ferrite measurements met the NRC requirements.

2. The LPT of all three welds were approved but FW111 had one LP indication running transverse to the weld in the base material of the pipe. It was approximately 1/2" away from the weld and about 1" long.

3. The radiographs of the welds were viewed and approved as adequately meeting Code. Comments were also made by the writer concerning film quality, detail of reader sheet documentation and the excellent condition of the radiographs, nearly 10 years after x-ray date.

Conclusions

1. Having reviewed the radiographs and reader sheets of all 102 selected piping welds identified in Exhibit 2, the writer found reader sheet documentation detailed and clear. Radiographs were readily available, in good order and of very good quality. Radiographs are approved as meeting the requirements of applicable Codes.

2. All 25 welds selected for delta-ferrite measurements met the requirements of Code and Regulatory Guide 1.31 (See Exhibit 3).

3. Visual and liquid penetrant examination of FW110 and 112 were acceptable. FW111 weld was also acceptable but an liquid penetrant indication was noted in the pipe base material (See WIT Penetrant Report, Exhibit 4).

Parameter, Inc.
CONSULTING ENGINEERS
ELM GROVE, WISCONSIN

List of Exhibits

1. Outline of Nondestructive Examination Work to be Performed at Diablo Canyon, November 14-18, 1983, by NRC Contract Personnel.
2. Field Welds Chosen for Radiograph and Reader Sheet Review.
3. Delta-Ferrite Measurements.
4. Visual and Liquid Penetrant Examinations.

Prepared by:

Kenneth A. Ristau

Kenneth A. Ristau, Level III

Reviewed by:

Walter J. Foley

Walter J. Foley, Q/A Engineer

Exhibit 1 to
Report No. PAR(DCNP)-NDE-2

November 8, 1983

OUTLINE OF NON-DESTRUCTIVE EXAMINATION WORK TO BE PERFORMED AT DIABLO CANYON, NOVEMBER 14-18, 1983, BY NRC CONTRACT PERSONNEL

GENERAL INFORMATION:

Location: Diablo Canyon Nuclear Plant, Unit Nos. 1 and 2
San Luis Obispo, California

Licensee: Pacific Gas and Electric Company
Docket No. 50-275 and 50-323

Purpose:
1. Perform independent delta-ferrite measurements on about 25 selected stainless steel welds to verify compliance with code and Regulatory Guide 1.31 requirements.

2. Visually examine and perform liquid penetrant examination of field welds FW-110, 111, 112 in isometric package 2-14-31.

3. Examine about 100 weld radiographs and verify reader sheet, radiograph and evaluation adequacy.

Site Contact: Mr. Marvin Mendonca, NRC Senior Resident Inspector
805-595-2353

RV Contact: Mr. Dennis Kirsch, NRC Section Chief, 415-943-3740

Work Hours: 0730-1630, November 14-18, 1983

REQUIREMENTS:

To be furnished at the Diablo Canyon Site by the licensee:

Hard hats and safety glasses
Insulation removal
Scaffolding erection
Escorts to locate welds in the plant
Assistance to assemble documentation (radiographs)
Electrical power and extension cords for portable test equipment
Working space for one or two persons to examine radiography records
Viewer to examine radiographs
Use of lunchroom and sanitary facilities
Use of Xerox machine as back-up
Calibrated severn gauge

To be furnished at the Diablo Canyon Site by the NRC:

Assistance as required by the Senior Resident Inspector
Telephones in the NRC trailer
Xerox machine for copying

To be furnished by the contractor:

Certified level II or III liquid penetrant and qualified radiograph interpreter examiner to conduct visual and liquid penetrant examinations and an examination of about 100 radiographs for adequacy

Two copies of certifications and qualifications of all contractor personnel, and documentation verifying certification and qualification of liquid penetrant cleaner, penetrant and developer used shall be given to the NRC contact upon arrival at the Diablo Canyon Site.

Measurements performed shall be in accordance with the latest editions of the ASME code. Two copies of all data sheets will be furnished to the NRC contact at the conclusion of the work.

A letter report including a description of the work performed, the data obtained or examined, and evaluation of the adequacy of licensee's documentation shall be prepared and delivered to the NRC Region V office by November 25, 1983. An exit meeting will be held with the NRC contact at the conclusion of the work to discuss the scope and findings.

