Enclosure 1
PG&E Letter DCL-98-111

December 15, 1997 Steam Leak Repair Evaluation

Diablo Canyon Power Plant

August 17, 1998

December 15, 1997 Steam Leak Repair Evaluation

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Concurred by:	Shift Foreman	Date
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Approved by:	Senior Vice President Nuclear Power Generation	Date

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ATTACHMENTS

1. EXECUTIVE SUMMARY

On August 5, 1998, during preparation for the August 21, 1998, predecisional enforcement conference, PG&E recognized the need to reevaluate our understanding and actions taken regarding the leak repair activity conducted on December 15, 1997, in the Unit 2 containment.

The reevaluation concluded that none of the three Senior Reactor Operators involved with the work in question had, in fact, intentionally violated procedures. Rather, the work was found to have been accomplished in accordance with accepted practices, albeit in a different manner than originally planned. Two procedural violations were identified involving the modification of the governing work order and the documentation of completion of the work activity in that same work order.

The inflammatory nature of the original action request (AR) written by the Shift Foreman (SFM) documenting the event and a breakdown in communications precipitated a rush to judgment which obscured what actually happened and why. This in turn led us to make inaccurate assessments and come to erroneous conclusions. The first indication that PG&E had come to incorrect conclusions was when the new Operations Director met with the involved individuals to recreate the event.

The steam leak repair event was reconstructed based on discussion with all involved personnel and was thoroughly evaluated. After our reevaluation of the event concluded that no willful violation occurred, it was considered necessary to assess why the original cause analysis of this event had concluded to the contrary. An investigation and analysis was performed by Nuclear Quality Services to determine why the original analysis failed and to identify conclusions, lessons learned and corrective actions as a result of that investigation.

Based on our reevaluation of the December 15, 1997 event and of its original cause analysis the following overall conclusions and corrective actions were identified.

1.1 Conclusions

- Management expectations were met for the leak repair in that the proposed work and work methods were well thought out and thoroughly discussed prior to implementation by the Operations crew and Maintenance personnel.
- An intentional violation of plant procedures did not occur.
- A violation of clearance and tagging procedure requirements did not occur.

- Two violations of the requirements of AD7.ID1 by Maintenance personnel did occur in that the work order was not properly modified before work performance and the work order steps were not properly dispositioned prior to the end of the shift during which the work order was completed.
- The overriding or primary cause of PG&E's improper characterization of the December 15, 1997, event has been determined to be that the Operations organization failed to fully investigate, understand, and agree on the true nature of the event which embedded a faulted mindset of "intentional" violation in all involved decision makers. Contributory causes include: the AR documenting the event was misleading and its purpose and details were unclear, the investigation of the event was untimely, key supervisory personnel involved in the event were conditioned to take responsibility for actions that did not occur, facts related to the event were not properly documented nor made available to the cause analyst, an inaccurate problem statement contributed to a cause analysis with faulted conclusions, and the nature of the problem and complexity of the process involved resulted in a level of ambiguity that allowed differing interpretations of actual requirements.

1.2 Completed Actions

- Maintenance has been briefed on the need to: (1) revise work orders prior to start of a job, and (2) sign off work order steps prior to the end of the shift.
- A self assessment of work order processing has been conducted to verify that work order changes are processed correctly and timely sign off is accomplished. No discrepancies were identified in the assessment which was completed on August 14, 1998.
- The SFM and the Shift Supervisor (SS) involved in the event have been counseled regarding compliance with procedures in the area of work order modifications prior to implementation. They have also received instruction on the proper use of ARs and the clarity, tone, and accuracy required when they are written.
- A non-conformance report (NCR) has been initiated to evaluate and validate the comprehensiveness of the conclusions and corrective actions presented in this report. The NCR will also provide a vehicle to track and report progress.

1.3 Future Corrective Actions

- The corrective action program will be reviewed to ensure initial quality problem level determination is appropriate.

- NPG Management (SVP to Director level), Operations personnel and key plant supervisors will receive training on this event. Issues that will be discussed of importance are:
  - Accurate reporting and timely updating of ARs.
  - Timeliness and thoroughness in performing investigations, including personnel statements.
  - Maintaining an open mind when investigating problems prior to considering administering positive discipline.
  - Reinforcing that other avenues are available if personnel want to appeal investigative conclusions
  - Maintaining open communications.
- Lessons learned from this event will be included in cause analyst training materials.
- The personnel records of the involved operators will be corrected to reflect what actually occurred. All of the involved operators have already been fully reinstated to crew duties.
- Requirements and expectations with regard to performing maintenance activities with or without the protection of a clearance will be clarified.
- A survey will be performed in Operations to ensure lessons learned from this event are understood.

2. INTRODUCTION

As part of PG&E's review of the December 15, 1997 steam leak repair activities during predecisional enforcement conference preparation, PG&E's Senior Vice President of Nuclear Power Generation (SVP-NPG) held a meeting on 8/5/98 to reconstruct the details of the event. With the three Senior Reactor Operators involved in the event in attendance at the meeting, information was obtained that led the SVP-NPG to believe that the characterization of the event may have changed from that previously recognized by PG&E. The SVP-NPG directed that a reevaluation be conducted into the facts, circumstances, and actions taken with regard to that event. As a result of that reevaluation, PG&E now believes that no willful procedural violations occurred, nor was there an intent by anyone involved to violate procedural guidance on December 15, 1997.

To understand PG&E's current perspective of this event, it is important to initially "put aside" literally reading the statements made in the AR (reference Attachment A) that documented this event and to understand how these statements were interpreted. The choice of words in the AR, especially its title, caused an immediate and negative reaction by PG&E management due to belief that a willful violation of procedures had occurred. The AR was titled "Intentional Procedural Deviation" and was taken to mean intentional procedural violation by the majority of personnel who reviewed this AR. Based on discussions with involved personnel, an important distinction must be made:

- A "violation" is considered a failure by responsible individuals to adhere to or implement a specific requirement of an approved procedure.
- A "deviation" was intended by the AR author to denote a departure from what he believed was the norm relative to his choice of available procedural "paths" for performing the steam leak repair (reference Attachment B).

The actions (immediate and long term) taken against the involved licensed individuals were reflective of management's initial assessment of the meaning of the AR. This initial assessment perpetuated a pervasive attitude among the involved personnel that influenced management's and others (including several of the involved individuals) subsequent actions including improper root cause analysis focus and conclusions, escalated disciplinary actions, and inappropriate admission of guilt by the operators involved.

PG&E now recognizes that the intent of the AR author was to document his belief that, as the responsible SFM, while he was deviating from what the SFM believed was normal use of the clearance procedure, he was not violating a procedural requirement. His general frustration with the complexities of the clearance process caused him to write the AR in the manner it was written. In the SFM's experience,

the clearance process was the most commonly used process used on certain valves, one of which was the valve involved in the steam leak repair. However, he was convinced (correctly) at the time by involved Technical Maintenance (TM) and other shift personnel that not using a clearance to control the position of the valve in question was acceptable under other plant procedures.

In this report, we will demonstrate that no willful procedure violation occurred on December 15, 1997. This conclusion will be supported by the two major sections of this report which consist of a detailed chronology, investigation and analyses of: 1) the activities that occurred on December 15, 1997 in support of the steam leak repair (Section 3.0) and 2) management's actions in response to this event (Section 4.0). As part of the evaluation of management's actions, we will address why the cause analysis for this event was delayed and why, once performed, it continued to perpetuate the incorrect conclusion that a willful procedural violation occurred. Finally, based on the results of these evaluations, we will present conclusions, lessons learned, and corrective actions.

3. ANALYSIS OF EVENT

3.1 Background

Purpose

The purpose of this section is to present a detailed chronology and analysis of the steam leak repair work conducted in Unit 2 on December 15, 1997. The chronology presents the actions taken by the involved Operations and TM personnel, including their thought processes as to why the actions were taken. Conclusions regarding the actions taken, including procedural usage/adherence, are also provided. Finally, this section presents corrective actions taken and planned as a result of this event.

Applicable Program Requirements

The steam leak repair activity involved the following programmatic areas: clearances, equipment operation, tagging, equipment configuration control, work orders, and procedural usage. The programmatic requirements applicable to the event are contained in various administrative procedures. The pertinent sections/intent from each of these procedures are presented within the chronology evaluation at each point in the event and are outlined comprehensively within Appendix 3.1-1. The full text of referenced procedures is provided in Attachment C.

3.2 Event Chronology And Evaluation

Date/Time	Action
12/11/97	Technical Maintenance (TM) Foreman (LaCross) was informed about a leak in Unit 2 on an instrument line associated with Steam Generator 2-4, Level Transmitter 549. (Refer to Appendix 3.2-1). Work was scheduled to be performed the following Monday, December 15, 1997. A work order (CO155758) was created for the repair and a clearance (57155) was requested.

Thinking/Motivation

A clearance was requested because the TM Foreman had previously been told by the Operations Work Control Shift Supervisor (Dye) that the clearance process was the preferred process to use for configuration control of the plant. (This "direction," was not mandated by procedure). In addition, the TM Foreman had experience with several SFM who were reluctant to allow TM Technicians to manipulate plant

valves per the allowances of OP1.DC18. Because the job would be performed on a "non-normal" workday (Monday), and to avoid any delay in implementation and completion of the work due to the perceived possibility that the SFM on duty could require use of a clearance, the TM Foreman elected to request a clearance.

The TM Foreman has stated that his preference would have been to perform the work utilizing isolation and configuration control provided through use of the work order, configuration control sheet and Caution Tag rather than through use of the clearance process. There are many examples, both at DCPP and at other high performing nuclear facilities, where work similar to this in nature is known to be performed utilizing only a work order and configuration control without a formal clearance. At Diablo Canyon specific examples include work on transmitters of various types on Steam Generators and Moisture Separator Reheaters as well the Main Turbine Valve Actuator EH control system. In each situation, local isolation valves are closed by Operations or Maintenance Craft in accordance with the requirements of OP1.DC18 and configuration control is provided through use of a configuration control sheet and Caution Tag per CF4.ID5.

Procedural Guidance/Adherence

AD7.ID1, "Use of the PIMS Work Order Module," allows completion of work with and without the protection of a clearance. Maintenance and Operations personnel must evaluate the value of using a clearance for each specific case. (In a case such as this one, using a clearance would not have enhanced personnel or plant safety beyond that which would be provided by isolation of valve 2-4008, placement of a Caution Tag and documentation of those actions in a configuration control sheet.) Step 2 of the Planning/Content section of Attachment 7.2, Maintenance Planning Checklist, states, "Clearance required? If YES reference OP2.ID1 [Clearance and Administrative Tagouts]. If NO reference OP1.DC18 [Authorization for equipment operation and maintenance]." When the work order process is used, concurrence for manipulation of equipment is given per OP1.DC18 and plant configuration is tracked and maintained by a configuration control sheet as shown in CF4.ID5, "Configuration Control During Maintenance Activities and the use of Caution Tags."

Conclusions/Corrective Actions

Use of the work order/configuration control sheet/Caution Tag method as described in AD7.ID1, CF4.ID5 and OP1.DC18 to manipulate and control plant configuration was an appropriate and commonly used practice for work of this type. In this case it provided the same level of protection as would the use of a clearance. In this case the action taken to provide isolation from high energy steam (closing root valve 2-4008) was identical to that described on the clearance. The clearance process could have been used, but it would not have provided additional value for

either plant or personnel protection or configuration control, and in fact would have complicated the issue of safe, expedient work completion due to additional steps which would have been required for clearance implementation in compliance with procedural requirements.

AD7.ID1 does not provide specific guidance for when a clearance must be used to support completion of work activities and when it is acceptable to use only the work order/configuration control processes. This decision is left to the determination of Maintenance and Operations personnel who plan and implement work. While some may have the opinion that a clearance should always be used to isolate workers from sources of energy during maintenance, there is no procedural requirement for this. In fact, maintenance is often performed on "hot" equipment both at DCPP and elsewhere in the industry. Therefore, in the opinion of Diablo Canyon Operations Management, there was not a violation of procedural requirements in this area.

Practices in this area at Diablo Canyon have been recently benchmarked against those at other high performing nuclear plants and have been found to be typical of practices in use. Maintenance and Operations personnel must have the flexibility to make decisions about protection that are appropriate for each situation. Given the complexity of operating a facility such as DCPP and the multitude of situations that can be encountered, the application of operator judgment, controlled by the SFM and SS, must be allowed. An acceptable choice of protection for jobs such as the one performed on December 15, 1997, was for the job to be performed in the manner in which it was, without the use of a clearance.

Date/Time	Action
12/15/97 ~ 0700	Shift Foreman (Craig) began review of work planned for the shift. The SFM reviewed the clearance and signed it.

