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June 10, 2005

PG&E Letter HBL-05-019

U.S. Nuclear Regulatory Commission
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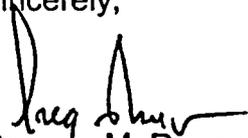
Docket No. 50-133, OL-DPR-7
Humboldt Bay Power Plant, Unit 3
Licensee Event Report 2005-001-01
Missing Incore Detectors

Dear Commissioners and Staff:

In accordance with 10 CFR 20.2201, PG&E is submitting the enclosed Revision 1 to licensee event report (LER) 2005-001 regarding the missing one complete and three partial incore detectors. This LER revision supercedes LER 2005-001-00 submitted in PG&E Letter HBL-05-002, dated February 22, 2005, which only provided information in the LER Abstract section. The revised LER provides new information for LER sections I through VI in their entirety, and therefore, does not contain revision bars.

This event did not adversely affect the health and safety of the public.

Sincerely,


Gregory M. Rueger

Enclosure

cc: Emilio M. Garcia
John B. Hickman
Bruce S. Mallett
PG Fossil Gen HBPP Humboldt Distribution

TE22

LICENSEE EVENT REPORT (LER)

(See reverse for required number of Digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME Humboldt Bay Power Plant Unit 3	2. DOCKET NUMBER 05000133	3. PAGE 1 OF 8
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4. TITLE
Missing Incore Detectors

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	04	2005	2005	- 001 -	01	06	10	2005	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE N/A	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)			
10. POWER LEVEL 0	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)3(i)	<input type="checkbox"/> 50.73(a)2(i)(C)	<input type="checkbox"/> 50.73(a)2(vii)
	<input checked="" type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)3(ii)	<input type="checkbox"/> 50.73(a)2(ii)(A)	<input type="checkbox"/> 50.73(a)2(viii)(A)
	<input type="checkbox"/> 20.2203(a)1	<input type="checkbox"/> 20.2203(a)4	<input type="checkbox"/> 50.73(a)2(ii)(B)	<input type="checkbox"/> 50.73(a)2(viii)(B)
	<input type="checkbox"/> 20.2203(a)2(i)	<input type="checkbox"/> 50.36(c)1(i)(A)	<input type="checkbox"/> 50.73(a)2(iii)	<input type="checkbox"/> 50.73(a)2(ix)(A)
	<input type="checkbox"/> 20.2203(a)2(ii)	<input type="checkbox"/> 50.36(c)1(ii)(A)	<input type="checkbox"/> 50.73(a)2(iv)(A)	<input type="checkbox"/> 50.73(a)2(x)
	<input type="checkbox"/> 20.2203(a)2(iii)	<input type="checkbox"/> 50.36(c)2	<input type="checkbox"/> 50.73(a)2(v)(A)	<input type="checkbox"/> 73.71(a)4
	<input type="checkbox"/> 20.2203(a)2(iv)	<input type="checkbox"/> 50.46(a)3(ii)	<input type="checkbox"/> 50.73(a)2(v)(B)	<input type="checkbox"/> 73.71(a)5
	<input type="checkbox"/> 20.2203(a)2(v)	<input type="checkbox"/> 50.73(a)2(i)(A)	<input type="checkbox"/> 50.73(a)2(v)(C)	<input type="checkbox"/> OTHER
<input type="checkbox"/> 20.2203(a)2(vi)	<input type="checkbox"/> 50.73(a)2(i)(B)	<input type="checkbox"/> 50.73(a)2(v)(D)	Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME David Sokolsky – Senior Regulatory Services Engineer	TELEPHONE NUMBER (Include Area Code) (707) 444-0801
-----------------------------------------------------------------------	--------------------------------------------------------

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
N/A									

14. SUPPLEMENTAL REPORT EXPECTED [] YES (If yes, complete 15. EXPECTED SUBMISSION DATE) NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

During a review and cataloging of the contents of the Humboldt Bay Power Plant (HBPP) spent fuel pool (SFP), PG&E personnel determined that incore detectors were missing and notified the NRC on February 4, 2005. Incore detectors contain non-fuel special nuclear material (SNM), varying from 0.04 to 0.005 grams of uranium-235 each. HBPP records showed that 54 incore detectors should be in the SFP. However, following an investigation, PG&E determined that one complete and three partial incore detectors were missing. PG&E submitted Licensee Event Report (LER) 2005-001-00 on February 22, 2005 in accordance with 10 CFR 20.2201(b)(1), stating a supplemental LER would be issued to provide more details.

