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GDP 08-1014

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-08-01

Pursuant to 10 CFR 76.120 (d)(2), enclosed is the final event report involving the failure of the C-333 Unit 3 Cell 5 Process Gas Leak Detector (PGLD) discovered during routine testing January 31, 2008. The Nuclear Regulatory Commission (NRC) was verbally notified on February 1, 2008 at 1348 CST. NRC assigned No. 43953 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:mjw

Enclosure: As Stated

cc: NRC Region II
NRC Resident Inspector – PGDP

IE72
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EVENT REPORT
ER-08-01

A. Description of Event

At 1400 hrs on January 31, 2008, C-333 Unit 3 Cell 5 (U3/C5) Process Gas Leak Detector (PGLD) alarm was received in the Area Control Room (ACR). The ACR Operator dispatched an operator to the cell panel per the Alarm Response procedure. The operator reported to the ACR operator that no detectors were in alarm and all lights were normal. Shortly after this report, the alarm in the ACR cleared. At 1406 CST on January 31, 2008, the Plant Shift Superintendent (PSS) was notified that the C-333 U3/C5 PGLD system had alarmed and the appropriate response required by TSR LCO 2.4.4.1-1 had been initiated. The system was declared inoperable at 1406 as a conservative measure until the cause of the alarm could be identified.

The PGLD system associated with this event covers C-333 U3/C5. At the time of this failure, U3/C5 was operating above atmospheric pressure (TSR mode 2). TSR 2.4.4.1 requires that at least the minimum number of detectors in the cell and in each defined section of the cell bypass to be operable in TSR mode 2. With the potential failure of the U3/C5 PGLD system failure, none of the required cell detectors were functional. After being notified, the PGLD system was declared inoperable by the PSS and a continuous smoke watch was put in place in the affected areas as required by the LCO actions of TSRs 2.4.4.1.B.1 and 2.4.4.1.C.1. To test the system, the instrument duct detector was subjected to smoke and did not respond properly. After the system was reset by the operator the detector responded properly when fired manually at the PGLD panel.

Prior to the event, there had been no recorded incident where the C-333 U3/C5 PGLD system had failed to work properly either through routine test firing or any other situation where the system should have responded. Maintenance and Engineering evaluation of the system did not reveal a clear cause of the alarm. At 1348 CST on February 1, 2008, PSS notified the Nuclear Regulatory Commission (NRC) in accordance with 10 CFR 76.120(c)(2)(i) and NRC No. 43953 was assigned to the notification.

Background:

The PGLD systems in the process buildings are tested twice per 12-hour shift. The subject system had functioned as designed in response to test firing approximately six hours earlier at 0840 hours on January 31, 2008. At the time of the alarm at 1400 hours on January 31, 2008, no abnormal conditions were present in the immediate area of the PGLD system or detectors.

Typically, an alarm can be received in the ACR as a result of two conditions: (1) detector firing due to testing or actual recognition of smoke (UF_6 or other) or (2) loss of power to the PGLD system. When an alarm results from actuation or firing of a detector, the alarm will not reset without operator intervention (i.e., pushing the reset and alarm disable buttons at the local cell panel associated with the detector). In this case, there was no indication the alarm associated with the subject event was received as a result of a detector actuation.

The operator responding to the local cell panel indicated all lights (manual and ready) were properly illuminated at the panel (indicating proper power was available to the PGLD system) at the same time the alarm was still illuminated in the ACR. While the operator was proceeding

back to the ACR (without taking any action at the panel to reset the system), the alarm cleared. This scenario indicates the alarm was associated with the loss of power alarm or a problem in the system logic module.

While no specific equipment failure was found through Maintenance and Engineering troubleshooting, the most likely cause of the alarm (given the combination of alarms and visual indications) was a failure within the logic control module card in the PGLD system signal conditioner.