Thinking/Motivation

At this point in time, the SFM did not foresee any reason the clearance should not be utilized to support the planned work. His intention was to approve the paperwork and give it to Operators to allow them to begin discussing the logistics of implementing the clearance.

Procedural Guidance/Adherence

OP2.ID1 contains the responsibilities of the SFM for clearance approval. Although his signing the clearance constitutes authorization of the work associated with the clearance, work can not begin until the SFM has reported "on" the clearance. This takes the clearance to ACTIVE status and releases equipment to sub-clearance holders to perform work.

Conclusions/Corrective Actions

No procedural violations occurred. No corrective action is necessary.

Date/Time	Action
12/15/97 ~0715	SFM and the U2 Senior Control Operator (Koehler) held a discussion concerning the clearance and the personnel to be utilized to hang the clearance.

Thinking/Motivation

Discussion points included who would implement the clearance and when containment entry would be made.

Procedural Guidance/Adherence

N/A

Conclusions/Corrective Actions

No procedural violations occurred. No corrective action is necessary.

Date/Time	Action
12/15/97 ~0730	The Utility SCO (Leader) was made aware Containment entries were planned for Unit 1 and Unit 2.

Thinking/Motivation

At this time, no discussion took place regarding how the containment entries would be performed or who would participate. This was only a "heads up" to the Utility SCO to allow him to plan the day's activities.

Procedural Guidance/Adherence

N/A

Conclusions/Corrective Actions

No procedural violations occurred. No corrective action is necessary.

Date/Time	Action
12/15/97 ~0800	Shift brief was conducted. Part of the brief included a statement about the entry into Unit 2 Containment for the purpose of repairing a steam leak.

Thinking/Motivation

The statement was made for enlightenment of the crew regarding activities up-coming on the shift. No specific discussion regarding implementation of this job occurred at this time, though questions regarding implementation of the clearance first surfaced at this time. Specific discussion of the job was deferred until after the shift brief was completed.

Procedural Guidance/Adherence

N/A

Conclusions/Corrective Actions

No procedural violations occurred. No corrective action is necessary.

Date/Time	Action
12/15/97 ~0830	On-going discussion occurred involving the TM Foreman (Shelburne), the TM Technicians who would be performing the repair (Belkin/Greenlee), the SFM (Craig), the Unit 2 SCO (Koehler) and the Utility SCO (Leader) concerning use of a clearance to facilitate performance of the work vs. utilizing only the work order and procedurally allowed configuration control tracking by Maintenance to provide isolation. The SFM reviewed the administrative procedures which control use of clearances and tagging. The SFM also attempted to contact the Operations Director and Operations Manager on-site (unsuccessfully).

Thinking/Motivation

The SFM was asked how he intended the clearance to be implemented. The questions centered around how to comply with the procedural requirements while also avoiding unnecessary heat and radiation exposure. Issues discussed related to not utilizing the clearance included the following:

- Configuration control: Concern was expressed regarding how to properly control and document the configuration of the plant. It was recognized that it was an acceptable practice to utilize a configuration control sheet in conjunction with the work order to provide configuration control.

- Worker safety: Concern was expressed regarding potential heat stress and unnecessary exposure to radiation due to the number of trips that would be necessitated up and down two sets of ladders, the amount of time individuals would be required to wait in a high heat area as well as travel through a

radiation field of 165 mR/hr. At the time of this discussion, the group felt the number of "man-trips" up and down ladders through the radiation field could be more than cut in half by not implementing the clearance. Of even greater concern was the fact that the Containment was very hot at this elevation (on the order of 120°F) and this might lead to heat induced stress due to the temperature of the atmosphere combined with climbing.

- Plant Safety: Concern was expressed regarding the increased amount of time the Unit would have to operate with bistables in the tripped condition if a clearance was utilized.

- Energy Isolation Requirements: Concern was expressed that if the clearance procedure was not to be used, a corresponding level of plant and worker safety as well as configuration control must be met. The fact was discussed that use of an MOL Tag can only be used in conjunction with a clearance, so an MOL Tag could not be used. It was recognized that use of a tag to provide protection was required by Cal OSHA regulations as they are reflected in DCPP procedures. It was decided root valve 2-4008 would be closed by an Operator to assure compliance with the requirements of OP1.DC18. It was further determined that TM would hang their Caution Tag on the valve once it had been closed by Operations. It was agreed that the Operator would stay in the area to avoid further exposing him to potential heat stress by requiring another trip up and down the ladders to the work area. Use of an Operator in attendance to act as a human MOL **was not** discussed or intended.

- Procedure Use and Adherence: Use of, and adherence to, procedural requirements was discussed at length. At no time did anyone express the opinion that what was being planned was in violation of any plant procedures. In addition, TM personnel indicated that performance of the work with personnel protection and plant configuration control in the manner proposed was a common practice from their perspective. (The procedures which govern use of a work order in conjunction with a configuration control sheet and Caution Tags to provide configuration control were not referred to at this time.) They also agreed the plan would work utilizing the work order, and further that the work order would be revised to eliminate the steps which referred to use of a clearance.

While all of the areas listed were covered in the discussion, the focal point of concern for resolution during the discussion was worker safety due to heat stress.

Although it is not uncommon to request revision of clearances and work orders both prior to and during their implementation, it was uncommon in the experience of the SFM to change an implementation plan which had called for the use of a clearance

into one where a clearance is not utilized. The SFM attempted to call the Operations Director and Operations Manager to obtain their opinion about the method proposed to perform the work. The SFM was also interested in determining what planning had gone into this work to determine if a clearance had been called for due to a reason he was unaware of. However, given that this was an "off Monday" where the TM Foreman involved in planning the work was unlikely to be at the plant, the SFM was generally comfortable enough with the decision that he did not attempt to contact work planning or to page anyone to obtain additional information.

Procedural Guidance/Adherence

- The purpose of CF4.ID5, "Configuration Control During Maintenance Activities", is to provide a method to document authorized changes to plant equipment status where provision for documentation has not been provided by a governing procedure, loop test or work order. Valve manipulations and hanging tags such as the one planned to support this maintenance activity are listed as "typical" activities covered by the procedure. The procedure does not contain any requirements which conflict with the activities as planned during these discussions. No violation of plant procedures occurred.

- Step 2.1 of OP2.ID2, "DCPP Tagging Requirements", states, "Certain DCPP Tags (Red and Man-On-Line) are used to mark working area boundaries, defined through a clearance process, prior to performing work on installed equipment." Further, step 5.3.2 states, "MOL Tags shall only be used on Master Clearance points." Since the clearance process was not to be utilized to facilitate performance of this work, use of an MOL Tag was prohibited and the Operators acted properly in not using an MOL Tag. No violation of plant procedures occurred.

- Per AD7.ID1, Use of "PIMS Work Order Module", equipment isolation may be provided by two separate processes at DCPP. The clearance process is defined in OP2, "Tagging Programs", OP2.ID1, "Clearances and Administrative Tagouts". and OP2.ID2, "DCPP Tagging Requirements". The work order/configuration control sheet/Caution Tag method is defined in CF4.ID5, "Configuration Control During Maintenance Activities", and OP1.DC18, "Authorization for Equipment Authorization and Maintenance". Each of these processes specifies use of tag types appropriate to the situation to provide isolation and configuration control. While use of the clearance process was initially specified, the type of work involved is more typically performed at DCPP and other high performing nuclear plants without the use of clearance. The Operators met management expectations by thoroughly discussing the situation

and deciding to use the process which provided the protection with the highest value. No violation of plant procedures occurred.

- Step 5.1 of OP1.DC18, "Authorization for Equipment Operation and Maintenance", states, "Plant equipment which is in service (not cleared in accordance with OP2.ID1/OP2.ID2) shall only be operated by plant Operations personnel who are authorized to operate such equipment". Management expectations were met by sending an Operator with the work group to operate valve 2-4008. No violation of plant procedures occurred.

- Use of "human MOL Tags" is prohibited at DCPP by omission from the tagging procedure. Since it is not specifically allowed by the DCPP tagging procedures, such use is prohibited. Since a human MOL Tag was not utilized, no violation of plant procedures occurred. The Operator stood by the valve only because doing so allowed him to avoid another trip down and up the ladders to the work area. This interpretation contradicts what was written in the AR by the SFM. However, it is supported by statements from all of the individuals involved relative to the job planning discussions that took place in the Control Room. (It should be noted that use of human MOL Tags was permitted early in DCPP history. This activity had its origins in PG&E Company's Operating Orders. Ultimately the practice was removed from the PG&E Operating Orders and the practice was discontinued at DCPP.)

- Step 2.1, AD2.ID1, "Procedure Use and Adherence," states, "It is the policy of NPG that the use of, and adherence to, approved written procedures for the accomplishment of work activities is a necessary ingredient to consistently achieving the goal of performing such work in a safe, professional and efficient manner." In accordance with this policy, the overall objectives are that: "...2.1.2) Personnel adhere to procedures and employ their knowledge and a questioning attitude in order to identify possible errors in procedures, or possible improvements in procedures." No violation of plant procedures occurred. Management expectations were met in this area in that personnel were aware of the requirements that procedures be adhered to, in that compliance with procedural requirements and intent was a high priority to all individuals involved and in that no violations of plant procedures actually occurred. The characterization of "intentional deviation" as it was used in the AR was intended to mean the SFM was deviating from use of a process he personally considered to be normal for this situation, and not that intentional deviations from procedural requirements had been made. However, management expectations were not met in this area in that when questions regarding the appropriateness of proceeding with work in the manner described were raised, individuals relied only on their memories to make the determination with respect to OP1.DC18 and CF4.ID5. If there is a question, management would expect applicable

procedures for the process involved to be reviewed by the crew to assure all requirements would be complied with.

- Step 4.7.2 of AD7.ID1, "Use of PIMS Work Order Module," states, "Work shall be performed in accordance with instructions provided by the work order". Step 4.8 of AD7.ID1 contains additional instructions which allow modification of a work order to facilitate work completion. Agreement by the TM Foreman to modify instructions contained in the work order prior to work being performed meets procedural requirements and management expectations in this area and it does not represent a procedural violation. Work orders may be changed in accordance with procedures as changing work plans and conditions dictate. This is accomplished by lining out or making additions and dating/initialing as necessary.

Conclusions/Corrective Actions

No procedural violations occurred during this planning process. Management expectations for a thorough review of the job and the best way to perform it were met in every respect with the exception that given the SFM's and SS's uncertainty, procedures which describe authorization for equipment manipulation and for amending work orders should have been consulted to confirm that no procedural violations were involved. The Operations supervisory personnel involved in this event were coached regarding management expectations in this area.

Date/Time	Action
12/15/97 ~0935	The SFM authorized steam generator pressure and level channels affected by the isolation of root valve 2-4008 to be removed from service and declared the channels inoperable.

Thinking/Motivation

N/A

Procedural Guidance/Adherence

N/A

Conclusions/Corrective Actions

No procedural violations occurred. No corrective action is necessary.

Date/Time	Action
12/15/97 ~0944	Bistables were placed in the tripped condition.

Thinking/Motivation

N/A

Procedural Guidance/Adherence

N/A

Conclusions/Corrective Actions

No procedural violations occurred. No corrective action is necessary.

Date/Time	Action
12/15/97 ~ 1000 to 1030	A formal tailboard was held outlining the details of the work to be performed and the methods to be utilized. All parties involved in performance of the work were present, including the SFM, U2SCO, Utility SCO, TM Technicians, TM Foreman, Radiation Protection (RP) Technician and the SS (Patty). The TM Foreman agreed to modify the work order to match agreements made for the performance of the job without a clearance. All parties were asked whether or not they agreed with the methods to be utilized. No one expressed dissent. Concern was expressed by the SS over the fact that valve 2-4008 was an Operations valve, and he was satisfied that since an Operator would be manipulating the valve there would not be a procedural violation. It was suggested that since a new work plan had been created, an Event Trend Record (ETR) should be generated to document the work method being utilized. The SFM decided an AR was more appropriate and volunteered to write the document. The SS concurred with the work plan.

Thinking/Motivation

The SS was brought into the discussion as he would be for any work which was to be performed inside Containment with a unit at power. In addition, he was consulted because the work was proposed to be performed in accordance with a work plan other than the original plan.

An SCO suggested the way the work was to be performed should be documented on an ETR. Although the work method used was deemed to be within allowance of all procedures, writing an ETR or AR identifying the basis for choosing to not use the clearance as originally planned was an action that met a management

expectation for documentation. An AR was generated rather than an ETR because the SFM didn't feel this event was a "trend" type event

Procedural Guidance/Adherence

N/A

Conclusions/Corrective Actions

No procedural violations occurred. Feeding back the actual method utilized would provide information to work planning for future use in planning similar jobs as well as to the clearance group to indicate where improvements in the clearance process could be made. No corrective action is necessary.