The physical search for the incore detectors is complete, and relevant historical documents have been reviewed. PG&E believes the missing incore detectors were erroneously included with irradiated hardware shipped to a low level radioactive waste facility at Hanford or Barnwell. If so, the addition of these detectors would be within the design and licensing basis of these facilities and would not increase the risk to the health and safety of the public, workers, or environment.

The causes of the event were determined to be use of an inadequate procedure for cutting the incore detectors from incore strings, inadequate training of SNM custodians, and failure to follow an SNM procedure for control and accountability of incore detectors. Corrective actions have been developed.

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I. Plant Conditions

Humboldt Bay Power Plant (HBPP), Unit 3, was shut down in 1976, and has been maintained in SAFSTOR since 1988.

II. Description of Problem

A. Background

During 2003, PG&E personnel initiated a review and cataloging of the contents of the spent fuel pool (SFP) in preparation for the planned decommissioning of the plant. During that work effort, PG&E discovered fuel fragments in November 2003. As a result, PG&E embarked on a thorough documentation review and SFP search for special nuclear material (SNM). During the documentation review, in June 2004, PG&E determined that three 18-inch fuel rod segments from a rod in fuel assembly A-49 were missing. PG&E reported the missing fuel rod segments in Licensee Event Report (LER) 04-001-00 to the NRC on August 16, 2004 in PG&E Letter HBL-04-020, with subsequent revisions submitted on November 18, 2002 (PG&E Letter HBL-04-026) and June 10, 2005 (PG&E Letter HBL-05-020). Another result of the documentation review occurred on August 9, 2004, when PG&E identified a problem regarding the physical inventories of incore detectors [IG].

PG&E continued to search the SFP and review documentation to identify and locate all SNM in the SFP, attempt to locate the three 18-inch fuel rod segments, and to determine if all incore detectors were accounted for. Plant records showed that a total of 54 incore detectors should be stored in the SFP as a result of incore sectioning in 1973 and 1985. Following a comprehensive visual and manual search completed on February 22, 2005, PG&E determined that one complete and three partial incore detectors were missing.

B. Event Description

(NOTE - an incore string is an assembly of three incore detectors. The detector contains SNM; the rest of the string does not.) During an SFP cleanup campaign in 1985, using an approved HBPP procedure, incore strings containing incore detectors were cut into sections for more efficient storage in the SFP and for shipment of non-detector-containing sections to low level radioactive waste (LLRW) sites for

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disposal. The cutting procedure provided both physical measurement criterion and a dose-rate methodology to identify the location of incore detectors in the incore strings. On August 9, 2004, PG&E identified a problem regarding the physical inventories of these detectors.

While PG&E was searching the SFP for SNM and attempting to locate the three missing fuel rod segments, PG&E also attempted to determine if all incore detectors were in the SFP. During the fourth quarter of 2004, PG&E applied the procedure used in 1985 to determine the presence of incore detectors in incore strings. However, in December 2005, PG&E realized that the 1985 procedure proved to be inconclusive when used in an attempt to locate incore detectors in low dose-rate sections of the incore strings. As a result, using a new procedure, these low dose-rate sections were physically opened and visually examined to verify the presence or absence of incore detectors.

Documentation shows that the cut incore sections contained a total of 54 incore detectors, each containing a small amount of SNM. In early February 2005, PG&E determined that not all 54 incore detectors were in the SFP. On February 4, 2005, PG&E notified the NRC of the situation and continued to investigate. Shortly thereafter, PG&E determined that there were only fifty complete and three partial incore detectors stored in the SFP, indicating that one complete and three partial incore detectors, thought to have been stored in the SFP for the period 1985 through early 2005, were not properly controlled and accounted for. On February 22, 2005, PG&E submitted Licensee Event Report (LER) 2005-001-00 in accordance with 10 CFR 20.2201(b)(1), notifying the NRC of the missing incore detectors. PG&E stated in the LER that a supplemental LER would be issued to provide the detailed information required by 10 CFR 20.2201(b)(1) as well as identify the root cause and corrective actions. Responses to the six specific items required by 10 CFR 20.2201(b)(1) are identified below.

