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United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-001

SERIAL: GDP 97-1005

Paducah Gaseous Diffusion Plant (PGDP) - Docket No. 70-7001 - Event Report ER-97-04

Pursuant to 10CFR 76.120(c)(2), Enclosure 1 is the required 30-day written Event Report covering ER-97-04. This report incorporates a total of ten sprinkler system events (see Enclosure 2). The Nuclear Regulatory Commission (NRC) was notified of each deficiency as required. Enclosure 3 is a list of commitments made in the report.

Should you require further information on this subject, please contact Bill Sykes at (502) 441-6796.

Sincerely,

Steve Polston
General Manager
Paducah Gaseous Diffusion Plant

SP:WES:JLH:mcl

Enclosures (3)

cc: NRC Region III
NRC Senior Resident Inspector, PGDP

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EVENT REPORT
ER-97-04

BACKGROUND

The Paducah Gaseous Diffusion Plant (PGDP) fire protection systems and equipment are designed to detect, contain, and suppress fires. The major process buildings at PGDP (C-331, -333, -335, -337, -310, and -315) are constructed of unprotected steel frames, concrete floors, noncombustible exterior walls, and a built-up metal deck roof assembly. Fixed automatic fire suppression systems provide the means for the detection and control of fires at the plant. Each building is considered a single fire area. Sprinkler coverage is provided throughout the buildings, except for cell housings and surge drum rooms. There are no fire barriers between any units/areas in the process buildings. Combustible loading is low, except for lube oil, and the fire hazards are limited to normal industrial activities. Emergency response is provided by the on-site Fire Services Group and Emergency Squad. The plant has mutual aid agreements with other fire departments in the county.

As discussed in the SAR Accident Analysis (Sections 4.3.2.5.1 and 4.3.2.5.2) an unmitigated lube oil fire in the process lube oil pits, or on the cell floor, could cause failure of the structural steel followed by localized collapse of the structure. This collapse could damage process piping allowing a release of UF_6 . The sprinkler systems are designed to actuate in sufficient time to prevent structural collapse and a potential release of UF_6 .

DESCRIPTION OF EVENT

On January 3, 1997, a sprinkler system branch line in C-333 was discovered to be disconnected and its supply line plugged. This is the second occurrence of this nature discovered at PGDP. The first occurred on June 17, 1996, and was investigated under event report PAD-1996-0031. A corrective action, involving a 40-sprinkler system statistically based sample inspection, was initiated and no additional missing lines were discovered. The corrective action was closed on August 16, 1996. The second occurrence (January 3, 1997) was self-identified and reported as problem report PR-SF-97-0044. On January 9, 1997, as a result of the second occurrence, a sprinkler system walkdown commenced and is currently in progress within the process buildings. The walkdown consists of an examination of sprinkler systems that are visible and accessible, as well as sprinkler piping which is not visible from the floor in selected areas. Areas in which major system modifications have been performed will be included in the walkdown. Further, the walkdown will identify additional fire sprinkler systems, if any, that may have disconnected/plugged lines or have other significant deficiencies. Enclosure 2 is a list of additional sprinkler systems that have been identified deficient during the period March 12, 1997, to April 16, 1997, declared events and reported to NRC, and included in this investigation report.

On March 12, 1997, upon discovery of the first NRC reportable sprinkler system deficiency (Enclosure 2), and as additional deficiencies were determined to exist, the systems were declared inoperable. Additionally, fire patrols were initiated and at least one high pressure fire water hydrant was confirmed to be operable adjacent to the affected buildings as required by Technical Safety Requirement (TSR) 2.4.4.5. The NRC Headquarters Operations Office was notified of each deficiency as required by 10CFR 76.120(c)(2)(I).

The sprinkler system deficiencies are attributed to legacy issues which have probably existed for many years and may be the result of construction projects and modifications that had taken place in the plant. The possibility also exists that some of the deficiencies are the result of original installations. These deficiencies occurred prior to the implementation of effective programs, supported by plant procedures, such as Project Management, Work Control, and Configuration Management.

Procedures which have been implemented provide guidance and requirements for initiating, controlling, implementing, and closing out plant modifications. Additionally, a configuration management program includes organizations, administrative process and assessments to ensure an accurate, current design documentation that matches the plant's physical configuration, while complying with applicable requirements. A work control program and procedure prescribes the methods and responsibilities for the administrative control of maintenance and modification work to "Q", "AQ-NCS", and "AQ" systems, structures, and components (SSCs).

On March 6, 1997, an Engineering Service Order (ESO) was initiated to restore the function of the sprinkler systems which have been impaired by the installation of SSCs that have obstructed, relocated, and/or eliminated sprinkler heads. The ESO will make modifications to the high pressure fire water (HPFW) sprinkler systems classified as "AQ" which are located in C-310, -315, -331, -333, -335, and -337 buildings. Fire sprinkler heads that are incorrectly located will be restored/replaced to properly locate those sprinkler heads for correct actuation and spray pattern. Additional heads may be required in some systems to restore the spray pattern due to obstructions. As sprinkler systems are identified which require an engineering correction, the systems will be included in the ESO to bring the sprinkler system into compliance.