Date/Time	Action
12/15/97 ~1058 to 1158	TM Technicians, an RP Technician and the Utility SCO enter the Containment. Following a survey of the area by the RP Technician and a briefing about radiological condition, the work group ascended the ladders to the work area. The Utility SCO closed root valve 2-4008 to isolate the steam leak. TM Technicians performed an independent verification that the valve was closed, hung their Caution Tag, documented plant configuration on a configuration control sheet in the work order and performed leak repair by disassembly/reassembly of the leaky fitting. TM Technicians gave the Utility SCO permission to operate valve 2-4008 for the purpose of opening the valve to perform a leak check. The leak check was satisfactory. The Caution Tag was removed by TM Technicians and plant configuration was documented on a configuration control sheet. All personnel then exited Containment. The work was accomplished in accordance with the work plan as outlined during the tailboard.

Thinking/Motivation

N/A

Procedural Guidance/Adherence

Management expectations were not met, and the requirements of AD7.ID1 were not adhered to, when work was performed prior to the work order being updated by the TM Technical Foreman to reflect the new work method. (Step 4.7.2 of AD7.ID1 requires that work be performed in accordance with the instructions of the work

order.) Management expectations were met in all other respects during work performance, and no violations of other plant procedures occurred.

Conclusions/Corrective Actions

Discussions with the TM Technicians following performance of the job indicated each felt sick due to heat stress following completion of the job. Performance of the job in the manner planned resulted in less work time for all individuals at elevated temperatures than would have been required if a clearance had been utilized. Job analysis performed at the time of the event indicated as many as 15 man-trips would have been required to complete this work if the clearance had been utilized and no exceptions had been taken to procedural requirements. By not using a clearance, the work was actually completed in 4 man-trips. Utilizing the clearance and taking procedurally allowed exceptions in the clearance procedure would have resulted in additional man-trips and a much longer time period of exposure to the high temperature environment due to delays incurred while paperwork and computer updates associated with the clearance were accomplished. These delays may have resulted in potentially worse consequences for the individuals involved.

Step 4.7.2 of AD7.ID1, Use of "PIMS Work Order Module," states, "Work shall be performed in accordance with instructions provided by the work order." In addition step 4.8 of AD7.ID1 contains instructions which allow modification of a work order to facilitate work completion. It is evident from the requirements of step 4.7.2 that it is management's intent that when work order changes are required, they be made prior to the point when the changed steps are implemented. This is a responsibility of Maintenance personnel. Management has assured that members of the Maintenance Department are aware that work order steps must be changed in work orders prior to their performance.

Date/Time	Action
12/15/97 ~1325	Bistables were reinstated, affected channels were declared operable.

Thinking/Motivation

N/A

Procedural Guidance/Adherence

N/A

Conclusions/Corrective Actions

No procedural violations occurred. No corrective action is necessary.

Date/Time	Action
12/15/97 ~1400	Documentation of the work performed and the work methods actually utilized was completed in AR A0449239.

Thinking/Motivation

The AR was written to document the fact that a work plan was substantially changed prior to its implementation in the plant. The SFM was upset at having been placed in a situation on-shift in which he felt the plan for performing work had to be changed as significantly as this one was to enhance worker safety. Though it is not uncommon for a SFM to require minor modifications to a work order or a clearance, it is rare that a change as substantial as elimination of a clearance from use is made. The title the SFM chose to utilize in the AR was purposefully chosen to be "inflammatory in nature" to motivate the organization to action to implement changes to the clearance process which would allow more expedient completion of work utilizing that process.

Procedural Guidance/Adherence

Management's expectations regarding documentation of events at the plant were met by documentation of this event with an AR. However, management's expectations regarding the clarity, tone and content of the AR were not met in that the title was very misleading, portions of the AR's content were inaccurate (e.g., use of "human MOL") and more appropriate means exist to vent frustration than the AR process.

Conclusions/Corrective Actions

The SFM who wrote the AR and the SS who reviewed it and allowed it to be submitted as written, have been coached and counseled regarding the appropriate use of AR's and the choice of wording they use in AR's to convey what is being reported.

Date/Time	Action
12/17/97	Steps 6, 7 and 9 of the work order were "N/A'd" (with reference to the Operations written AR) by the TM Foreman since the clearance had not been utilized during work performance.

Thinking/Motivation

On the day maintenance was performed, the TM Technicians completing the maintenance were confused regarding how work order steps which had not been utilized during the work should be dispositioned. They correctly decided not to initial the omitted steps regarding use of the clearance, but did not "N/A" these

steps as should have been done. A TM Technician did contact the appropriate TM Foreman about dispositioning the steps the next day. The TM Foreman completed documentation cleanup to close-out the work order two days following work completion.

Procedural Guidance/Adherence

Step 4.7.9 of AD7.ID1states, "W/OA steps shall be signed off, initialed and dated, as soon as practical after completion. Do not delay signing off a completed activity beyond the end of the work shift in which the activity was completed." Since all work was complete within one shift, all steps in the work order should have been signed off prior to completion of that shift on December 15, 1997. Management expectations were not met in this area, and a violation of plant procedures occurred.

Conclusions/Corrective Actions

Management has disciplined the TM Foreman involved, and has made clear to the rest of the Maintenance organization what the procedurally driven expectations are for completion of work order steps and modification of work order steps, including appropriate approval.

In addition, a self assessment of work orders was conducted to verify that work order changes are processed correctly and timely sign-off is accomplished. No discrepancies were identified in the assessment which was completed on August 14, 1998.

3.3 Conclusions/Lessons Learned

1. An **intentional** violation of plant procedures **did not** occur. The Operators and TM Technicians involved in this event were aware of all applicable procedural requirements. Discussions regarding how to perform the intended repair without the use of a clearance centered on completing the job in the safest way possible for personnel and the plant while maintaining compliance with procedural requirements.

2. A violation of clearance and tagging procedure requirements **did not** occur. Application of a clearance does not improve the level of safety and protection for the completion of work in every situation. The benefits of using a clearance must be analyzed for each work type and each work situation. It is clear that use of a clearance in this situation would not have provided a measurable safety improvement over simple isolation of valve 2-4008 and control of its configuration as performed.

Diablo Canyon procedures do not specifically state when a clearance is required to be used. However, Diablo Canyon procedures are specific regarding requirements for what type of tag is to be utilized in various situations. For example, use of an MOL Tag is only allowed if a clearance is used.

Diablo Canyon work process procedures specifically allow work completion utilizing isolation and Caution tagging for configuration control, with the use of a configuration control sheet.

Since Diablo Canyon procedures are "silent" regarding when a clearance must be utilized, the requirements of either procedural group may apply to completion of work. In the situation for this event, although utilization of a clearance was the method initially selected, the Operations crew and TM personnel met management's expectations by discussing the merits of the plan as originally proposed against the merits of a new plan in which a clearance would not be provided. Based on information available to them at the time and on factors such as personnel safety, it was ultimately decided that use of the work order/configuration control sheet/Caution Tag method provided overall results superior to that of using a clearance. Diablo Canyon management supports this decision.

Based on a recent review of other high performing nuclear facilities clearance and work completion practices, including discussions with their subject matter experts in these areas, Diablo Canyon management has determined that DCPP practices are consistent with those in use elsewhere in the industry. Typically decisions regarding when a clearance is utilized vs. when work will be completed by the work order/configuration control technique are left solely to the discretion of Maintenance and Operations supervision.

3. Two violations of the requirements of AD7.ID1 by Maintenance personnel **did** occur in that the work order was not properly modified before work performance and the work order steps were not properly dispositioned prior to the end of shift during which the work order was completed. No violations of procedural requirements other than these occurred.

4. Management expectations were met in that the proposed work and work methods were well thought out and thoroughly discussed prior to implementation by the Operations crew and Maintenance personnel. Review of the clearance procedures was utilized to supplement memory during the discussions. Subject matter experts were also utilized in the form of Maintenance personnel to assure all requirements of the work order process were completely addressed. The work was completed with the fewest possible

number of man-trips up and down the ladders to the work area and therefore the lowest exposure to safety hazards and radiation was achieved.

5. Management expectations were met in that work methods utilized to perform the work were immediately documented on an AR. Management's expectations were **not** met, however, with regard to the clarity, tone and accuracy of the information presented in the AR. It is management's expectation that when work methods are changed from those originally proposed, the changes made and the reasons for those changes are properly documented. This assures that similar work in the future is planned in a similar manner using available lessons learned.

3.4 Corrective Actions

Completed

1. Management has assured that members of the Maintenance Department are aware that when changes are required to work order steps the steps must be changed prior to performance of work.

2. Management has assured that members of the Maintenance Department are aware that documentation for steps of a work order completed on a shift must be completed prior to the end of the same shift. In addition, the TM Foreman involved has been disciplined for failing to appropriately comply with this procedural requirement.

3. A self assessment of work orders was conducted to verify that work order changes are processed correctly and timely sign-off is accomplished. No discrepancies were identified in the assessment which was completed on August 14, 1998.

4. The SFM who wrote the AR as well as the involved SS have each been coached and counseled regarding compliance with procedures in the area of work order modification prior to implementation. They have also received instruction on the proper use of AR's and the clarity, tone and accuracy required when they are written.

5. The personnel records of the involved operators have been corrected to reflect what actually occurred. All of the involved operators have already been fully reinstated to crew duties.

6. A NCR has been initiated to evaluate and validate the comprehensiveness of the conclusions and corrective actions. The NCR will also provide a vehicle to track and report progress of corrective actions.

Future

This event and its lessons will be presented to all Operators during Operations Continuing Training as part of recent industry events.

4. ANALYSIS OF EVENT RESPONSE

4.1 Background

On 8/5/98, in preparation for the enforcement conference, a concern was raised that the cause analysis that formed the basis of the corrective actions to prevent recurrence was potentially flawed.

The purpose of this section is to:

- Present a detailed chronology and analysis of the PG&E response to the steam leak repair work performed on December 15, 1997,
- Describe the initial investigation that evaluated the concern that the original cause analysis was faulted,
- Provide an analysis of the reasons for the faulted cause analysis,
- Provide the corrective actions to be taken to address the deficiencies that resulted in the erroneous causal conclusions,
- Provide an analysis of the timeliness of the initial corrective actions taken as a result of this event.

4.2 Evaluation

4.2.1 Post Event Response Timeline

Subsequent to the steam leak repair event that occurred on December 15, 1997, a number of actions were taken. These actions were primarily driven by the event as described in AR A0449239. A detailed timeline describing the actions that resulted from this initiating event was constructed based on review of documents and interviews with involved personnel. In addition to actions taken by PG&E, the timeline reflects key actions associated with the NRC investigation and inspection into the issue. The timeline of actions following the December 15, 1997 event is presented in Appendix 4.2-1.

4.2.2 Investigation of Concern That Cause Analysis Was Faulted

On 8/5/98, based on conflicting information pertaining to the Root Cause Analysis for QE Q0011991, the SVP-NPG requested an investigation to determine if the conclusions of that analysis were valid.

A panel was formed to review the information and to interview personnel involved in the leak repair job on 12/15/97 (AR A0449092, C0155758). Specifically, the panel was asked to determined if any individuals involved in that work assignment believed that they were willfully violating plant procedures or acted in a manner of

willful procedure violation. Additionally, the panel interviewed the Operations management staff that performed the initial investigation, and interviewed the root cause evaluator. The evaluation was conducted 8/6/98 through 8/10/98. This subsection summarizes the methodology, conclusions and recommendations associated with this management evaluation.

Methodology

The investigation into the determination of the validity of the analysis began by a review of the applicable documentation as follows:

- QE Q0011991, "Intentional Procedure Deviation."
- AR A0449239, "Intentional Procedure Deviation."
- Work Order C0155758.
- NQS cause analysis report of 2/25/98.
- NRC Office of Investigation Transcripts for SS,SFM and Utility SCO (with their permission).
- Mike Craig's written statement regarding intended meaning of words and phrases in A0449239.

After the documentation review, formal interviews were conducted of all key personnel involved with the steam leak repair activity of work order C0155758. Personnel interviewed were:

David Patty	Shift Supervisor
Mike Craig	Shift Foreman
Brian Leader	Senior Control Operator
Steve Hiett	Operations Director (by phone)
Jim Dye	Operations Clearance Coordinator
Frank LaCross	Maintenance Foreman
Ron Greenlee	Maintenance Technician (by phone)
Jim Belken	Maintenance Technician
Bill Blunt	Root Cause Evaluator (by phone)
Terry Shelburne	Maintenance Foreman (by written statement)

Conclusions

Based on the information provided by the interviewees and a review of the above mentioned documentation, the panel concluded that there was no intention to violate procedures by the Shift Foreman or anyone else involved in the work task on December 15, 1997. Therefore, the root cause for QE Q0011991 was in error.