- (i) A description of the licensed material involved, including kind, quantity, and chemical and physical form

The 54 detectors in question vary in length from 2.5 inches to 3.25 inches, and they vary in the amount of SNM they contain. It is not known what length the missing detectors were, or how much SNM they contained. Therefore, HBPP Calculation NX-287 examined the inventory of irradiated

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incore detector strings stored at HBPP and performed a statistical analysis to determine the upper bound, lower bound, and best estimate for the SNM contained in the missing detectors.

The proportionate length of the remaining partial detectors is used to calculate the amount of SNM they contain, from which it is inferred how much is missing, e.g. if 40% of a detector remains, it is assumed that it contains 40% of the SNM contained in the full detector, and thus 60% is missing. This computation is performed twice, assuming first that the missing detectors were 3.25 inches long, and then assuming they were 2.5 inches long. Then the upper and lower SNM values for the missing detectors were derived by assuming all of the missing detectors were from strings with the highest or lowest SNM content, respectively. The resultant calculated values are given below. The values for detectors assumed to be 3.25 inches long are listed first; then the values for detectors assumed to be 2.5 inches long are listed in parentheses.

Upper Bound SNM Value = 0.12 (0.108) grams U-235

Lower Bound SNM Value = 0.0015 (0.00135) grams U-235

The Best Estimate SNM Value was arrived at by taking a weighted average of SNM content for all detectors residing in the SFP, which is then adjusted by the proportion of the length of the missing detectors to a full-length detector (i.e. for the case of a 3.25 inch detector, or a 2.5 inch detector):

Best Estimate SNM Value = 0.0384 (0.0345) grams U-235

A value of 0.035 grams U-235 for the SNM content of the missing three partial and one complete detectors is a reasonable best estimate value given the uncertainty associated with nominal detector length.

(ii) A description of the circumstances under which the loss or theft occurred

Shipments of incore detectors to LLRW facilities have been routinely made by BWR licensees since the 1960s. PG&E engaged in this practice for HBPP. For example, AEC Form 578, Material Status Report for the period ending December 12, 1968, indicated that six expended incore strings were discarded as radioactive waste during the report period. Prior to 1985, items such as incore detectors that contained minimal amounts of SNM were required to be segmented and "stabilized" prior to disposal at

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an LLRW facility. Stabilization consisted primarily of material to "hold" the SNM in the detectors. After 1985, the LLRW burial requirements were modified to allow items containing minimal amounts of SNM to be buried without segmentation and stabilization of the detectors.

No records related to the disposition of the missing incore detectors have been located. The possibility of theft or diversion of the missing incore detectors has been evaluated. Using the same reasoning and approach as was used for evaluation of the theft or diversion of three missing fuel rod segments, PG&E has concluded that the theft or diversion of the missing incore detectors is highly unlikely (see PG&E Letter HBL-05-020 dated June 10, 2005, re: LER 2004-001-02 for the missing fuel rod segments; and PG&E Letter HBL-05-017, dated May 27, 2005 re: HBPP SNM Project Final Report).

The barriers that applied to theft or diversion of the fuel rod segments would also apply to deter, prevent, and detect an attempted theft or diversion of the missing incore detectors. The missing incore detectors have even less economic and strategic value than the fuel rod segments and the radiation levels of the incore detectors through the 1980s were sufficient to present a significant health hazard to a thief or an individual attempting to carry out diversion of the detectors for disposal without authorization.

(iii) A statement of disposition, or probable disposition, of the licensed material involved

PG&E believes it is reasonable to assume that the missing one complete and three partial incore detectors were erroneously included with irradiated hardware in an offsite shipment to an LLRW facility. Based on a review of shipping records, PG&E believes the missing incore detectors are at either the Hanford or Barnwell facilities.

