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GDP 97-2012

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

Portsmouth Gaseous Diffusion Plant (PORTS) - Docket No. 70-7002 - Event Report 97-11

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

DIA:Scholl:mc

Enclosures

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

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Description of Event

On June 1, 1997, at 2225 hours, X-344 Autoclave (AC) #4 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 FSV-213 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 UF_6 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 foreign debris in the condensate drain line upstream of the in-line strainer. Maintenance inspected the in-line strainer and discovered that the strainer volume was approximately one third full of debris, however this debris was not believed to have been enough to cause the HCLS actuation.

The AC #4 condensate line was borescoped to investigate any other potential blockages in the line that could have caused water to backup and actuate the HCLS safety system. This investigation revealed that the condensate piping upstream of the in-line strainer was partially blocked with foreign debris. The foreign debris consisted of brass port caps and Teflon gaskets that are used to connect the UF_6 pigtail to the cylinder and to the autoclave head. These items had been inadvertently dropped through the grating when pigtails were connected/disconnected. Also found in the piping was a clamp and part of a hacksaw blade. The condensate line downstream of the strainer was also borescoped and no debris was found.

The root cause for the event was the lack of adequate controls to preclude foreign material from getting into the condensate drain line. Foreign material can fall through the grating or roll off the edge of the grating into the head of the autoclave. When the autoclave is heated with steam, the flow of condensate causes the debris to flow into the condensate drain. In the past there was no requirement to ensure that once material entered the autoclave head or entered the condensate

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drain line that it would be removed prior to autoclave startup.

There have been two past events where foreign material accumulated in the condensate drain line and caused HCLS actuations. These events occurred in June and July of 1995 on AC #3 in the X-344. In one event a latex surgical glove was found and in the other a combination of rust and pigtail gaskets were found.

Corrective actions for the previous two events included briefing autoclave operators on the importance of cleaning up debris that could cause condensate drain plugging. This action appears to have been ineffective because foreign material was again found in the AC #3 condensate drain line when it was recently inspected as part of the corrective actions for this event.

Corrective actions also included plans to modify the autoclaves to prevent debris from entering the autoclave drain system. The modifications included installation of screens that would be located beneath the condensate level probes in the X-342 and X-343 autoclaves. These modifications were included in the Autoclave Nuclear Safety Upgrade Project as part of a long term effort to improve autoclave operations. However, these modifications have not yet been implemented and were not planned to be installed in the X-344 autoclaves because the drain configuration precluded installing the screens.

In the past, removable screens were installed on the inlet to the condensate drain lines in the four X-344 autoclaves as a method to prevent foreign material from entering the condensate system. However, the X-344 autoclaves have been operated for periods of time without the screens in place, which provided opportunities for foreign material to enter the drain lines. In addition, the screens were recently removed from the autoclaves because of concerns that they could plug and prevent the downstream condensate from sensing a high autoclave water level. The remaining nine autoclaves in the X-342 and X-343 building have not had these same screens installed.

An inspection of the condensate drain lines on the other twelve autoclaves in X-342, X-343 and X-344 for foreign debris was completed. The results of the inspection revealed that five other autoclaves also had an accumulation of foreign material in their condensate lines. AC #3 in X-344 condensate drain line was found to contain a welding rod, several pigtail gaskets and port caps. AC #1 condensate line in X-342 contained nine pigtail gaskets. AC #5 condensate drain line in X-343 contained a piece of Viton O-ring material and a magic marker. AC #2 condensate drain line in X-344 contained seven pigtail gaskets and a piece of wire.

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Although most of the foreign material appears to be the result of pigtail gaskets that are used for connecting/disconnecting the pigtail from the cylinder and the head of the autoclave, some of the foreign objects originated from maintenance activities in and around the autoclave. Procedure XP3-GP-GP1070 "Foreign Material Exclusion" does provide requirements to control foreign material entry into plant equipment during maintenance. However, the investigation into this event determined that this procedure was not applied to all maintenance activities where materials could enter into the autoclave interior.

Corrective Actions

1. On June 4, 1997, work instructions for all autoclaves were issued to ensure that any known or suspected foreign material entering the autoclave condensate drain system is removed or its absence verified by visual inspection prior to autoclave startup. This action will provide interim controls until procedure revisions can be completed.
2. On June 25, 1997, guidance was issued to maintenance planners to reinforce the requirement that Foreign Material Exclusion be applied to all work where foreign material could enter open piping or equipment, such as work being performed in the autoclave interior.
3. By August 21, 1997, Autoclave operating procedures will be revised to add steps to ensure that any known or suspected foreign material entering the condensate drain system is removed or its absence verified by visual inspection prior to autoclave startup.
4. By August 30, 1997, engineering will evaluate the X-342, X-343 and X-344 autoclave designs and foreign material exclusion programs, including current planned modifications, and determine what additional changes may be necessary to prevent foreign material from entering the condensate drain system.
5. Based on the results of the evaluation, a schedule for implementing necessary design changes will be developed by September 30, 1997.

Extent of Exposure of Individuals to Radiation or Radioactive Materials

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

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Lessons Learned

Foreign material entry into the condensate drain lines can cause the lines to become restricted. In addition, foreign material can potentially affect the ability of safety related containment isolation valves that are located in the condensate line to close. Engineering controls will need to be in place to prevent foreign material entry, as well as administrative controls to ensure that once material enters it is removed before autoclave startup.

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Enclosure 2

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List of Commitments

1. By August 21, 1997, Autoclave operating procedures will be revised to add steps to ensure that any known or suspected foreign material entering the condensate drain system is removed or its absence verified by visual inspection prior to autoclave startup.
2. By August 30, 1997, engineering will evaluate the X-342, X-343 and X-344 autoclave designs and foreign material exclusion programs, including current planned modifications, and determine what additional changes may be necessary to prevent foreign material from entering the condensate drain system.
3. Based on the results of the evaluation, a schedule for implementing necessary design changes will be developed by September 30, 1997.