Actions Taken

The Panel initiated a formal investigation into why the initial cause analysis came to the wrong conclusion, and to determine appropriate action PG&E should take for the faulted cause analysis. Refer to section 4.2.3.

4.2.3 Evaluation of Faulted Cause Analysis

Purpose

The original cause analysis was performed by an NQS Cause Advisor for QE Q0011991, "Intentional Procedure Deviation," during the week of February 16, 1998. This cause analysis was performed at the request of Operations management. At a meeting with the Operations Director and the QE owner on February 13, 1998, the scope of the analysis and problem statement were discussed and agreed upon. The problem statement was identified as, "Operations Crew Management intentionally deviated from administrative procedures."

It has since been determined that this analysis was faulted.

The purpose of this cause analysis is to determine how and why the original cause analysis for the subject QE was developed and issued with faulty conclusions. This analysis concentrates on events and actions taken from December 16, 1997 (the day after the event) through February 25, 1998 (the day the original cause analysis was issued).

Methods

Evidence and information used to conduct this analysis was obtained primarily through interviews with cognizant personnel associated with the original event and personnel taking actions in response to the original event on December 15, 1997.

An event and causal factors chart was developed during the course of this investigation. Personnel statements were initially obtained from those identified as having potential involvement with the original event or subsequent cause analysis.

Conclusions

The overriding or primary cause of this event has been determined to be:

The Operations Organization failed to fully investigate, understand and agree on the true nature of this event which embedded a faulted mindset of "intentional" violation in all involved decision makers.

There are numerous conditions and contributing factors which both resulted in, and were a result of, the condition stated above. These factors are:

- On December 15, 1997, an Action Request was initiated to document the activities associated with a maintenance activity. The AR contained inflammatory language and was not fully indicative of the true course of actions taken on December 15, 1997, and the intentions of shift personnel.
- An objective investigation and evaluation of the events to determine what happened on December 15, 1997, was not conducted until late July 1998, well after the date of the cause analysis.
- Key supervisory personnel involved in the original event were conditioned to accept full responsibility for actions and intentions which were later determined to have not occurred, or been present on December 15, 1997.
- Communications failed in that, as facts related to the original event were uncovered, they were not adequately documented in the original AR, or QE, or not made available to the cause analyst.
- The nature of the problem and the process involved was complex and governed by multiple administrative procedures. This process and the implementing procedures contained a level of ambiguity that allowed differing interpretations of actual requirements.
- The corrective action process did not ensure that an investigation and analysis were performed to the extent required to come to accurate conclusions. An inaccurate problem statement contributed to a cause analysis with faulted conclusions.

The following sections will explain in further detail how these conditions affected the final results of the analysis performed for QE Q0011991.

Action Request Misleading

Action Request A0449239 was written to document the sequence of events leading to the decision to perform scheduled maintenance in a manner that differed from the original plan. For reasons stated in the AR, a plan was developed that resulted in not utilizing the clearance that had been prepared in conjunction with the Work Order. This AR played a key role in subsequent perceptions of management personnel and prompted specific actions. The AR was inflammatory in nature and somewhat misleading in that the wording was intended to elicit a response from personnel responsible for the clearance and work control processes. Although the author chose specific wording to include in the AR, the meaning of this wording was taken in a literal sense by most, if not all, who subsequently reviewed it. Most notable is the title of the AR, "Intentional Procedure Deviation." All personnel contacted during this investigation concur that these words connote a knowing, willful violation of procedural requirements. However, it has been emphatically stated by the author that the title was **not** intended to communicate this message. He also agrees now that this choice of words was extremely poor. The causes of this AR being worded as such were identified as follows:

- The original cause analysis identified some conditions which are still considered to be germane to this event. One was growing frustration with the work control process and complexity of the clearance process in general. Previous discussions between the author and the clearance process owner had not resulted in actions to incorporate desired changes. This AR was originally seen by the author as a vehicle to document viable alternatives to the clearance process in special situations where use of the clearance process was viewed as cumbersome and overly complex by the SFM.
- As the AR was being written it became more personal in nature as the emotions of the author began to surface. This resulted in what amounted to a personal "poke" at the clearance process owner. The author has since acknowledged that this was inappropriate.
- The original intent of the AR, a request for an evaluation of the alternate process actually used, was never explicitly communicated. The AR appeared to be reporting a procedure violation. As a result, the intended purpose of the AR was lost on those reviewing it in subsequent days.

Thus the inflammatory wording in this AR was responsible to a great extent for the immediate and severe verbal reprimands administered by Operations management personnel. It also created a mindset in parts of the organization that some intentional violations had been committed on December 15, 1997.

Objective Investigation of What happened on December 15, 1997

DCPP failed to perform an objective review of actions taken on December 15, 1997, to establish the basis and validity of Action Request A0449239 until July 22, 1998. The exact cause of this failure could not be explicitly determined. There are several factors that are related to this failure; however, a cause and effect correlation could not be firmly established. These factors are as follows:

- The Operations Director felt he understood the issues involved well enough at the time and decided to let the QE run its course and resolve the problem.
- The involved SS and SFM did not take it upon themselves to adequately describe their actions, motivations and intentions to management. This was caused primarily by the "conditioning" described later in this report that they had done something wrong.
- For most events involving Operations personnel, the general responsibility for collecting personnel statements and other supporting evidence immediately following an event lies with the SS. On the date of the initial event, there was no recognition of the need for collecting this information since there was no recognition of an actual problem. During the days following December 15, 1997, the SS did not recognize the need, since he had already been disciplined and had accepted responsibility. (A result of "conditioning" noted later.)

- Although required by PG&E's Positive Discipline Program, a thorough investigation was not performed immediately since it was felt that the AR provided a clear picture of the actions taken. In addition, verbal reprimands administered on December 16, 1997, and the following week were not formally documented as positive discipline. The recipients of this discipline certainly perceived the discussions with their supervision as disciplinary in nature and responded accordingly.
- Likewise, the cause analysis performed by NQS, as discussed later, contributed to the organization not determining what the SFM and SS thought they were doing on December 15, 1997.

"Conditioning" of Personnel

Key personnel involved with the original event, specifically the SS and SFM, accepted responsibility for the perceived procedure violation(s) almost immediately. This acceptance contributed to the difficulty in determining whether specific procedural requirements had indeed been violated. This also affected the cause analysis process as described later in this analysis. The factors that allowed and resulted in this conditioning are as follows:

- It was the nature of the SS, as the senior operations management person on shift, to accept full responsibility for his and his crew's actions. This willingness to accept responsibility was certainly heightened by his personal involvement in the decision making process during the activities of December 15, 1997.
- The SFM had stated during the discussions preceding the maintenance activity that he would accept full responsibility for the decisions made concerning the methods actually employed to perform the maintenance activity.
- Following the decisions to proceed with activities described in A0449239, the SFM began to harbor self doubt regarding the absolute validity of the logic employed to plan and conduct the maintenance activity. Upon being counseled the following day, he accepted responsibility for violating procedures with little questioning.
- The nature of the reprimands received in the days immediately following left little opening for rebuttal. Both personnel stated that they recognized they were being disciplined for a procedure adherence issue and, recognizing the seriousness of the situation, chose not to "push back."
- Numerous ongoing communications regarding procedure adherence within the Operations section, both as a result of this event and as a matter of dedication to procedure adherence in general, tended to reinforce their acceptance of responsibility.

Communications and Documentation

Communications regarding the original event failed to relate certain key elements and information to appropriate personnel. As understanding of the original event was unfolding, the AR and QE were not updated to reflect key information. Specifically, the conclusion by some personnel that in fact there were no apparent procedure violations was not documented or communicated. It is difficult to ascertain exactly when this conclusion was reached. This may be due to the lack of consensus within the Operations organization concerning the acceptable methods of performing this type of maintenance activity with or without a clearance. It has been determined that in the weeks following December 15, 1997, the exact nature of the implied procedure violation could not be positively characterized. Communications regarding this event to remaining Operations section personnel were of a generic nature and tended to further cloud the issue. Had communications been more specific, it is possible that someone would have identified or understood what actually happened on December 15, 1997, and properly characterized the issue at an earlier date.

One negative impact of these communications failures, was on the cause analyst. He developed a mindset based on the AR, a meeting with Operations management personnel, and in his mind a lack of contrary information which resulted in him analyzing an action that in fact did not occur (intentional procedure violation).

Complexity of Issue

The work control process is complex in nature and governed by multiple administrative procedures. Clearances, which are a sub-process of the overall work control process, are themselves complex and are implemented by various individual procedures. These procedures contain a level of ambiguity that allows more than one path to follow depending on how one approaches each decision point. This complex series of decisions resulted in a plan to perform the scheduled maintenance, which appeared, after the fact, to conflict with expectations and actual procedural requirements.

Operations management personnel reviewing the actions stated in the AR had difficulty arriving at an agreement as to what the "correct" path should have been. The complexities that were being reviewed after December 15, 1997, were the same issues that the control room crew had originally dealt with. Although the issue of actual procedure adherence was becoming less and less clear, the mindset of "intentional deviation" continued to manifest itself. This can be attributed to the language in the AR itself and the difficulty encountered in establishing the facts regarding procedurally allowed practices versus expectations of certain personnel.

Corrective Action Process

The corrective action process obviously failed to correctly identify, investigate and resolve the issues presented in AR A0449239. This discussion will center on the process and actions taken to implement that process in an effort to identify potential corrective actions.

- Level of identified quality problem (QE vs. Non-Conformance Report) - The primary factors that differentiate QE's and NCR's are safety significance and complexity of the problem. At the time of discovery it was recognized that the safety significance of the actions detailed in AR A0449239 was minimal. Due to the nature of the AR, the potential complexity of the issue was not recognized. In retrospect, the issue was more complex than anticipated. In addition, the corrective action process with regard to cause analysis is not well suited by itself to investigate and analyze actions that involve willful intent or deliberate violations. These types of issues present additional considerations above and beyond normal event investigations which focus on errors.
- Level of effort vs. safety significance - Level of effort associated with cause analyses is commensurate with safety significance in accordance with the governing procedure. In the case of QE Q0011991, level of effort was reduced in response to the simplistic nature of the problem statement and the apparent "admission" of wrongdoing by the SS and SFM. When the question of "why" they chose the actions they took resulted in more acknowledgment of wrongdoing, the investigation appeared to have played itself out and the level of effort expended seemed adequate.
- Documentation requirements - Although not specifically considered a factor in the resulting original analysis, the minimal documentation gathered and generated during the investigation made it difficult to reconstruct the original process used or to validate the conclusions. There are currently no requirements for the retention of evidence reviewed or generated (field notes) during an investigation with the exception of the final report.
- Validation of problem - Validation of the problem statement is a step that is performed periodically during the course of an analysis. Validation of an incorrect problem statement occurred as a result of the organization's mindset (based on AR wording) and a lack of any evidence or information to the contrary. Again, the failure to establish "what" happened contributed to this failure.
- Conduct of interviews - Interviews conducted by the cause analyst for QE Q0011991 were performed with personnel on watch in the control room or at their workplace during the beginning of an outage. Interviews are often conducted with personnel at their workstations to minimize the impact of the investigation on an organization. This is particularly true of Operations personnel as their availability is usually limited due to rotating schedules. While

this usually is not a limiting factor, in this case the sensitive nature of the interviews may have hampered a free flow of information. One individual indicated that had the interview been conducted elsewhere, he may have contributed more to the process. Level of effort and completion deadlines also dictate when and where interviews are conducted.

Cause Summary

The following causal factors were determined to have played a role in the failure of QE Q0011991 to adequately identify and resolve the intended problem(s).

- An Action Request was initiated which contained misleading language and was unclear in its intent.
- A thorough investigation into the facts was not performed in a manner which identified the true nature of the event.
- Personnel were conditioned to accept responsibility for questionable actions prior to determining the facts.
- Available information was not documented and communicated in a timely manner.
- A complex set of procedures did not clearly specify how situations of this nature were to be resolved.
- The corrective action process for this event was not implemented in a manner which provided a satisfactory outcome.

Corrective Actions

No single factor identified above is considered to be solely responsible for this event. It required a combination of unique but inter-related conditions to reach this end state. The following actions will be taken as part of an overall corrective action plan to prevent recurrence of similar events.

- The corrective action program will be reviewed with regards to initial quality problem level determination. Consideration will be given to assigning a higher level of problem classification if intentional or willful acts are reported or suspected.
- The importance of obtaining prompt statements from involved personnel will be reinforced with appropriate personnel.
- Supervisory personnel will be made aware of this event with emphasis on performing necessary investigations before administering disciplinary actions and on the potential results of improperly administered discipline.
- The importance of accurate reporting and timely updating with regards to Action Requests will be emphasized. Additional requirements or expectations on reviewing and routing Actions Requests should be considered.

