

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No: 50-275/91-34
Docket No: 50-275
License No: DPR-80
Licensee: Pacific Gas and Electric Company
77 Beale Street, Room 1451
San Francisco, California 94106

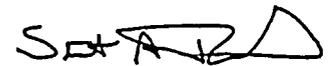
Facility Name: Diablo Canyon Unit 1

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

Inspection Conducted: September 21 through September 23, 1991

Inspector: P. J. Morrill, Chief, Project Section 1, Region V

Approved by:



S. A. Richards, Chief, Reactor Projects Branch

11-1-91

Date Signed

Summary:

Inspection from September 21 through September 23, 1991 (Report No. 50-275/91-34)

Areas Inspected: The inspection consisted of an announced special inspection of the circumstances associated with the Unit 1 reactor trip on May 17, 1991 and the use of an unlicensed person to assist the licensed operators while implementing the procedures for reactor trip and safety injection.

Safety Issues Management System (SIMS) Items: None

Results:

General Conclusions on Strengths and Weaknesses:

The licensee's actions during the May 17, 1991 unit trip and safety injection were good. The prompt recognition of overcooling and isolation of the main steam system indicates that operators were aware of the steam dump valve problems and capable of mitigating the event. The exception was the use of the non-licensed operator on the control boards.



Significant Safety Matters:

The inspection found that a non-licensed operator had been used to assist in the control room during recovery from a unit trip and safety injection on May 17, 1991. This may be contrary to 10 CFR 50.54(i) and PG&E's own procedures.

The inspector found that the composition of the crew in the control room during the unit trip recovery on May 17, 1991, was short one reactor operator from that used for simulator training and requalification. The operators involved in the event felt they were one person short when implementing the emergency procedures. This indicates that consideration should be given to either more operators in the control room, or training with fewer operators. The Technical Specifications may also require revision to ensure the shift crew has an adequate number of personnel to implement the emergency procedures.

Summary of Violations and Deviation:

None, pending further review.

Open Items Summary:

No items were closed. Two unresolved items were opened.





manipulated at the main control boards and to determine if these devices were "controls" in the context of the regulations.

Subsequently, in a letter dated August 22, 1991 (Zimmerman to Shiffer), the NRC requested the licensee's evaluation of this event as related to 10 CFR 50.54(i) and (j), an explanation of their policy concerning duties of non-licensed ACO's on shift, and a description of the training received by the ACOs. PG&E responded in a letter dated September 17, 1991 (Shiffer to Zimmerman), that the SCO had directed the ACO to secure the steam to the turbine driven auxiliary feedwater pump, to secure the safety injection pumps, and to manipulate instrument air valves from the main control board. The licensee concluded that the SCO was directing the ACO, and the equipment involved did not directly affect reactivity or reactor power level; therefore, the actions of the licensee did not violate 10 CFR 50.54(i) or (j). The licensee also concluded that a new policy was needed to provide guidance on the use of licensed control room operators during emergencies and to revise operations policies to prohibit the use of non-licensed personnel for control board manipulations during emergency operating procedure responses or major plant evolutions.

3. Review of Licensee Procedures and Actions

The inspector reviewed the licensee's interpretation of "controls" of the reactor and the licensee's procedures related to duties of licensed and non-licensed operation personnel. Licensee Nuclear Plant Administrative Procedure (NPAP) A-100, "General Authorities and Responsibilities of Nuclear Plant Operators," states, "Controls are specifically considered to be control rods, makeup control, and turbine control."

The licensee's Operations Department Policy (ODP) A-13, "Non-Licensed Operator Control Room Duties", states that the ACOs are allowed to:

- Do surveillances which are essentially data collection tests
- Perform surveillance test procedures (STPs) which do not cause a significant system realignment or change operating system status, such as valve stroke testing
- Do surveillance test procedures (STPs), such as the emergency diesel generator starting test M-9A, which are covered by the Non-licensed Operator (NLO) training program

The ODP also states that the NLOs are not allowed to operate controls which:

- Directly affects reactivity, such as control rods, reactor make-up control system, and main turbine controls;
- Indirectly affects reactivity, such as steam dumps, main feedwater, and CVCS charging and letdown;



Involves a complex series of steps normally practiced on the simulator, such as restoration of letdown, main turbine start-up, or reactor coolant pump start-up.

On September 5, 1991 the licensee revised ODP A-13 to state that NLOs were not allowed to manipulate control board controls in response to emergencies or during major plant evolutions. At the same time, in order to ensure that an adequate number of licensed operators are readily available to implement emergency operating procedures, the licensee implemented ODP B-25, "Control Room Staffing During Emergency Operations," to specify a minimum of one SRO (preferably a shift foreman) and three ROs in the control room at all times when both units are operating. This is one more RO in the control room than Technical Specification 6.2.2.b requires.

