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June 11, 1997

GDP 97-2007

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Portsmouth Gaseous Diffusion Plant (PORTS) - Docket No. 70-7002 - Event Report 97-07

Pursuant to Safety Analysis Report (SAR), Section 6.9, Table 6.9-1, J (2), Enclosure 1 provides the required 30 day written Event Report (ER) for an event involving a high condensate level shutoff actuation at the Portsmouth Gaseous Diffusion Plant. Enclosure 2 is a list of commitments made in the report.

Should you require additional information regarding this event, please contact Scott Scholl at (614) 897-2373.

Sincerely,

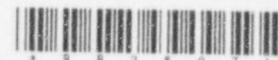
Dale Allen
General Manager
Portsmouth Gaseous Diffusion Plant

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DIA:Scholl:mc

Enclosures

cc: C. Cox/D. Hartland, NRC Resident Inspectors
NRC Region III



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Description of Event

On May 13, 1997, at 1718 hours, X-344 Autoclave (AC) #1 was in Mode II heating a 48-inch Uranium Hexafluoride (UF_6) cylinder when the audible alarm for steam shutdown was received. Operators responding to the alarm found the "A" and "B" condensate level probe lights on indicating the high condensate level shutoff (HCLS) safety system had actuated. Steam supply block valve PSV-103 was verified to be in the closed position, stopping steam flow to the autoclave as designed. A HCLS actuation is reportable in accordance with the Safety Analysis Report (SAR), Table 6.9-1, J (2).

The condensate level shutoff system is provided to prevent over pressurization or a nuclear criticality in an autoclave following a postulated UF_6 release. Excess water is undesirable in the event of a release from the cylinder that could cause either high Hydrogen Fluoride pressure as the result of the reaction between UF_6 and water or the excessive moderation of an unsafe mass of uranium thereby causing a criticality within the autoclave. The system function is to detect either a drain line plug or restriction and to shutoff the steam flow to the autoclave.

Cause of Event

The direct cause for the HCLS safety system actuation was the accumulation of debris in the condensate strainer. Maintenance inspected the in-line strainer and discovered that the strainer was restricted with debris.

The root cause for the event was that an abnormal amount of rust accumulated within AC #1 causing the condensate strainers to become rapidly plugged. In the past the accumulation of rust on the autoclave strainers was observed to be a gradual process. Normally an autoclave can be expected to operate for at least six months before strainer cleaning would be required. However, in this event the AC #1 strainer became restricted after approximately one hour and twenty-eight minutes of heating. This event is similar to a previous event (Portsmouth Event Report 97-04) where the X-344 AC #3 strainer became restricted with rust after approximately one month of operation.

Autoclave #1 was out of service for approximately a year for maintenance. Since the autoclave was down for so long a time, all TSR surveillance tests were completed before placing the autoclave back in service. The autoclave shell and head were cleaned on April 9, and 21, 1997. On May 6, 1997 Maintenance inspected the AC # 1 in-line strainer and found it to be 80% plugged. On May 7, 1997, a Post Maintenance Test (PMT) was performed on AC #1, in which the empty autoclave was heated with steam for 12 hours. On May 9, 1997, the

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interior head and shell of Autoclave #1 were swept out to remove loose debris. On May 13, 1997, the HCLS safety system actuated on AC #1 after heating a 48-inch UF₆ cylinder for an hour and twenty five minutes. Maintenance checked the strainer after the actuation and found the strainer volume was completely full of debris.

Since the autoclave shell was swept out after the strainer was cleaned, it is believed the shell cleaning contributed to the accumulation of debris in the strainer. Previous HCLS actuations caused by restricted strainers resulted in the implementation of an autoclave interior shell cleaning program. Interior shell cleaning was considered as a way to reduce the amount of rust that could accumulate in the strainers. Because of the autoclave design, interior shell cleaning is limited to accessible surfaces. Autoclave shell and head cleaning methods have been changed as a result of this event. Now autoclave shell and head cleaning will be followed by a PMT, in which the autoclave is steam heated to wash any residual debris into the in-line strainer. After the PMT has been completed the in-line strainers will be inspected for debris accumulation and cleaned if necessary. In addition, thoroughly cleaning UF₆ cylinders is not considered practical. As a result, cleaning operations are not completely effective at limiting rust accumulation from all sources.

The autoclave interior and UF₆ cylinders are made of steel which provides the source of rust within the autoclave. When rust flakes off it accumulates in the autoclave and eventually collects in the condensate strainer. The amount of rust within an autoclave is a function of the autoclave age and operational history. AC #1 has been in service for approximately twelve years. In addition, AC #1 was out of service for an extended period of time just prior to this event. This HCLS actuation occurred on the first cylinder that had been heated in the autoclave in approximately one year. Both of these factors would increase the amount of internal surface corrosion and contribute to an increase in rust accumulation.

Since the accumulation of rust within the autoclave cannot be readily controlled, Engineering has determined that the strainer design should be changed to accommodate the increased amount of rust. The engineering investigation in response to Event Report 97-04 identified that the X-344 autoclaves have one-inch diameter drain lines which differ from the two-inch drain lines that are incorporated into the other nine autoclaves. The condensate strainers in the one inch drain lines have a smaller surface area than the strainers in the two-inch lines. The smaller surface area will cause the strainers to become restricted more rapidly. The X-344 strainers will be increased in size to present fewer challenges to safety systems and allow longer run times between strainer cleaning.

A particle size analysis for debris typically collected in the strainer was performed. The analysis determined that most of the debris collecting on the strainer was two millimeters or

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less in size. Since the purpose of the strainer is to prevent large particles from fouling downstream equipment, Engineering determined that the strainer mesh size could be increased without any adverse effects to downstream equipment. As a result, the strainer mesh size will also be increased as a part of the design change that will increase the strainer surface area.

The above design change will be implemented prior to the restart of AC #1. As part of the evaluation of the new design, the strainer will be inspected to ensure the new design is effective at preventing rapid strainer plugging. Weekly inspections of the X-344 autoclave strainers will also be implemented and will continue until an appropriate inspection frequency can be determined based on the rate of debris accumulation.

Corrective Actions

1. On June 4, 1997, a new condensate strainer incorporating a larger surface area and mesh size was installed in X-344 AC #1.
2. By July 16, 1997, weekly condensate in-line strainer cleaning for the X-344 building autoclaves will be included on the PM Master portion of the Computer Maintenance Management System (CMMS). This frequency will continue until an appropriate inspection frequency can be determined based on the rate of debris accumulation.
3. Work instructions were revised on June 2, 1997 for the X-344 building Front Line Managers to assure that autoclave in-line strainer cleaning is performed after shell cleaning, prior to returning an autoclave to service.

Extent of Exposure of Individuals to Radiation or Radioactive Materials

There were no exposures to individuals from this incident to radiation or radioactive materials.

Lessons Learned

Cleaning of autoclave interior surfaces was originally considered as a way to reduce the amount of rust that could accumulate in the strainers. However, experience has proven that cleaning operations are not effective at limiting rust accumulation from all sources.

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Enclosure 2

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List of Commitments

1. By July 16, 1997, weekly condensate in-line strainer cleaning for the X-344 building autoclaves will be included on the PM Master portion of the Computer Maintenance Management System (CMMS). This frequency will continue until an appropriate inspection frequency can be determined based on the rate of debris accumulation.