- Lessons learned from this event will be developed and included in cause analyst training materials.
- Requirements and expectations with regards to performing maintenance activities with or without the protection of a clearance will be clarified.

4.2.4 Timeliness of PG&E Response

The purpose of this subsection is to provide conclusions as to whether the corrective actions for this AR and QE were timely and in accordance with the DCPP corrective action procedures. Specifically, were the immediate corrective actions and cause analysis timely. Additionally, this subsection provides:

- A brief overview of the DCPP Corrective Action Program.
- A detailed timeline of the Immediate Planned Corrective Actions (IPCA), cause analysis investigation, and Corrective Action to Prevent Recurrence (CAPR) development taken as a result of the AR A0449239 (Intentional Procedure Deviation).

Corrective Action Program Requirements:

There are three basic levels of Quality Problems at DCPP:

- Non-Conformance Report (NCR) which is used to address significant problems adverse to quality. This requires immediate corrective actions, cause analysis and corrective actions to prevent recurrence (CAPR). The NCR gets reviewed by the Plant Staff Review Committee (PSRC) at the 30-day point for status and must go back to PSRC for approval of the cause analysis, CAPRs and completion date. All NCRs are approved by a manager, monitored by the Corrective Action Group and corrective actions verified (when complete) by Nuclear Quality Services.
- Quality Evaluation (QE) is used to address a problem adverse to quality which deserves a cause analysis. There are no procedural time requirements on QEs. However, there is a management expectation that the cause analysis and corrective action plan be determined within 30 days. In most cases, QEs are initiated to supplement an "A"-type AR when management feels the corrective action process would benefit from a cause analysis. Most QEs require immediate corrective actions, cause analysis and CAPRs. All QE CAPRs are concurred with by NQS. This can be done prior to completion of the CAPRs. The verification that corrective actions have been completed is performed by the responsible organization.

- "A"-type Action Request (AR) is used to address a problem adverse to quality. There are no procedural time requirements on an "A"-type AR. Most "A"-type ARs require immediate corrective actions, but do not require a cause analysis or CAPRs. The verification of corrective actions is performed by the responsible organization.

The corrective action program utilizes an Action Request Review Team (ARRT). A group of management-designated representatives which review ARs on a routine basis. The ARRT is responsible for:

- Reviewing ARs to determine significance
- Performing the quality problem determination
- Identifying repetitive occurrences and adverse trends
- Ensuring immediate corrective actions are initiated as required
- Elevating concerns requiring further management attention
- Reviewing ARs with a quality problem determination pending over 30 days and reporting them as necessary to the Plant Manager

Detailed Timeline of Corrective Actions

December 15, 1997, Monday

Date of event; AR A0449239 initiated.

December 16, 1997, Tuesday

AR A0449239 reviewed by Action Request Review Team (ARRT) and pended to Belmont (NQS ARRT Representative and NQS, Acting Director, Operations and Strategic Programs) to discuss with Operations Management to request that a Quality Evaluation be initiated so that a Formal Cause Analysis could be performed.

The event was discussed with the involved SS (David Patty) and SFM (Mike Craig) by the Operations Clearance Supervisor (Jim Welsch) Operations Scheduling SS (Jim Dye) and Operations Director (Steve Hiett). Those discussions focused on the procedural methods available to accomplish the goals stated in AR A0449239 and pointed out the inappropriate nature of the actions taken that did not comply with procedures OP2.ID1 and OP2.ID2. This immediate corrective action was taken to prevent these supervisors from doing something similar. (These actions were documented in the Immediate Planned Corrective Action section of QE Q0011991 on March 4, 1998.)

December 17, 1997, Wednesday

Corrado Sansone (NQS, Corrective Action Group Engineer) entered in the AR that the issue was pended to Belmont.

Later on Tuesday or early on Wednesday, Belmont discussed the AR with Jim Molden (Operations Services Manager). Molden and Belmont agreed that this was a serious event and that a QE should be initiated to find out why the operating crew would intentionally deviate from the procedures. Belmont and Molden believed at the time that deviation meant violate the requirements of the procedure.

December 18-23, 1997 Thursday-Tuesday

Additionally "immediate corrective actions" took place during this period. The other crews shift supervisors were briefed by the Operations Director on the event and shown AR A0449239. They were reminded to ensure procedure adherence expectations were understood and followed by their shift foreman and crews. Emphasis was made that this event was an example of unacceptable procedural deviation and that as the senior management member on shift they were expected to have better judgment and they should not let something similar happen to them. This action was taken to assure that the correct procedures were followed and not deviated from. This action was completed within one week of the event due to crew schedules. (These actions were documented in the immediate planned corrective action section of QE Q0011991 on March 4, 1998.)

It took Belmont a couple of working days to contact Hiett and inform him that ARRT was going to initiate a QE. Saturday, Sunday and Monday are not normal work days, so Belmont did not get back to Sansone until Friday or Tuesday with the go ahead to initiate the QE.

There was no procedural requirement at the time to initiate the QE or perform the cause analysis within a prescribed time. Sansone made the entry in the AR on December 23, 1997, that a QE and formal cause analysis are required.

December 23-30, 1997, Tuesday -Tuesday

Sansone was assisted in writing this QE during this time frame by Rich Cheney and Mark Smith. Smith was Sansone's supervisor at the time and Rich Cheney is an NQS Operations Auditor who was considered to be very knowledgeable in the clearance area both from a Technical Maintenance and Operations standpoint. This was also the start of the holiday season and it should be noted that many personnel were not here during the remainder of December and early January. Wednesday, December 24, 1997, was a half work day, Thursday, December 25,

1997, was the Christmas holiday and Friday, December 26, 1997, many personnel, including Sansone, took as a day off. The next working day was Tuesday, December 30, 1997.

So, in actuality, there were only about two working days from when Sansone was assigned the task to initiate the QE and when it was actually initiated.

December 31, 1997 - January 12, 1998

At this point, we are still in the holiday season. Hiett was on vacation until the week of January 12, 1998. Hiett did not delegate his responsibility to his delegate in regard to this issue.

January 12-Febuary 8, 1998

There were no actions taken by Operations to either perform the cause analysis for QE Q0011991 or any requests made to the NQS Corrective Actions Group to perform the cause analysis. There was considerable discussion and debate going on at this time as to what the problem statement would be for the cause analysis. Some people thought the issue was related to the clearance process and procedures and some thought the issue was the intentional nature of the deviation and the question of what authority the SFM and SS had. Since these were very different issues it was very difficult to formalize a problem statement to perform a cause analysis. This contributed to the delay in performance of the cause analysis.

The other factor that contributed to the delay in initiating the formulation of the cause analysis was that the Operations Director thought the cause analysis was just a formality since he felt that he already understood the problem and had taken actions to prevent recurrence. The Operations Director felt the immediate corrective actions taken by Operations addressed the individuals involved and addressed the other crew's SFM and SS.

February 9, 1998

Bill Blunt (NQS, Human Performance Coordinator and Cause Advisor) approached Molden on this day and offered assistance with the cause analysis for QE Q0011991. Molden accepted and sent Blunt to Dye, the owner of the QE. Blunt met with Dye and they agreed to discuss the issue further during a meeting scheduled for February 13, 1998.

February 11, 1998

The event associated with AR A0449239 was discussed at the Plant Director's meeting prior to 2R8 to inform other Sections of the concern Operations had about procedural adherence and to ask their cooperation to not place additional pressure on Operations when they are informed that a procedure adherence issue is slowing work activities. (This entry was made in QE Q0011991 in the corrective action to prevent recurrence CAPR section on March 4, 1998.)

February 13-19, 1998

The Operations Director discussed the event and procedure adherence expectations with all crews in pre-2R8 tailboards. This event was characterized as an example of an unacceptable procedural deviation. Additional emphasis was placed on the fact, as it related to clearances, that we can not take any risk that could lead to an event that would cause personal harm or damage our respect within the community as well as our self-confidence and respect with the regulator. An NRC Inspector observed the last tailboard. This action was completed on February 13, 1998. (This entry was made in QE Q0011991 in the corrective action to prevent recurrence CAPR section on March 4, 1998.)

February 13, 1998

Blunt starts cause analysis for QE Q0011991. A meeting was held on this day with Dye, Hiett and Blunt to discuss plans for the cause analysis. Additionally, they discussed the corrective actions already taken, the cause analysis due date, which was established as the end of February, and the problem statement. Blunt got the crew schedules and began the interview process on the following Monday, February 16, 1998.

February 16-18, 1998

Blunt begins cause analysis investigation, interviews involved individuals.

February 20, 1998

Blunt completes cause analysis.

Powers (VP and Plant Manager), Hiett, and Molden meet to discuss preliminary cause analysis and what discipline will be administered to involved parties.

February 21-23, 1998.

Operations Director administered discipline at the written reminder level to SS and SFM involved. (This action was documented in CAPR section of QE Q0011991 on March 4, 1998.)

The SFM (February 21, 1998) and SS (February 22, 1998) involved were relieved of licensed duties pending completion of a remediation program. (This action was documented in IPCA section of QE Q0011991 on April 25, 1998.)

February 25, 1998

Formal Cause Analysis issued. Corrective actions to prevent recurrence were developed based on this cause analysis. (Long term CAPRs were documented in the QE on April 25, 1998, and June 9, 1998.)

February 26, 1998

E-mail sent by the Operations Manager to all Operations personnel discussing this incident and management expectations for procedural adherence. This was documented in the IPCA section of QE Q0011991 on April 25, 1998.

March 4, 1998

The Operations Director initiated development of a remediation program, supervised by Glen Goelzer (SS), for the SS and SFM involved. Program development was completed and approved on March 4, 1998. (This was documented in the QE CAPR section on March 4, 1998.)

Conclusions

Based on the timeline, the **immediate** corrective actions for this AR and QE were considered timely given what PG&E management believed to be the problem. Specifically, communications occurred with the involved shift management and other Operations shift management regarding the event and the expectations to prevent any future occurrences of the same or similar event. However, the documentation of these actions was less than adequate in that while these actions were taken in a timely manner, they were not documented until March 4, 1998. In addition, there were actions taken over the course of the next two months that were not documented until the first week of March and then later in May and June.

While there is no time requirement for the completion of a cause analysis, NQS believes that the cause analysis for this QE was **not** timely. The QE procedure states that the cause analysis and corrective action plan should be determined in 30 days. This is a management expectation. The cause analysis was not assigned and completed for approximately 60 days. The delay of the first 30 days is in large part due to the slow initiation of the QE and the unavailability of personnel during the holiday season. However, if the issue had been determined to have been more significant in nature, then this unavailability would not have been an issue. The reason Operations Management did not consider timeliness of this QE an issue was that they felt they understood the cause and had taken sufficient immediate corrective actions to mitigate any further consequences for this issue. With this assumption of understanding this issue and it's cause, the Operations Director felt no real time pressure to assign and complete the cause analysis.

While no program requirements were violated during the processing of this QE, there is definite room for improvement.

It should be noted that this issue, from the onset, was not determined to be a significant problem adverse to quality. This determination is based on the low safety significance of the event itself. This is the reason a QE was initiated instead of an NCR. If the determination had been made that this event was significant due to the believed "willfulness" of the reported procedure deviation, a Non-Conformance Report (NCR) would have been initiated. If an NCR would have been initiated then more stringent time requirements would have applied and a higher level of management review would have been required. This should be considered as a "lesson learned." While this issue does not clearly meet one of our criteria for an NCR, when there is a potential willful act, such as an intentional procedure deviation, then it is prudent to initiate an NCR to investigate and resolve the issue.

APPENDICES

3.1-1 Steam Leak Repair - Applicable Program Requirements
3.2-1 Steam Leak Repair - Valve Diagram
4.2-1 Steam Leak Repair - Event Response Timeline

Steam Leak Repair - Applicable Program Requirements

Department Level Administrative Procedure (DLAP) OP1.DC18, "Authorization For Equipment Operations And Maintenance," Revision 3

OP1.DC18, describes the plant policy on who is authorized to manipulate plant equipment and controls during normal plant operation and during outages. Guidance is also provided on how authorization to perform maintenance and testing on plant equipment is obtained during various plant operational modes.

Step 2.1 states, "It is an established operating philosophy that all plant equipment is to be operated only by properly authorized personnel."

Step 5.1 states, "Plant equipment which is in service (not cleared and tagged in accordance with OP2.ID1/OP2.ID2) shall only be operated by plant Operations personnel who are authorized to operate such equipment." This statement forms the basis which allows Operators to manipulate plant equipment. Operators are authorized by this statement to accept direction from their supervision to manipulate plant equipment.