B. Description of Equipment Failure

The overall chronology of the incident from receipt of the alarm to the return of the system to service after the repair evolution is as follows:

January 31, 2008:

- 1400 – C-333 U3/C5 PGLD alarmed in ACR
- 1401 – Operator responded per the Alarm Response procedure
- 1405 – System condition at panel as reported by the operator to the ACR operator:
  - No detectors locked in
  - No indication of a release
  - Operator took no actions
  - Normal lights illuminated
  - Operator proceeded by to the ACR
- 1406 – System conditions
  - ACR alarm cleared
  - PSS contacted and informed of incident
  - PSS declared system inoperable
- 1420 – Actions completed to determine system status
  - Smoke tested detector YE-13(instrument duct detector) and no alarms actuated
  - Verified all PGLD panel normal lights (ready and manual) illuminated
  - No detector indicating light illuminated
  - Operator test fired the detectors worked correctly
  - Operator reset the system
  - Smoked (again) detector YE-13. System actuated as required and all alarms received.
- 1430 – Smoke watch in place
- Maintenance troubleshooting initiated

February 1, 2008:

- PSS verbally notified NRC of event at 1348.

C. Exact Location of the Event

C-333 U3/C5

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

There was no radioactive material released or involved in this event.

E. Causes of the Event

1. Direct Cause of the Event

The event occurred when the PGLD system alarmed during normal operation. Even though local panel indications were normal and indicated power was available to the system, an alarm was received in the ACR. Since the alarm cleared (reset) without operator intervention, the most likely cause of the alarm is a momentary loss of power due to a failure within the logic control module card in the PGLD system signal conditioner. A specific failed component was not identified through post-event testing and, as a result, the incident was reported as a conservative measure.

2. Root Cause (s) of the Event

No definitive root cause for the momentary loss of power causing the alarm in the ACR was found. Troubleshooting and evaluation subsequent to the event by Maintenance and Engineering did not discover any apparent equipment malfunction or condition that would have resulted in the situation presented to the operators on January 31, 2008. Since the cause could not be determined, all components that could have generated the alarm were replaced.

3. Contributing Cause of the Event

Several individual bases were found to have corroded connections and significant brittleness. While these conditions would not be expected to result in a loss of power to the entire system, all detector bases were replaced as a precaution.

F. Corrective Actions Taken

The following actions were taken as part of the Maintenance troubleshooting process:

- System wiring was tested.
  - Wiring was meggered at 500V with the detectors in place with no faults detected.
  - Detectors were removed and the wire was meggered again at 1000V with no faults detected.
- Bases were replaced.
  - During testing of the wire, Maintenance personnel noted that the bases for some detectors were extremely brittle and showed signs of corrosion. As a proactive measure, Engineering, Operations, and Maintenance collectively decided to replace all the bases. This type of condition is not a typical means of degradation of bases.
- Power supply was replaced.
  - The power supply was replaced as a proactive measure. No problems were suspected with the components; however, due to the possibility the system lost power, power supply integrity could have been challenged.
- Control logic module.
  - Even though there was no clear indication this component failed, the visual and alarm indications associated with this event indicate the most likely cause of the loss of power alarm was failure of the control logic module card. The component was tested in the Instrument Shop with inconclusive results. Subsequently the control logic module was replaced.

In summary, a failure of the Control Logic Module Card could explain how an apparent loss-of-power alarm could be received initially while no abnormal indications were present at the cell panel. A review of the circuitry could not determine another failure mode which would allow a loss of power alarm without a corresponding loss of the manual and/or ready light at the cell panel.

After the testing and replacement of critical parts, the system was tested satisfactorily and was declared operable at 0042 on February 3, 2008. Since that time, testing of the system twice per 12-hour shift has discovered no other problems with the system (other than a single detector sensitivity adjustment).

G. Corrective Actions Planned

No further corrective actions are planned.

H. Results of Any Evaluations or Assessments

None.

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

There was no radioactive material release or involved in this event.

J. Lessons Learned

None.

LIST OF COMMITMENTS
EVENT REPORT-08-01

There are no commitments contained in this event report.