4. Use of An Unlicensed Individual to Assist the Operators on May 17, 1991

Prior to the Unit 1 trip on May 17, 1991 the control room operations watch was manned as follows. Both Units were at full power.

Shift Supervisor (1)	SRO	
Shift Technical Advisor (1)	Non-licensed	
Utility Senior Control Operator (1)	Absent for training	
Control Room ACO (3)	One person, non-licensed.	
Others were sick or on vacation.		
Shift Foreman (2)	Unit 1 - SRO	Unit 2 - SRO
Senior Control Operator (2)	Unit 1 - SRO	Unit 2 - SRO
Control Operator (2)	Unit 1 - RO	Unit 2 - RO

In this condition the Technical Specifications require that, at a minimum, two SRO licenses, three RO licenses, an STA, and three "Auxiliary Operators" (non-licensed) are on shift (Table 6.2-1) with a SRO and two ROs (one for each unit) in the control room (6.2.2.b). Consequently the licensee was meeting Technical Specification requirements.

The main control boards for each unit consist of an inner "CC" control console which contains controls for the control rods, makeup (dilution and boration), feedwater, main turbine-generator, and alarm/annunciator displays. The Control Operator (a licensed RO or SRO) normally sits at a desk built into this control board. He can look over the top of this board to see indications and alarms on other main control boards. The rest of the main controls, indications, and alarms are located on taller vertical control boards "VBs" in a "C" shape around the "CC" board. A desk with logs and telephones where the ACO normally works is behind the CC board. The SCO and/or the SF



are generally at another set of desks about fifteen feet behind the CO and ACO.

At 6:24 a.m. the Unit 1 trip occurred due to an I&C Technician error. Approximately 1 minute and forty seconds later a safety injection (SI) occurred due to overcooling of the Reactor Coolant System (RCS). This over cooling was apparently caused by the failure of two steam dump valves (SDVs), which were bleeding steam to the main condenser. All the licensed operators and senior operators were initially in the control room.

The three operators assigned to Unit 1 included two SROs as the Shift Foreman (SF) and the Senior Control Operator (SCO), and one RO as the Control Operator (CO). The CO manipulated the controls while the SCO read the Emergency Procedures (EPs) and the SF stood back to observe, check and coordinate. On the Unit 2 side of the control room the CO and SFM stayed with their unit and did not participate. However the Unit 2 SCO announced the trip on the public address system and went out in the turbine building to assist the ACOs and AOs in their post-trip duties. The Shift Supervisor (SS) implemented the Emergency Plan. The STA monitored critical safety function status trees and answer the phone. Overall the licensee's response appeared to be satisfactory.

The crew on Unit 1 entered EP E-0, "Reactor Trip or Safety Injection," on the trip, transitioned to E-0.1 "Reactor Trip Response," per E-0, step 5, and re-entered E-0 when the SI occurred. The main steam isolation and bypass valves were shut about two minutes after the SI occurred. The crew transitioned to EP E-1.1, "SI Termination," at step 24 of E-0. The event was classified by the SS as an Unusual Event (UE) and a one hour verbal emergency report was completed. Implementation of the EPs appeared to be satisfactory.

The letter from PG&E dated September 17, 1991 states that the SCO directed the ACO to secure steam to the turbine drive auxiliary feedwater pump, to secure the SI pumps, and to manipulate air valves from the main control boards. This is consistent with discussions the inspector had with the ACO in early July of this year.

During this inspection, the ACO remembered shutting down the two SI pumps and that he had some experience with this since he had stopped the pumps before for a surveillance test. He also remembered reopening the containment instrument air isolation valve. He did not verify flows from the SI pumps, but was following the orders of the SCO. He felt he was slow because he had not been trained for this situation and he did not want to make any mistakes. The ACO thought he was relieved by the Unit 2 SCO when that individual returned from helping the ACOs and AOs in the turbine building.

The CO remembered asking for help during the event and being too busy to keep up with the big picture. The ACO remembered the CO telling him to "get over there," while pointing to the vertical (main) control boards. The CO remembers the ACO being directed to reset control room ventilation and to do something with auxiliary



feedwater. The CO felt that they were one RO short during the event, although technical specification manning requirements were met.