Step 5.3 states, "Whenever plant equipment is to be removed from service for maintenance ..., written authorization from the appropriate Unit Shift Foreman must be obtained prior to the removal from service." Per steps 5.3.1 and 5.3.3, authorization for removal from service may be accomplished with clearance (step 5.3.1) or without clearance and use of a work order (step 5.3.3).

Program Directive (PD) OP2, "Tagging Programs," Revision1

OP2 establishes requirements for the clearance and tagging of operating equipment at Diablo Canyon Power Plant. Step 4.2.1.h requires that, "The scope of systems and equipment at DCPP for which clearances must be obtained prior to performing work shall be clearly defined."

Inter Departmental Administrative Procedure (IDAP), OP2.ID1, "Clearances And Administrative Tagouts," Revision 8

The primary purpose of OP2.ID1 is to control the process that isolates plant equipment from sources of energy to allow safe work. The procedure does not contain reference to a scope of systems and equipment for which clearance must be obtained prior to performing work.

Steam Leak Repair - Applicable Program Requirements (cont)

IDAP OP2.ID2, "DCPP Tagging Requirements, Revision 6

OP2.ID2 identifies the type of tags used at DCPP and specific instructions for use of each tag.

Step 2.1 indicates certain types of tags, "...(Red and Man On Line) are used to mark working area boundaries defined through a clearance process...."

Step 5.3.1 states, "MOL Tags on plant equipment shall be hung by plant Operations personnel under the direction of the Shift Foreman."

Step 5.3.2 contains additional guidance for hanging MOL Tags. In step 'b' it states, "MOL Tags shall only be used on Master Clearance points." In step 'c' it states, "MOL Tags shall only be used to identify devices which are positioned to prevent flow of liquids, steam or electrical power in order to place equipment in a safe condition for maintenance...."

Step 2.2 indicate tags such as Caution Tags, "... are used to identify or administratively control the operating status, position, or condition of installed equipment.

Step 3.2 states, "The Caution Tag is used to mark equipment which is not cleared, but for other reasons is not to be operated except upon specific instructions from the individual named on the tag.

Step 5.5.1 states, "Caution Tags shall be hung by personnel who are responsible for carrying out the procedure requiring the tag (e.g., Operations personnel hang tags involved with clearances..., TM personnel hang tags involved with instrumentation work, etc.)."

IDAP CF4.ID5, "Configuration Control During Maintenance Activities," Revision 2

The purpose of the procedure is to provide a method to document authorized changes to plant equipment where provision for documentation has not been provided by a governing procedure, loop test or work order.

Per step 1.1, typical documentation activities covered by this procedure include valve manipulations and hanging tags.

Per step 1.2, authorization to make changes to plant equipment is given in OP1.DC18, Authorization for Equipment Operations and Maintenance.

Steam Leak Repair - Applicable Program Requirements (cont)

The Configuration Control Sheet (Form 69-11636) is included in this procedure. The configuration control sheet is used in conjunction with a work order. Page 2 of the configuration control sheet includes tables in which component position and tag hanging/removal are documented.

IDAP AD7.ID1, "Use of PIMS Work Order Module," Revision 2

AD7.ID1 provides instructions for implementation of the Plant Information Management System (PIMS) work order module.

Step 4.7.2 states, "Work shall be performed in accordance with the instructions provided by the W/O [work order]".

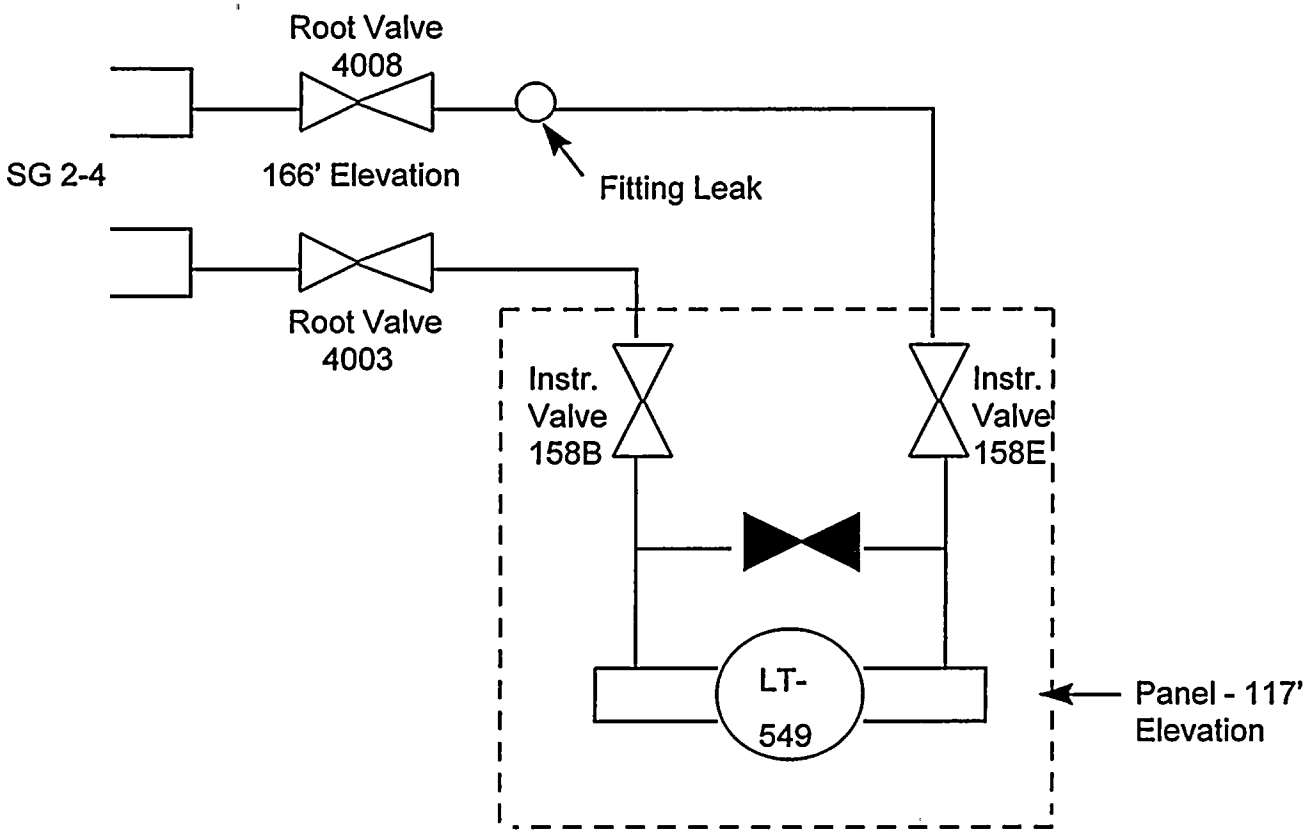
Step 4.7.9 states, "W/OA [work order activity] steps shall be signed off, initialed and dated, as soon as practicable after work completion. Do not delay signing off a completed activity beyond the end of the work shift in which the activity was completed."

Step 4.8 contains instructions which allow changes to be made to work orders. Hard copy work order changes are covered in step 4.8.3. Step 4.8.3.c states, "Changes involving Technical Instructions...require Foreman, Planner, Engineer (or designee) approval depending on the scope of change."

IDAP AD2.ID1, "Procedure Use and Adherence," Revision 5

Step 2.1 states, "It is the policy of NPG that the use of, and adherence to, approved written procedures for the accomplishment of work activities is a necessary ingredient to consistently achieving the goal of performing such work in a safe, professional and efficient manner. In accordance with this policy, the overall objectives are:

2.1.2 Personnel adhere to procedures and employ their knowledge and a questioning attitude in order to identify possible errors in procedures, or possible improvements in procedures."


Root Valve
4008
SG 2-4
166' Elevation
Fitting Leak
Root Valve
4003
Instr.
Valve
158B
Instr.
Valve
158E
LT-
549
Panel - 117'
Elevation

Steam Leak Repair Event Response Timeline

Date	Action
12/15/97	Event occurred. Steam leak repair performed inside Unit 2 containment. AR A0449239 initiated to document the decision to perform the steam leak repair without the use of clearance request 57115 accompanying work order C0155758. Action characterized in AR as "intentional procedural deviation."
12/16/97	Operations Manager (Molden) made aware of AR and reinforced unacceptability of actions as described in the AR to Operations Director (Hiett). Operations Manager requested that a Quality Evaluation (QE) be issued. Based on wording in the AR, Operations Manager was convinced that an intentional procedure violation had occurred.
12/16/97	Unacceptability of procedural deviation discussed with the involved SS (Patty) and SFM (Craig) by the Operations Clearance Supervisor (Welch), Operations Scheduling SS (Dye) and Operations Director. The discussions focused on the procedural methods available to accomplish the goals stated in AR A0449239 and pointed out the inappropriate nature of the actions as described in the AR that did not comply with procedures OP2.ID1 and OP2.ID2. This action was taken to prevent these supervisors from taking similar actions in the future. Reinforced with SS the seriousness of the event (bad judgment) and the fact that as the senior management member on shift he should have prevented these actions.
12/16/97	Initial AR Review Team (ARRT) review of AR A0449239. AR pended to NQS to discuss with Operations management. The intent was to request that a QE be initiated so that a formal cause analysis could be performed.
12/16/97 - 12/22/97	Operations Director discussed the event with remaining crew SS and showed them AR A0449239. SS's were reminded to ensure that procedure adherence expectations were understood and followed by their SFM and their crews. Emphasis was made that this event was an example of unacceptable procedural deviation and, as the senior management member on shift, they were expected to have better judgment and they should not let something similar happen to them.

Steam Leak Repair Event Response Timeline (cont)

This action was taken to ensure that the correct procedures were followed and that deviations did not occur. This action was completed within one week of the event. Operations Manager, Operations Director, and Operations Scheduling SS reviewed procedures and came to the preliminary conclusion that no clear violation occurred. Operators' "intent" remained an issue.

12/17/98	AR A0449239 updated to reflect initial ARRT review.
12/18/98	NQS Acting Director (Belmont) discussed AR A0449239 with Operations Manager. Operations Manager and NQS agreed that this was a serious event and that a QE should be initiated to find out why the operating crew would intentionally deviate from the procedures. NQS and Operations Manager believed at the time, that the terms "deviation" and "violation" were synonymous relative to procedural compliance.
12/23/97	Entry made in QE that ARRT had determined that a QE and formal cause analysis are required. It took NQS a couple of working days to contact Operations Director and inform him that ARRT was going to initiate a QE. NQS did not get back to the ARRT until December 19, 1997 or December 23, 1997 with the go ahead to initiate the QE (December 20, 21 and 22, 1997, are not normal workdays.).
12/30/97	QE Q0011991 initiated. It should be noted that Wednesday (December 24, 1997) was a half work day, Thursday (December 25, 1997) was the Christmas holiday and Friday (December 26, 1997) was taken as a day of vacation by many. The next working day was Tuesday (December 30, 1997). Therefore, there were only about two working days from when Sansone was assigned the task to initiate the QE and when it was actually initiated.
1/1/97 - 1/9/98	Operations Director on vacation. The responsibility for following up on QE Q0011991 was not specifically delegated during this time.
1/98-2/98	Operations Manager discussed the December 15, 1997 event in Friday operator requalification training sessions. Discussed the facts of the event, the need to follow procedures, and the fact that human Man-On-Line (MOL) tags are not allowed.
1/98-2/98	Ongoing discussions between two camps regarding event characterization: The Technical/Process camp believed that the event was not significant since the method used to do the work was very close to existing work order and clearance processes. The Procedure Compliance camp believed that the event was very significant since a willful procedure violation was stated in the AR to have occurred.

Steam Leak Repair Event Response Timeline (cont)

	NQS reminded Operations of the need to resolve Q0011991.
1/29/98	NRC Senior Resident (Proulx) requested information regarding corrective actions for Q0011991.
2/9/98	NQS met with Operations Manager to discuss providing assistance with root cause analysis.
2/11/98	Event discussed at Director's Meeting prior to 2R8 to inform other sections of the concern Operations had about procedural adherence and to ask their cooperation to not place additional pressure on Operations when they are informed that a procedure adherence issue is slowing work activities.
2/13/98	AR A0449239 issue added to the NRC Open Issues List to be tracked as an NRC inspection issue.
2/13/98	Cause analysis initiated. NQS Cause Analyst (Blunt) met with Operations management personnel to discuss the event.
2/13/98	Operations Director discussed the event and procedure adherence expectations with all Operations crews in pre-2R8 tailboards (completed on February 13, 1998). This event was characterized as an example of an unacceptable procedural deviation. Additional emphasis was placed on the fact, as it related to clearances, that we cannot take any risk that could lead to an event that would cause personal harm or damage our respect within the community as well as our self-confidence and respect with the regulator. An NRC Inspector observed the last tailboard.
2/14/98	Initiated process for management review of errors as they occur. Investigative actions are initiated immediately leading to more timely corrective and disciplinary actions. Errors discussed at daily Plant Manager's meeting.
2/16/98-2/18/98	NQS cause analysis interviews conducted. Interviews were conducted with involved SS, SFM, Utility SCO (Leader), U-1 SCO (Koehler), TM Foreman (Shelburne), and TM Technician (Greenlee).
2/17/98	Operations shift order issued with incident summary.