(iv) Exposures of individuals to radiation, circumstances under which the exposures occurred, and the possible total effective dose equivalent to persons in unrestricted areas

Receipt and burial of the missing incore detectors at Hanford or Barnwell would not represent a condition outside the design and licensing basis of these facilities. Moreover, these detectors would not pose any increased risk to the health and safety of the public or environment not already anticipated for the long-term management of these facilities.

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(v) Actions that have been taken, or will be taken, to recover the material

PG&E searched the SFP, collected and reviewed all potentially relevant HBPP documents, and interviewed selected former and current employees to find out if they had any recollections related to the cutting and disposition of incore detectors. No evidence was found regarding the disposition of the missing incore detectors.

PG&E does not plan to take any additional action to recover the missing incore detectors. If the missing incore detectors are buried at either Hanford or Barnwell, any attempt to exhume the detectors would pose a far greater worker health and safety risk and potential environmental detriment than leaving them buried. Moreover, these facilities are licensed to receive and bury incore detectors.

(vi) Procedures or measures that have been, or will be, adopted to ensure against a recurrence of the loss or theft of licensed material

HBPP procedures have been revised to ensure control and accountability of all SNM in PG&E's possession at HBPP. A full cataloging and characterization of the contents of the SFP has been performed, and a "qualification" will be created for the SNM Custodian and persons delegated to perform the duties of the SNM Custodian.

C. Status of Inoperable Structures, Systems, or Components that Contributed to the Event

No inoperable structures, systems, or components contributed to the loss of the incore detectors.

D. Other Systems or Secondary Functions Affected

None

E. Method of Discovery

As part of an investigation to verify the inventory of all SNM at HBPP, PG&E performed an SFP search for incore detectors. Using a new procedure, low dose-rate sections of the incore strings were physically opened and visually examined to verify the presence or absence of incore detectors. On February 4, 2005, PG&E determined that not all

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of the 54 incore detectors that were supposed to be stored in the SFP could be located and informed the NRC of this finding.

F. Operator Actions

None

G. Safety System Responses

None

III. Cause of the Problem

A. Immediate (apparent) Cause

Lack of attention to detail regarding identification, movement, storage, location, and documentation of the incore detectors following cutting of the incore strings in 1973 and/or 1985.

B. Root Cause

Performance of a cause analysis resulted in determination of the three following causes for the missing incore detectors:

1. An inadequate procedure was used to determine the location of incore detectors in incore strings during cutting operations.
2. The SNM Custodians were not adequately trained on control and accountability of SNM.
3. A personnel error – cognitive, for failure to follow the SNM control and accountability procedure for incore detectors.

IV. Assessment of Safety Consequences

As previously described in Sections B(ii) and (iii) of this LER, PG&E believes the missing incore detectors were erroneously shipped to either the Hanford or Barnwell facilities. Receipt and burial of these detectors would not represent a condition outside the design and licensing basis of these facilities. In fact, these facilities are licensed to receive and bury incore detectors, and PG&E has shipped incore detectors to these facilities in the past for burial. Therefore, these detectors would not pose any increased risk to the health and safety of the

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public, workers, or environment not anticipated for the long-term management of these facilities.

V. Corrective Actions

A. Corrective Actions to Prevent Recurrence (CAPRs)

CAPR 1: Revise HBAP D-7 "Control and Accountability of Special Nuclear Material and Waste Shipments" and STP 3.6.6 "SNM Inventory" to address the issue of the physical inventory of non-fuel SNM in the pool.

CAPR 2: Revise procedures EDOI B-3, "Movement of Non-Fuel Material in Spent Fuel Pool," EDOI B-5, "Fuel Handling Procedure for Moving Fuel Within the Spent Fuel Storage Pool," and HBAP D-7 to ensure that procedures used for future work in the SFP and other areas where SNM may be located shall include provisions for control and accountability of fuel fragments and non-fuel SNM.

CAPR 3: Create a "qualification" for the SNM Custodian and persons designated to be SNM Custodian.

VI. Additional Information

A. Failed Components

None

B. Previous Similar Events

None