The SCO remembers that the CO was much too busy. The SCO told the ACO (who was standing at the Unit 1 desk behind the CC control board) to help the CO in non-critical steps. He did not remember the ACO completing any manipulations by himself. He did remember telling the ACO to open the containment instrument air supply and the ACO questioning if the SCO really wanted him to do this. The SCO thought the CO actually opened the valve (1-FCV-584). The SCO thought that RCS pressure went as low as 1750 to 1800 PSIG and therefore no SI flow into the RCS occurred. The SCO observed that if the ACO had been licensed and had been familiar with the control boards they would have had adequate support. He felt they were one operator short while executing the EPs and therefore they took too long, although the trip response was adequate and did not aggravate the event.

The SFM thought that he had told the ACO to throttle the flows to the steam generators from the turbine driven auxiliary feedwater pump, but that the CO had actually done the operation. The auxiliary feedwater flows needed to be throttled to prevent over-filling the steam generators and to stop further RCS cooldown. The SFM thought that the SI pumps never injected due to the RCS pressure being too high. He also felt he could have used more licensed people to man the control boards.

None of the personnel interviewed believed that they had violated 10 CFR 50.54 (i) or (j). To get a broader perspective the inspector also discussed the definition of "controls", "direct" reactivity changes, and "indirect" reactivity changes with several other operators and senior operators. The consensus was that "controls" were control rods, boration, dilution, and the turbine when at power. "Direct" reactivity changes were caused by control rods, boration, and dilution, while "indirect" reactivity changes were caused by turbine controls, feedwater flow, letdown temperature changes, primary chemical additions, and possibly pressurizer level changes.

The operators' statements were generally consistent with licensee Nuclear Plant Administrative Procedure (N-PAP) A-100, "General Authorities and Responsibilities of Nuclear Plant Operators." However, 10 CFR 50.2 defines "controls" as "... apparatus and mechanisms, the manipulation of which directly affects the reactivity or power level of the reactor..." The licensee's procedure NPAP A-100 states, "Controls are specifically considered to be control rods, makeup control, and turbine control." The inspector considered that the shutdown of the SI pumps or stopping the steam driven auxiliary feedwater pump each may directly affect reactivity. The procedure appears to erroneously interpret 10 CFR 50.3. However, this item will remain unresolved pending discussion with the NRC Office of Nuclear Reactor Regulation (NRR) of the application of those terms. (50-275/91-34-01)

In addition, the inspector observed that Operations Department Policy (ODP) A-13, "Non-Licensed Operator Control Room Duties," states that "A Non-licensed ACO or AO in the Control Room shall not be assigned tasks which involve the following: ... Operation of controls which have or



could possibly have an indirect affect on reactivity, such as, Steam Dump Controls, Main Feedwater Controls, or CVCS charging and letdown controls." Contrary to the requirement of ODP A-13, licensee personnel directed the non-licensed ACO to shutdown the SI pumps and the steam driven auxiliary feed-water pumps. However, this issue will also remain unresolved, to be addressed in conjunction with the issues discussed above. (50-275/91-34-02)

5. Training of Unlicensed ACOs

The inspector determined that the ACOs who are not licensed are not trained or requalified with the licensed members of the crew. The ACOs in this situation get exposure to the simulator by observing portions of operations demonstrated by the training staff about twice a year. This occurs during Non-licensed Operator requalification training.

The ACOs are initially qualified by completing several watch station qualification guides. There is no such guide for the control room. After becoming ACOs, they rotate through the various watch stations and the control room. The non-licensed ACOs are rotated through the control room without any assigned duties to gain familiarity with control room operations in anticipation of being trained to be licensed operators. Reportedly, the individuals who have been rotated through the control room in this manner have done much better during licensed operator training and in subsequent licensing examinations.

As stated above, the crew composition for training and requalification is different from the control room watch structure. In the simulator training and evaluation sessions, the licensee uses four licensed positions and the STA who is generally not licensed. The licensed positions are the SF (SRO license), SCO (SRO license), CO (SRO or RO license), and the ACO (SRO or RO license). In the control room, the licensee always has a SRO licensed SS, the SCO could be a RO license, the ACO is generally non-licensed, and there is usually one Utility SCO with a SRO license to help either unit and to supervise the "in plant" ACOs and AOs. The inspector observed that these differences became a problem during the May 17, 1991 Unit 1 trip, when the Unit 1 crew was one operator short of the crew that they had been trained to operate with.

6. Exit Meeting

On September 23, 1991, at the end the inspection the inspector met with the licensee personnel denoted in paragraph 1 to go over the findings and conclusions of this inspection. The inspector stated that he had sufficient information related to the May 17, 1991 event and would review the issues raised within the NRC prior to reaching a conclusion.