During the investigation a review of randomly selected Fire Services' monthly sprinkler system inspection sheets generated during the period January 1997, to March 1997, was conducted. The review found that none of the deficiencies discovered during the current walkdown (Enclosure 2) were noted during the monthly Fire Services inspections. This may be attributed, in part, to the wording contained in procedure CP4-SS-FS6111, "TSR Surveillance, Inspection, and Testing Of Wet Pipe Sprinkler Systems." Section 8.1.2 states "observe sprinkler heads that are accessible (without a permit) for obvious damage (such as leaking) or obstructions." Section 8.1.3 states "observe sprinkler piping that is accessible (without a permit) for sagging or broken hangers." The Fire Services Authority Having Jurisdiction (AHJ) indicated the monthly sprinkler system inspections are not intended to be as rigorous as the current walkdown and thus did not uncover the sprinkler deficiencies.

The ESO will correct the legacy sprinkler system deficiencies which have probably existed for many years. Further, the possibility of similar events, such as those in Enclosure 2, reoccurring in the future have been reduced because of the implementation of the Configuration Management and Work Control Programs.

CAUSES OF EVENT

A. Direct Cause

The direct cause of this event was probably the result of a failure of past construction, modification, and initial installation projects to adequately regulate system modifications due to a lack of configuration control.

B. Root Cause

The root cause of these events was a failure to have effective programs in place relative to configuration management and work control. Existing procedures should preclude similar events in the future.

C. Contributing Cause

A contributing cause was a failure to have an effective program to self-identify, report, and repair problems, such as safety equipment deficiencies.

CORRECTIVE ACTIONS

A. Completed Corrective Actions

1. From January 9, 1997, to February 13, 1997, Fire Services personnel received additional training relative to the sprinkler systems, including proper methods of walkdown inspection. The training included a tour of the process buildings to view the sprinkler systems and to reinforce classroom discussions.
2. On March 27, 1997, corrective actions for the deficient systems were certified for construction under Engineering Service Order (ESO) Z98400.
3. Effective March 31, 1997, procedure UE2-EG-CF1032, "Configuration Management Program" was implemented.
4. Effective October 31, 1995, procedure UE2-TO-EG1031, "Modification Design Control" was implemented.
5. Effective April 1, 1996, procedure UE2-HR-CI1030, "Problem Reporting" was implemented.

6. Effective December 11, 1996, procedure CP2-GP-GP1032, Rev. 1, "Work Control Process" was implemented.

NOTE: The procedures listed above are intended to reflect the latest editions, not necessarily the first date of publication.

B. Planned Corrective Actions

1. By May 15, 1997, Fire Services will complete a walkdown of all sprinkler systems in the process buildings that are visible, or accessible without a permit. The results of the walkdown will be documented and deficiencies will be addressed and appropriately reported and dispositioned.
2. Within 120 days after completion of the work on the sprinkler systems as delineated in ESO Z98400, the Site and Facilities Support Manager will conduct an end-point assessment of the work completed under the ESO. The goal of the assessment will be to verify that the required work has been completed. Further, the end-point assessment will ensure that all sprinkler systems are capable of performing their installed function. The assessment will be documented and subject to audit.
3. By July 1, 1997, Engineering will update drawings affected by required modifications as a result of sprinkler system deficiencies corrected under ESO Z98400. The drawings will be "as built" to reflect true field configuration in accordance with approved plant procedures.
4. By August 25, 1997, procedure CP4-SS-FS6111, "TSR Surveillance, Inspection, and Testing of Wet Pipe Sprinkler Systems" will be revised to include more detailed inspection criteria. Included will be a requirement to look for missing sprinkler piping, as well as damaged or incorrectly oriented sprinkler heads. Lessons learned as a result of the current walkdown effort will be included in the procedure revision.

LESSONS LEARNED

Installation or modification to equipment/machinery, or construction in the vicinity of safety equipment, can adversely impact the ability of the safety system to perform its intended function. This potential for safety system degradation, or failure, must be considered and thoroughly coordinated prior to initiating the intended project.

EXTENT OF EXPOSURE OF INDIVIDUALS TO RADIATION OR TO RADIOACTIVE MATERIALS

None.