Steam Leak Repair Event Response Timeline (cont)

2/20/98	Draft of NQS cause analysis given to Operations Manager. Plant Manager, Operations Manager, and Operations Director met to discuss preliminary cause analysis and what discipline will be administered to involved parties.
2/20/98	SS and SFM called in to talk to VP and Plant Manager (Powers), Operations Manager, and Operations Director. The purpose of the meeting was to obtain SS and SFM commitment to procedure adherence.
2/20/98	Operations Director initiated development of a remediation program for the SS and SFM involved.
2/21/98	Positive discipline written reminder - SS
2/21/98	SFM removed from shift.
2/22/98	SS removed from shift.
2/23/98	Positive discipline written reminder - SFM.
2/25/98	NQS cause analysis issued.
2/26/98	E-mail sent by the Operations Manager to all Operations personnel discussing the December 15, 1997 incident and management expectations for procedural adherence.
3/4/98	Remedial training record issued - SS.
3/4/98	Remedial training record issued - SFM.
3/5/98	First set of OI interviews conducted. Personnel interviewed - S. Hiett, D. Patty, and M. Craig. PG&E Legal counsel (Locke) was in attendance.
4/1/98	Second set of OI interviews conducted. Personnel interviewed - B. Blunt, J. Dye, D. Patty, and M. Craig. PG&E Legal counsel (Locke) was in attendance for all but a portion of M. Craig's interview.

Steam Leak Repair Event Response Timeline (cont)

4/28/98	Third set of OI interviews conducted. Personnel interviewed - B. Leader and D. Koehler. PG&E Legal counsel (Locke) was in attendance.
5/15/98	In the IR 98-08 exit, D. Proulx announces upcoming special inspection of the intentional procedure deviation.
5/21/98	New Operations Director (Garrett) initiates detailed review of procedures in preparation for special inspection.
5/26/98	Presentation made to NRC by Operations Manger and Operations Director at entrance meeting for special inspection.
5/26/98-5/28/98	Special Inspection conducted by Dyle Acker (lead) and Ryan Lantz of the NRC. During inspection, Operations Manger/Operations Director, recognize that no Operations procedure deviations occurred on December 15, 1997.
5/28/98	Briefing conducted at conclusion of special inspection identifying three potential violations - clearance process, work order process, and untimely corrective actions.
6/2/98	Meeting held between D. Acker, W. Garrett, T. King, and S. Ketelsen. NRC intends to pursue the clearance issue as a TS 6.8.1 violation based on inadequate procedures for doing clearances. Dyle Acker also made a distinction between "minor operation" and closing a valve as a clearance point. Dyle noted for the first time that the report may be critical of the Utility SCO (Leader) also.
6/4/98	Telecon between H. Wong, J. Pellet, J. Molden, W. Garrett, D. Christensen revealed difficulties by PG&E and NRC in clearly defining the nature of the clearance/tagging procedure violations. PG&E was willing to accept a violation if it were clearly defined such that Operations personnel could understand and learn from it.
6/5/98	Meeting between D. Acker and S. Ketelsen. D. Acker indicated that the potential clearance violation would be for using Valve 2-4008 for personnel protection isolation without using an MOL tag and associated clearance.

Steam Leak Repair Event Response Timeline (cont)

7/2/98	Telephone exit for the special inspection conducted by H. Wong and R. Lantz identifying two apparent violations and the need for a pre-decisional enforcement conference.
7/22/98	W. Garrett, during meeting with SS, SFM and Utility SCO, determined that what Mike Craig was attempting to document in the AR he wrote was not an intentional violation of clearance or work order control procedures, but was a deviation from the practice of using a clearance for work where it 'normally' would have been considered necessary.
8/4/98	OI transcripts for SS, SFM, and Utility SCO provided by operators to PG&E.
8/5/98	The enforcement conference preparation team led by SVP-NPG (Rueger), during meeting with SS, SFM and Utility SCO, determined that and intentional procedure violation may not have occurred. Reinvestigation was initiated.

ACTION REQUEST A0449239

PG AND E *** ACTION REQUEST *** PAGE: 01

A/R NUMBER : A0449239 A/R AGE: 00245 A/R STATUS : ROUTED
A/R TYPE : AT EVAL STATUS DATE : 16DEC97
REQST GROUP: PGOF DATE REQUIRED: 15FEB98
SUBGROUP : PRINT DATE : 17AUG98
REQST ID : MEC2 CONTACT: JIM DYE AT: 3555

A/R SUMMARY: INTENTIONAL PROCEDURAL DEVIATION

THE UNIT 2 SFM AUTHORIZED A SPECIFIC DEVIATION FROM THE	MEC2	15DEC97
ADMINISTRATIVE PROCEDURES FOR BOTH CLEARANCES (OP2.ID1)	MEC2	15DEC97
AND TAGGING (OP2.ID2) IN THE PROCESS OF PERFORMING A LEAK	MEC2	15DEC97
REPAIR ON AN INSTRUMENT LINE COMING OFF OF STEAM GENERA-	MEC2	15DEC97
TOR 2-4. THE LEAK WAS DOCUMENTED ON AR A0449092, WORK	MEC2	15DEC97
ORDER C0155758 WAS CREATED TO CORRECT THE PROBLEM, AND	MEC2	15DEC97
CLEARANCE REQUEST 57155 WAS WRITTEN TO ISOLATE THE LEAK	MEC2	15DEC97
FOR THE NECESSARY REPAIRS. AFTER DISCUSSION WITH THE	MEC2	15DEC97
TECHNICIANS WHO WOULD BE TAKING THE AFFECTED CHANNELS OUT	MEC2	15DEC97
OF SERVICE, THE TECHNICIANS WHO WOULD BE PERFORMING THE	MEC2	15DEC97
ACTUAL REPAIRS, THE FOREMAN FOR BOTH SETS OF TECHNICIANS,	MEC2	15DEC97
THE OPERATORS WHO WOULD BE INVOLVED IN THE EVOLUTION,	MEC2	15DEC97
BOTH IN THE CONTROL ROOM AND IN CONTAINMENT, THE SHIFT	MEC2	15DEC97
SUPERVISOR ON DUTY AND THE UNIT 2 SHIFT FOREMAN, IT WAS	MEC2	15DEC97
DECIDED THAT IN THE INTEREST OF ALARA AND PERSONNEL	MEC2	15DEC97
SAFETY THAT A DEVIATION FROM THE NORMAL METHODS OF	MEC2	15DEC97
CORRECTING THE PROBLEM WOULD BE USED. UNDER NORMAL	MEC2	15DEC97
CONDITIONS, 2 OPERATORS WOULD BE USED TO ENTER CONTAIN-	MEC2	15DEC97
MENT, ISOLATE THE COMPONENT, HANG AND VERIFY THE CLEAR-	MEC2	15DEC97
ANCE. 2 TECHNICIANS WOULD THEN ENTER CONTAINMENT AND	MEC2	15DEC97
PERFORM THE LEAK REPAIR. THEY WOULD THEN HAVE TO PERFORM	MEC2	15DEC97
A ROFT TO VERIFY THE ADEQUACY OF THE LEAK REPAIR, WHICH	MEC2	15DEC97
WOULD REQUIRE A SECOND ENTRY BY THE OPERATORS TO CUT IN	MEC2	15DEC97
THE ISOLATED LINE. THIS AREA IS A HIGH RADIATION AREA	MEC2	15DEC97
IN DIRECT LINE WITH THE REACTOR VESSEL, WITH HIGH TEMPER-	MEC2	15DEC97
ATURE CONDITIONS PRESENT, REQUIRING CLIMBING A LADDER	MEC2	15DEC97
FROM THE 140' DECK TO A PLATFORM ON THE 166' ELEVATION.	MEC2	15DEC97
WORK IN THIS AREA REQUIRES HEAT STRESS ANALYSIS AND	MEC2	15DEC97
CONTINUOUS MONITORING BY A RADIATION PROTECTION TECHNI-	MEC2	15DEC97
CIAN. AFTER DISCUSSING THE SITUATION, IT WAS DECIDED	MEC2	15DEC97
THAT 1) THE CLEARANCE WOULD NOT BE USED 2) THAT INSTEAD	MEC2	15DEC97
OF A MAN-ON-LINE TAG BEING USED, THAT AN OPERATOR IN	MEC2	15DEC97
CONTINUOUS ATTENDANCE WOULD BE USED 3) TO MEET THE OSHA	MEC2	15DEC97
REQUIREMENT THAT A TAG BE USED AT THE ISOLATION POINT,	MEC2	15DEC97
THAT A CAUTION TAG HUNG BY THE TECHNICIANS WOULD BE USED	MEC2	15DEC97
ON MS-2-4008 4) TO MAINTAIN STATUS CONTROL, THE REPOSI-	MEC2	15DEC97
TIONING OF THE VALVE WOULD BE PERFORMED BY THE OPERATOR,	MEC2	15DEC97
VERIFIED BY THE TM TECHNICIANS, AND DOCUMENTED IN THE	MEC2	15DEC97
WORK ORDER ON THE CONFIGURATION CONTROL SHEET. THIS	MEC2	15DEC97
WOULD FURTHER BE DOCUMENTED IN THE CREM SECTION OF THE	MEC2	15DEC97
WORK ORDER AT COMPLETION OF THE JOB 5) TO FACILITATE	MEC2	15DEC97
TESTING OF THE LEAK REPAIR, THE OPERATOR WOULD OPEN THE	MEC2	15DEC97
ISOLATION VALVE AFTER THE WORK HAD BEEN COMPLETED AND THE	MEC2	15DEC97
TAG REMOVED BY THE TM TECHNICIANS. THE ABOVE METHODS	MEC2	15DEC97
WERE TAILBOARDED WITH ALL PARTICIPANTS AND IT WAS AGREED	MEC2	15DEC97
THAT THIS WOULD BE SAFER AND WOULD REDUCE RAD DOSE TO ALL	MEC2	15DEC97
PARTIES. DISCUSSION POINTS, BESIDES THE SAFETY AND ALARA	MEC2	15DEC97

A/R NUMBER : A0449239 A/R AGE: 00245 A/R STATUS : ROUTED
A/R TYPE : AT EVAL STATUS DATE : 16DEC97
REQST GROUP: PGOF DATE REQUIRED: 15FEB98
SUBGROUP : PRINT DATE : 17AUG98
REQST ID : MEC2 CONTACT: JIM DYE AT: 3555

CONCERNS, INCLUDED THE FACT THAT THIS IS A REMOTE ACCESS	MEC2	15DEC97
LOCATION WITH LIMITED ENTRY, SUCH THAT THE LIKELIHOOD OF	MEC2	15DEC97
INADVERTANT OPERATION OF THE ISOLATION POINT WAS REMOTE,	MEC2	15DEC97
ESPECIALLY WITH AN OPERATOR BEING CONTINUOUSLY PRESENT.	MEC2	15DEC97
IN THE EVENT THAT THE LEAK REPAIR WENT BEYOND A SINGLE	MEC2	15DEC97
SHIFT, IT WAS DECIDED THAT A FURTHER REVIEW OF THE	MEC2	15DEC97
SITUATION WOULD TAKE PLACE, AND THAT IN ALL LIKELIHOOD,	MEC2	15DEC97
THE CLEARANCE WOULD BE HUNG. THE FINAL DISCUSSION POINT	MEC2	15DEC97
INCLUDED DOCUMENTATION OF THE ABOVE AUTHORIZATION BY THE	MEC2	15DEC97
SFM VIA THIS AR. NO ETR HAS BEEN WRITTEN AT THIS TIME AS	MEC2	15DEC97
THIS IS SEEN A SINGLE EVENT WITH NO TREND IMPLICATIONS.	MEC2	15DEC97
.	CXS3	17DEC97
SPIGOT REVIEW OF THIS ISSUE IS PENDING.	CXS3	17DEC97
.	CXS3	17DEC97
.	CXS3	23DEC97
THE ISSUE/EVENT DESCRIBED IN THIS AR HAS BEEN REVIEWED BY	CXS3	23DEC97
THE SPIGOT AR REVIEW TEAM (SART) AND DETERMINED TO BE A	CXS3	23DEC97
QUALITY PROBLEM PER OM7.ID1 AND WILL BE TRACKED ON A	CXS3	23DEC97
QUALITY EVALUATION (QE). IF ADDITIONAL INFORMATION IS	CXS3	23DEC97
DISCOVERED THAT WOULD AFFECT THE QUALITY PROBLEM	CXS3	23DEC97
DETERMINATION, CONTACT THE AR REVIEWER OR A MEMBER OF THE	CXS3	23DEC97
SPIGOT TEAM. SET QP FIELD = "Y".	CXS3	23DEC97
.	CXS3	23DEC97
REFER TO QE Q0011991.	CXS3	30DEC97
.	CXS3	30DEC97

MUC: F FEG: 2 45 XNA COMP ID:
FEG DESC : 45 CONTAINMENT STRUCTURE MISC/MULTIPLE FEG'
AR TAG:
NO EQUIP TAG

REVIEW AND ASSIGNMENT

POTENTIAL RPT: N COMP UNAVAIL: N SFM NOTIFIED: Y SUPV GROUP: DC
PRI/CTD/WMI : 3 X M1 REQD DATE : 15FEB98 CAT:
RESPON GROUP : PGOW SUBGROUP: ID: INFO: DYE, J.

