



December 11, 2008  
GDP 08-1044

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555-0001

**Paducah Gaseous Diffusion Plant (PGDP)  
Docket No. 70-7001, Certificate No. GDP-1  
USEC Event Report ER-08-08**

Pursuant to 10 CFR 76.120 (d)(2), enclosed is the final written event report involving the failure of the C-337 Unit 1 Cell 2 Process Gas Leak Detector system on October 28, 2008. The Nuclear Regulatory Commission (NRC) was verbally notified on October 28, 2008 at 1315 hrs. NRC assigned No. 44608 to the notification.

Any questions regarding this event report should be directed to Vernon Shanks, Regulatory Affairs Manager, at (270) 441-6039.

Sincerely,

Steven R. Penrod  
General Manager  
Paducah Gaseous Diffusion Plant

SRP:MLB:he

Enclosure: As Stated

cc: NRC Region II  
NRC Resident Inspector – PGDP

IE 72  
NMSS

**EVENT REPORTS**  
**ER-08-08**

**A. Description of Event**

On October 28, 2008, at 0849 hrs., the C-337 Unit 1 Cell 2 Process Gas Leak Detection (U/1 C/2 PGLD) system failed and was declared inoperable by the Plant Shift Superintendent (PSS). The C-337 Operators were alerted to the U/1 C/2 PGLD failure by the receipt of the Area Control Room (ACR) alarm. The alarm is designed to either indicate a leak detector that has actuated from an actual leak or that the leak detection system has lost power to the detectors. The operators responded to the U/1 C/2 local control panel in accordance with the alarm response procedure and discovered the "ready" and "manual" lights were extinguished indicating a loss of the 200-volt DC supply voltage to the PGLD detector heads. At the time of the failure, the U/1 C/2 leak detection system was providing coverage for the cell heads and section 1 of piping in the cell bypass housing that was operating above atmospheric pressure (Cascade Mode 2). Facility operators initiated a continuous smoke watch of the affected area in accordance with the Limiting Conditions of Operation (LCO) actions of Technical Safety Requirement (TSR) 2.4.4.1.A.1 and 2.4.4.1.C.1. The PGLD system is required by TSR 2.4.4.1 to be operable when associated piping is above atmospheric pressure (Cascade Mode 2).

On October 28, 2008, at 1315 hrs., the Nuclear Regulatory Commission Headquarters Operations Office (NRC-HOO) was notified of the event in accordance with 10CFR76.120(c)(2)(NRC No. 44608).

**B. Description of Equipment Failures**

The C-337 PGLD systems consist of a signal conditioner rack in a ground floor cell panel, which houses a 200-volt DC power supply signal conditioner module, one control logic module circuit card, and 5 detector head signal channel cards. Each detector head signal channel card can monitor up to 5 heads, which provides up to 25 detector heads per signal conditioner rack. The C-337 U/1 C/2 PGLD system contains 17 active detector head channels, including 2 detectors monitoring the cell bypass piping. A loss of power relay monitors the 200-volt DC power and provides visual and audible alarm indication in the ACR upon a loss of power. The alarm that is received in the ACR upon loss of power is the same alarm that would be received by the actuation of a leak detector in an actual UF<sub>6</sub> release event. The signal conditioner rack is connected to the individual smoke detectors on the cell floor, via wires in conduit and hard-wired detector head bases. Three wires are run to each detector; one to carry 200-volt DC to the detector (the #4 wire), a return path to the signal conditioner to carry a signal in the event of an actuation, and a test signal wire used to force the detector to actuate during twice per shift TSR surveillances. The leak detectors plug into the bases.

This event involved the loss of the 200-volt DC power to the detectors. The loss of power resulted from a designed protective feature of the system that reduces the output of the power supply upon sensing an over current condition. It was determined that an internal electrical short circuit caused by an end-of-life failure of the K1 relay caused the power supply to reduce its output to zero and alarm in the ACR (loss of power alarm actuation), as designed. The K1 relay remains energized continuously in manual mode (the typical mode of operation). This protective feature is intended to interrupt the flow of current to a damaged component, and to protect the power supply from being damaged in the process. Since the output of the power supply is monitored and annunciated in the ACR as a PGLD alarm, the precise moment of the failure is known and LCO actions can be (and were in this case) immediately implemented. The system was fully functional until the moment the ACR alarms were received and had been subjected to routine surveillances twice per shift, not to exceed 8 hours, in accordance with the TSR.

**C. Exact Location of Event**

C-337 U/1 C/2 PGLD System

**D. Description of Isotopes, Quantities, and Chemical and Physical Form of the Material Involved**

None.

**E. Causes of the Events**

1. Direct Cause of the Event

The direct cause of this event was the loss of the 200-volt DC voltage to the smoke detector heads, due to an internal end-of-life short circuit of the K1 relay coil in the control circuit module card. In this condition, the power supply is not able to maintain the 200-volt DC required to operate the detectors.

2. Root Cause of the Event

The root cause for this event was an end-of-life failure of the K1 relay coil component of the control circuit module card.

**F. Corrective Actions Taken**

1. On October 29, 2008, the control circuit module card was replaced and the system was successfully tested and returned to service.

**G. Corrective Actions Planned**

None.

**H. Results of Any Evaluations or Assessments**

None.

**I. Extent of Exposure of Individuals to Radiation or to Radioactive Material**

None.

**J. Lessons Learned**

None.

**List of Commitments**  
**ER-08-08**

There are no commitments contained in this report.