SPRINKLER SYSTEM DEFICIENCIES
(AS OF APRIL 16, 1997)

<u>NRC EVENT NO.</u>	<u>EVENT DATE</u>	<u>PROBLEM</u>	<u>LOCATION</u>
31972	3/18/97	Sprinkler system head C-2 obstructed by steel beams.	C-337
32002	3/22/97	Sprinkler system 21 installed incorrectly (45 degrees from vertical) and one head was obstructed by a light fixture. Sprinkler System 29 obstructed by utility piping system.	C-331
32012	3/24/97	Sprinkler system C-10 incorrect spacing. Sprinkler system B-16 did not provide adequate coverage. Sprinkler system C-2 did not provide adequate coverage.	C-337 C-337 C-333
32026	3/26/97	Sprinkler system 17 missing branch line.	C-331
UNK	3/12/97	Sprinkler system 33 branch pipe not connected to main header.	C-331
32080	4/3/97	Sprinkler system B-9 branch line disconnected.	C-333
32121	4/9/97	Sprinkler systems 13 & 17 No flow restricting orifices in inspector test valve. Sprinkler systems A-2, B-1, B-13; and C-5 No flow restricting orifices in inspector test valve.	C-331 C-333

<u>NRC EVENT NO.</u>	<u>EVENT DATE</u>	<u>PROBLEM</u>	<u>LOCATION</u>
32148	4/14/97	Sprinkler system A-5 branch section of piping not connected.	C-337
32162	4/15/97	Sprinkler systems D-1, D-5, B-1, D-9, D-13, B-13, B-9, B-5, B-4, C-1, C-5, C-9, C-13, branch lines installed, but never connected to fire water supply. Sprinkler systems A-1, A-5, A-9, A-5, A-13, C-13, B-9, B-5, B-1, installed, but never connected to fire water supply.	C-337 C-333
32170	4/16/97	Sprinkler systems 31 and 3 not connected to water supply. Sprinkler systems A-1, A-5, A-9, and A-13, not connected to water supply.	C-331 C-337

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List Of Commitments

1. By May 15, 1997, Fire Services will complete a 100 percent walkdown of all sprinkler systems in the process buildings which are visible or accessible without a permit. The results of the walkdown will be documented and deficiencies will be addressed and appropriately reported and dispositioned.
2. Within 120 days after completion of the work on the sprinkler systems as delineated in ESO Z98400, the Site and Facilities Support Manager will conduct an end-point assessment of the work completed under the ESO. The goal of the assessment will be to verify that 100 percent of the required work has been completed. Further, the end-point assessment will ensure that no sprinkler systems are determined to be deficient at the time of this assessment. The assessment will be documented and subject to audit.
3. By July 1, 1997, Engineering will update drawings affected by required modifications as a result of sprinkler system deficiencies corrected under ESO Z98400. The drawings will be "as built" to reflect true field configuration in accordance with approved plant procedures.
4. By August 25, 1997, procedure CP4-SS-FS6111, "TSR Surveillance, Inspection, and Testing of Wet Pipe Sprinkler Systems" will be revised to include more detailed inspection criteria. Included will be a requirement to look for missing sprinkler piping, as well as damaged or incorrectly oriented sprinkler heads. Lessons learned as a result of the current walkdown effort will be included in the procedure revision.

6. Effective December 11, 1996, procedure CP2-GP-GP1032, Rev. 1, "Work Control Process" was implemented.

NOTE: The procedures listed above are intended to reflect the latest editions, not necessarily the first date of publication.

B. Planned Corrective Actions

1. By May 15, 1997, Fire Services will complete a walkdown of all sprinkler systems in the process buildings that are visible, or accessible without a permit. The results of the walkdown will be documented and deficiencies will be addressed and appropriately reported and dispositioned. *OK 4/18/97*
2. Within 120 days after completion of the work on the sprinkler systems as delineated in ESO Z98400, the Site and Facilities Support Manager will conduct an end-point assessment of the work completed under the ESO. The goal of the assessment will be to verify that the required work has been completed. Further, the end-point assessment will ensure that all sprinkler systems are capable of performing their installed function. The assessment will be documented and subject to audit. *OK 4/18/97*
3. By July 1, 1997, Engineering will update drawings affected by required modifications as a result of sprinkler system deficiencies corrected under ESO Z98400. The drawings will be "as built" to reflect true field configuration in accordance with approved plant procedures. *Cal Jones 4-12-97*
4. By August 25, 1997, procedure CP4-SS-FS6111, "TSR Surveillance, Inspection, and Testing of Wet Pipe Sprinkler Systems" will be revised to include more detailed inspection criteria. Included will be a requirement to look for missing sprinkler piping, as well as damaged or incorrectly oriented sprinkler heads. Lessons learned as a result of the current walkdown effort will be included in the procedure revision. *OK 4/18/97*

LESSONS LEARNED

Installation or modification to equipment/machinery, or construction in the vicinity of safety equipment, can adversely impact the ability of the safety system to perform its intended function. This potential for safety system degradation, or failure, must be considered and thoroughly coordinated prior to initiating the intended project.

EXTENT OF EXPOSURE OF INDIVIDUALS TO RADIATION OR TO RADIOACTIVE MATERIALS

None.