QUALITY PROBLEM CHECKLIST

QA CLASS : N N/A
QUALITY PROB: Y DART 23DEC97
QP RESP ORG : N/A QP DUE DATE: N/A
IND VERIFIER: DATE:

PROGRAM REVIEWS

MRFF : N REG DOC CD: PARENT AR:
POA : OTHER INFO: QE Q0011991 NRFR SCHED :
DCP NUM: 000000 MTE ID : RT NBR :
CLI NUM: OUTAGE : REVIEWER: N/A
OEA :

PG AND E *** ACTION REQUEST *** PAGE: 03

A/R NUMBER : A0449239 A/R AGE: 00245 A/R STATUS : ROUTED
A/R TYPE : AT EVAL STATUS DATE : 16DEC97
REQST GROUP: PGOF DATE REQUIRED: 15FEB98
SUBGROUP : PRINT DATE : 17AUG98
REQST ID : MEC2 CONTACT: JIM DYE AT: 3555

========== ACTIONS TAKEN / AR CLOSURE ==========

HAVE TAG CONSIDERATIONS BEEN ADDRESSED? : _

========== PROCESS ROUTING ==========

	ID	NAME	PHONE		PAGER	DATE	TIME
INITIATED BY :	MEC2	CRAIG, M. E.	1234	3700		15DEC97	
SUPV REVIEW BY:	MEC2	CRAIG, M. E.	1234	3700		15DEC97	
ROUTED BY :	SAH1	HIETT	3208	4325		16DEC97	
ASIGN RESP BY:						N/A	
COMPLETED BY :						N/A	

WHEN AR GOES TO HISTRY STATUS, NOTIFY: ____ ____ ____ ____ ____ ____

A/R NUMBER : A0449239 A/R AGE: 00245 A/R STATUS : ROUTED
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REQST GROUP: PGOF DATE REQUIRED: 15FEB98
SUBGROUP : PRINT DATE : 17AUG98
REQST ID : MEC2 CONTACT: JIM DYE AT: 3555

EVALUATION NBR : 01
EVALUATING ORG : PTRB EVAL DUE DATE: 01APR98
EVAL ASIGND TO : HEATHERLY DATE ASSIGNED: 13MAR98
EVAL REQUEST ORG: PGOM
EVAL REQUESTOR : HIETT EVAL STATUS : COMPLT
EVAL RETURNED BY: BACKMAN
NRC COMMIT CODE : _ _ OUTAGE CODE : _____ _____
PREMIS : _ POA STATUS : _

EVAL DESC: DETERMINE THE REPORTABILITY OF THIS EVENT & QUAL REMOVAL
A REPORTABILITY MEMO WAS PREPARED FROM TLG TO SAH. VAB1 13MAR98
THE MEMO CONCLUDES THAT THIS EVENT IS NOT REPORTABLE VAB1 13MAR98
UNDER 10CFR 50.5, 50.72/73, 21, 50.9, 26, 50.74, OR 55. VAB1 13MAR98
THE MEMO IS DATED 3/12/98, COPIES WERE PROVIDED TO SAH. VAB1 13MAR98
. VAB1 13MAR98
THE MEMO WILL BE RMS'D AND POSTED ON EDMS IN VAB1 13MAR98
REGULATORY DOCUMENTS/REPORTABILITY/MEMOS. VAB1 13MAR98

==========END OF ACTION REQUEST==========

SHIFT FOREMAN EXPLANATION OF AR A0449239 CONTENT

Shift Foreman Explanation of AR A0449239 Content

The following is an explanation by the involved SFM (AR author) of the intended meaning of the words and phrases he used in AR A0449239:

1. Title: Intentional Procedural Deviation

   These three words were chosen very carefully. The word **intentional** was used to denote the use of a methodical process which was performed with a specific targeted outcome. The word **procedural** was used due to the fact that all tasks performed at DCPP are procedurally controlled. The word **deviation** was used to denote not that a violation had occurred, but rather that a path other than that normally followed was used to control the evolution described in the body of the action request.

2. First Sentence: The Unit 2 SFM authorized a specific deviation from the administrative procedures for both clearances (OP1.ID1) and tagging (OP2.ID2) in the process of performing a leak repair on an instrument line coming off Steam Generator 2-4.

   The intent of this statement was to further clarify the title of this AR by specifically identifying the Administrative Procedures that had been "deviated" from as defined above. Specifically, since a clearance was not used in the performance of the task, the clearance procedure was listed. Also, since a clearance was not used, then a Man-On-Line Tag could not be used for the isolation of MS-2-4008, so the reference to the tagging procedure was included.

3. Second Sentence: The leak was documented on AR A0449092, work order C0155758 was created to correct the problem, and clearance request 57155 was written to isolate the leak for the necessary repairs.

   This sentence was strictly informational giving cross references between the clearance, the work order, and the originating AR.

4. Third Sentence: After discussion with the technicians who would be taking the affected channels out of service, the technicians who would be performing the actual repairs, the foreman for both sets of technicians, the operators who would be involved in the evolution, both in the control room and containment, the Shift Supervisor on duty and the Unit 2 Shift Foreman, it was decided that in the interest of ALARA and personnel safety that a deviation from the normal methods of correcting the problem would be used.

This sentence was written to identify the specific participants in the decision making process that led to the use of the W/O to control the task instead of the C/R, to identify the primary reason for taking this path (specifically, personnel safety), and to identify that this was seen as a deviation from the methods originally identified in the W/O which used a C/R to relying entirely on the W/O to control the task.

5. Fourth through Eighth Sentence: Under normal conditions, two operators would be used to enter containment, isolate the component, hang and verify the clearance. Two technicians would then enter containment and perform the leak repair. They would then have to perform a ROFT to verify the adequacy of the leak repair, which would require a second entry by the operators to cut in the isolated line. This area is a High Radiation Area in direct line with the reactor vessel, with high temperature conditions present, requiring climbing a ladder from the 140' deck to a platform on the 166' elevation. Work in this area requires heat stress analysis and continuous monitoring by a radiation protection technician.

   These sentences were intended to give a brief description of the work process that would have been involved if a clearance had been used. In fact, this was an oversimplification of the process. If all normal processing methods had been used as required by the clearance procedure, the tagging procedure, and RP procedures, the process would have included more personnel trips up the ladder than I listed. The radiation field that was addressed was not at the work location, but was located between the 140' deck and the elevated work platform.

6. Ninth Sentence: After discussing the situation, it was decided that 1) the clearance would not be used 2) that instead of a Man-On-Line Tag being used, that an operator in continuous attendance would be used 3) to meet the OSHA requirement that a tag be used at the isolation point, that a caution tag hung by the technicians would be used on MS-2-4008 4) to maintain status control, the repositioning of the valve would be performed by the operator, verified by the TM technicians, and documented in the work order on the configuration control sheet.

   This sentence was written to describe the specific steps that had been agreed to carry out the task. Items 1), 3), and 4) are self explanatory. Item 2) is misleading and was not what was agreed to during the actual tailboard. The intent of leaving the operator at the job location during the job was to minimize the number of trips up and down the ladder, including the disruption of the job as the RP technician and the TM technicians would have had to come down with the operator. The intent was that the Caution Tag that was being hung by the TM technicians would be the control of the valve and that it would only be repositioned under the direction of the technicians who had placed the tag on the valve. Reading item 2) at this date, and remembering what happened that day, I believe that I was probably disrupted during the writing of that portion of the sentence, and did not catch my error on the review. David Patty, the SS, also did not catch it during his reading as he was aware that we were not using the operator as a human Man-On-Line

tag. There was never any intent to use the operator as the clearance, as this would imply that a clearance was in fact being used, and that would be in conflict with the ninth sentence above were it was stated that we had decided not use a clearance.

7. Tenth Sentence: This would further be documented in the CREM (Completion Remarks) section of the work order at completion of the Job 5) to facilitate testing of the leak repair, the operator would open the isolation valve after the work had been completed and the tag removed by the TM technicians.

   This sentence was meant to close out the description of the steps that were planned and executed.

8. Eleventh and Twelfth Sentence: The above methods were tailboard with all participants and it was agreed that this would be safer and would reduce rad dose to all parties. Discussion points, besides the safety and ALARA concerns, included the fact that this is a remote access location with limited entry, such that the likelihood of inadvertent operation of the isolation point was remote, especially with an operator being continuously present.

   These two sentences were meant to identify some of the additional concerns that were addressed during the pre-job discussion and tailboard. The mention of the operator being present shows that he was not the primary method of control of the isolation point, but rather was a back up to the tag hung by the TM technicians.

9. Thirteenth Sentence: In the event that the leak repair went beyond a single shift, it was decided that a further review would take place, and that in all likelihood, the clearance would be hung.

   This sentence was included to indicate that contingency plans had been considered in the event that the job did not go as planned. Per Operations, requirements to maintain appropriate configuration control beyond the end of a shift for out of normal position valves, a clearance needs to be hung as documentation.

10. Fourteenth and Fifteenth Sentence: The final discussion point included documentation of the above authorization by the SFM via this AR. No ETR has been written at this time as this is seen a singe event with no trend implications.

I had volunteered to write this AR after it was suggested at the tailboard that we should probably document our actions. The original suggestion was to document this under an ETR, but at this time, ETRs were being used as a method to identify errors, and this was not felt to be an error. I felt that we should probably document our actions so that they could be used as a guideline for future similar situations and for possible inclusion into our procedures.

11. Mind set when this AR was written.

At the time I wrote this AR, I had just spent the biggest part of the preceding 5 hours dealing with a problem that should not have been a problem. I had attempted to work through a set of conditions to reach a final solution that would meet the concerns for plant safety, personnel safety, configuration control, and procedural compliance because it was felt by all concerned parties that the use of a clearance was not in the best interest of personnel safety in this specific case. As I wrote this AR, I recognized that by the very act of not having used the clearance and writing this AR, I would be opening myself up to potential criticism. I had recently been frustrated by discussions that I had had with the supervisor of the clearance group concerning the need to simplify the clearance procedure in an effort to reduce the number of ETRs that were being written against Operation's performance in this area. My expressed feeling was that the errors were largely due to the complexity of the procedure and the detail to which it went. I felt that it should be routine for tasks such as the one that we had undertaken that day to allow the TM technicians to self isolate the instrument line and repair the equipment as necessary utilizing the work order and attached configuration control sheet with SFM approval. The sum of this situation was that I did not have a very good attitude when I wrote this AR, and in fact, I was probably looking to create a problem for the sponsor of the clearance procedure by showing that there was a way to get the job done, within procedures, without using a clearance. The feeling that the clearance procedure was too complex, too detailed, and in fact sometimes interfered with personnel safety was widely held within Operations based on my day to day conversations with the Operators and the other SFM. I ended up using this AR to vent a lot of the frustration that was built up because of the way I felt about the procedure.

APPLICABLE ADMINISTRATIVE PROCEDURES

Applicable Administrative Procedures attached:

1. Department Level Administrative Procedure (DLAP) OP1.DC18, "Authorization For Equipment Operations And Maintenance," Revision 3

2. Program Directive (PD) OP2, "Tagging Programs," Revision1

3. Inter Departmental Administrative Procedure (IDAP), OP2.ID1, "Clearances And Administrative Tagouts," Revision 8

4. IDAP OP2.ID2, "DCPP Tagging Requirements, Revision 6

5. IDAP CF4.ID5, "Configuration Control During Maintenance Activities," Revision 2

6. IDAP AD7.ID1, "Use of PIMS Work Order Module," Revision 2

7. IDAP AD2.ID1, "Procedure Use and Adherence," Revision 5