Attachment 1

Exhibit 2 to
Report No. PAR(DCNP)-NDE-2

Parameter, Inc.
CONSULTING ENGINEERS
ELM GROVE, WISCONSIN

Field Welds Chosen for Radiograph and Reader Sheet Review

ISO Drawing	Field Weld	ISO Drawing	Field Weld	ISO Drawing	Field Weld	ISO Drawing	Field Weld
1-7-21	100	1-7-6	31A	1-7-1	215	1-07-22	106
1-7-21	101	1-7-6	32	1-10-19	144	1-07-22	107
1-7-21	105	1-7-6	33	1-9-24	216	1-07-22	108
1-7-18	80	1-7-6	282	1-7-24	124	1-07-22	109
1-7-18	81	1-7-6	280	1-7-24	126	1-10-9	83[R1]
1-7-14	62	1-7-6	283	1-9-42	249	1-07-22	110
1-7-14	63	1-7-9	294	1-9-42	245	1-07-22	111
1-7-14	64	1-7-9	284	1-9-42	250	1-07-22	112
1-7-10	46	1-7-9	182	1-7-8	242	1-07-22	113
1-7-2	7	1-7-9	43	1-7-8	40	1-09-9	75
1-7-5	22	1-7-9	42A	1-12-8	100	1-09-9	73
1-7-5	23	1-7-9	42	1-12-8	103	1-09-9	72
1-7-5	24	1-8-323	1084	1-12-8	99	1-09-9	74
1-7-5	25	1-7-1	1	1-12-8	104	1-09-9	71
1-7-5	26	1-7-1	2	1-7-23	117	1-09-9	77
1-7-5	27	1-7-1	3	1-09-41	242	1-09-9	78
1-7-5	295	1-7-1	4	1-09-41	243	1-07-17	76
501014	362	1-7-1	201	1-09-41	244	1-07-17	77
1-8-321	1069	1-7-1	203	1-09-17	130	1-07-17	78
1-7-28	186	1-7-1	204	1-09-17	131	1-07-17	79
1-7-28	187	1-7-1	206	1-09-17	132	1-07-16	72
1-4-153	1428	1-7-1	207	1-09-38	230	1-07-16	73
1-4-153	1060	1-7-1	209	1-09-28	231	1-07-16	74
500136	251	1-7-1	211	1-09-38	232	1-07-16	75
1-7-6	28	1-7-1	213	1-09-38	233	1-07-19	82
						1-07-19	83
						1-07-19	84

AUDIT PERFORMED BY DANIEL HUNT (PARAMETER) 11-16-83

FERRITE INDICATOR S/N 2947, CAL. DATE 3-9-83

ISO NUMBER	FW NUMBER	FERRITE READING
1-8-328	1117	> 7.5% < 10%
1-8-328	1125	> 7.5% < 10%
1-8-328	1124	> 7.5% < 10%
1-8-328	1122	> 7.5% < 10%
1-8-328	1119	> 7.5% < 10%
1-8-328	1118A	> 7.5% < 10%
1-8-328	1118	> 7.5% < 10%
1-8-320	1060	> 7.5% < 10%
1-8-320	1059	> 7.5% < 10%
1-8-320	1057	> 7.5% < 10%
1-8-20	293	> 7.5% < 10%
1-8-20	293A	> 7.5% < 10%
1-8-20	293B	> 7.5% < 10%
1-8-20	150	> 10% < 15%
1-8-20	149	> 10% < 15%
1-8-20	148	> 10% < 15%
1-8-20	147	> 10% < 15%
1-8-20	145	> 7.5% < 10%
1-8-20	146	> 7.5% < 10%
1-8-2	16	> 7.5% < 10%
1-8-2	20	> 7.5% < 10%
1-8-2	21	> 7.5% < 10%
1-8-2	22	> 7.5% < 10%
1-8-2	24	> 7.5% < 10%
1-8-2	19	> 7.5% < 10%

Daniel J. Hunt

11-16-83

EXHIBIT 4 TO REPORT NO. 1 [illegible]

WISCONSIN INDUSTRIAL TESTING, INC.

4250 N. 126th Street • Brookfield, WI 53005 • Tel. (414) 781-0106
889 Ehlers • Neenah, WI 54956 • Tel. (414) 722-3115
FAA Repair Station C13-29

Attachment 1

REPORT OF NONDESTRUCTIVE EXAMINATION (UT, MT, PT, ET)

Customer: ARC	Location: DIABLO CANYON, CALF.	Contract No:	Date: 11-16-83
P.O.	Item Description: STEAM PIPE	Plan or Drawing No: ISO 2-14-31	Control Report No:
Part OR Joint #: FW-110, 111, 112	System # Or Line #:	Heat # Or Serial #:	Surface Condition: AS WELDED
Type of Examination: ET ☐ UT ☐ MT ☐ PT ☒	Examination Standard:	Acceptance Standard: ASME III NB-5223	NDE Procedure: ASME V T III
Type of Work: New ☒ Repair ☐ R#	Total Length Examined: 100% WELD	Material Type: STAINLESS STEEL	Material Thickness:	Material Grade: AUSTENITIC
ET Equipment	Probe:	Test Block:	Technique Description:	Sensitivity Level:
UT Equipment	Transducer:	Test Block:	Technique Description:	Sensitivity Level:
MT Equipment	Dry ☐ Visible ☐ Wet ☐ Fluor ☐	AC ☐ DC ☐ Rectified ☐	Amperage:	Prod Spacing: Head ☐ Coil ☐	Particle Color:
PT Equipment: MAGNAFLUX SPOTCHECK	Visible ☒ Fluorescent ☐	Penetrant Dwell Time: 20 MIN. Water ☐ Post ☐ Solvent ☒	Developer Time: 7 MIN. Dry ☐ Wet ☐ Nonaqueous ☒

Defect Code: C = Crack P = Porosity LF = Lack of Fusion LI = Linear Indication S = Slag LA = Lamination

PART NO.	ACC.	REJ.	DEFECT CODE	REMARKS
FW-110	/			
FW 111		/	LAP	1/2" FROM WELD 1" LONG.
FW-112	/			

PART NO.	ACC.	REJ.	DEFECT CODE	REMARKS
CLEANER: SKC-5				
PENETRANT: SKL-5/SKL-HF				
DEVELOPER: SKD-5				

Comments: INDICATION NOTED ON PIPE

Number of Items Accepted:

Number of Items Rejected:

Technician: David J. Hunt II — Cert Level: — Date: 11-16-83

Customer: — Date:

Asst. Technician: — Cert Level: — Date:

Authorized Inspector: — Date:

FORM # S-11