U. S. NUCLEAR REGULATORY COMMISSION

REGION III

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| Docket No. | 70-7002 |
| Certificate No. | N/A |
| Observation Report No. | 70-7002/96004 (DNMS) |
| Applicant: | United States Enrichment Corporation |
| Facility Name: | Portsmouth Gaseous Diffusion Plant |
| Location: | 3930 U. S. Route 23 South<br>P. O. Box 628<br>Piketon, OH 45661 |
| Dates: | June 18, 1996 through July 28, 1996 |
| Inspectors: | C. R. Cox, Senior Resident Inspector<br>F. D. Brown, Resident Inspector |
| Approved By: | Gary L. Shear, Chief<br>Fuel Cycle Branch |

## EXECUTIVE SUMMARY

### United States Enrichment Corporation
### Portsmouth Gaseous Diffusion Plant
### NRC Inspection Report 70-7002/96004(DNMS)

This observation report includes aspects of plant operations, maintenance/material condition, engineering, and plant support. Observations were made by the resident inspectors as part of their routine duties.

Authority Statement: The Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) have agreed to cooperate to facilitate the NRC's obtaining of information and knowledge regarding the gaseous diffusion plants and the United States Enrichment Corporation's (USEC) operation thereof through observation/inspection activities during the interim period before the NRC assumes regulatory responsibility. This report is a summary of NRC observations for the period stated. Each of the observations was communicated to the DOE site safety staff and USEC site staff during and at the end of the observation period to allow for their future followup and evaluation, as appropriate.

Plant Operations

While some improvements in the rigor used in valving orders was noted, there continued to be problems in this area. Conditioning Agent was valved into the wrong cascade component due to ambiguities between procedure controlled valves versus valves requiring valving orders (Section O1.2).

Material condition problems (leaking valves) in the Low Assay Withdrawal header led to a potential Operational Safety Requirement (OSR) violation; higher than allowed assay in the X-330 building (Section O1.3).

Maintenance and Surveillance

Poor material condition (inoperable isolation valves) caused repair problems when the Recirculation Cooling Water main to the X-530 Switchyard building ruptured (Section M1.2).

Engineering

A single nuclear contingency condition was discovered in the X-344 scale pits when water was found in the pits at greater than assumed values (Section E2.1).

DOE and the NRC inspectors identified a lack of rigor and procedure compliance in the Unreviewed Safety Question Determination program (Section E2.2).

Plant Support

The NRC inspectors identified that a Plant Shift Supervisor (PSS) was unaware of a fire fighting restriction being placed on the Emergency Squad. The PSS had received a poor turnover (Section P8.1).

## REPORT DETAILS

### Summary of Plant Status

The plant operated at approximately 1400 MW during most of this observation period.

## I. Operations

### O1 Conduct of Operations[1]

#### O1.1 General Comments

The inspectors observed selected operational activities. Specific events and noteworthy observations are detailed in the sections below.

#### O1.2 Two Valving Errors in X-330 Conditioning Agent Operations

a. Inspection Scope

The inspectors reviewed the circumstances surrounding two valving errors in the X-330 building.

b. Observations and Findings

Control of valving operations has been an area of concern (see Observation Reports 70-7002/96001, Paragraph 2., and 70-7002/96002, Section O.1). During this observation period, the Portsmouth problem reporting system identified two instances of valving errors in the X-330 building Conditioning Agent (CA) system. In one case, a CA system leakrate test failure led to the discovery that a boundary valve verified closed on the valving order was in fact open. In the other case, CA was charged into the wrong header. Fortuitously, the header which received the CA led to an off-stream booster compressor which was already being treated. The additional CA fed into the booster did not cause any technical or regulatory limit to be exceeded. This valving error occurred in a valve manifold for which no procedural guidance existed, and for which no valving order was prepared.

The Enrichment Plant Manager and the Operations Manager indicated to the inspectors that they felt the latest programmatic controls for valving operations were generally adequate, and that the most recent valving errors were specific cases which required corrective actions for personnel performance issues. The

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[1]Topical headings such as O1, M8, etc., are used in accordance with the NRC standardized inspection report outline contained in NRC Manual Chapter 0610. Individual reports are not expected to address all outline topics, and the topical headings are therefore not always sequential.

inspectors also noted examples of management's resolve to enforce the new program controls in the face of strong resistance from operations staff. Notwithstanding these positive observations, the continued occurrence of valving errors in the Cascade was of concern. The inspectors noted that valving errors in Cold Recovery, and most recently, the CA system had been attributed to an ambiguity in the transition between valves under procedural control and valves which require valving orders.

c. Conclusions

Valving errors continue to be a recurring problem area. Identification of any remaining procedural ambiguities in a planned and controlled manner appeared appropriate. Additionally, the continued examples of errors in the development and implementation of valving orders indicated the need for additional involvement of line management in this performance area.

O1.3 Leaking Valve Leads to Potential OSR Violation

a. Inspection Scope

The inspectors performed regular reviews of the Cascade Controllers' logs, discussed plant status with the on-shift Cascade Controller, and walked down the Plant Control Facility mimic panels.

b. Observations and Findings

On July 22, 1996, the inspectors noted that on July 21, 1996, the X-333 building had been unable to achieve a satisfactory leak rate for a vent return path that was being established in anticipation of a 1.9 weight per cent (wt%) uranium 235 ($U^{235}$) withdrawal from the "A" loop of the Low Assay Withdrawal (LAW) station. Unsatisfactory leak rates were not uncommon because of the poor material condition of boundary and isolation valves in the X-333 and X-330 buildings. This material condition was discussed in Observation Report 70-7002/96002, Section O2.1.

On the morning of July 23, 1996, the inspectors noted in a Cascade Controller's log entry that the problem with the LAW "A" vent return leak rate had been identified as a leaking valve which isolated the LAW "B" loop vent return path. The LAW "B" loop was then in use for a 4.4 wt% $U^{235}$ material withdrawal. The leak between the two vent paths meant that a small quantity of 4.4 wt% $U^{235}$ material was transferred to a cell containing approximately 1.9 wt% $U^{235}$. The Cascade Controller informed the inspectors that Operations was preparing to pull the higher assay material into the X-330 building, where the evacuation booster system (EBS) was rated to handle it. The inspectors discussed the generic implications of the condition with the X-333 building management team on July 23, 1996, and concurred that there was little direct

safety consequence associated with the condition because of the small quantity of material in the vent return line and the non-moderated environment within the cascade service piping. The building management team was unable to tell the inspectors whether the X-333 building EBS (limited to 2.3 wt% $U^{235}$ by an operational safety requirement (OSR)) had been used to evacuate the LAW "A" loop vent on July 21, 1996.

On July 24, 1996, the inspectors attempted to review the problem report on the LAW vent return situation in an effort to determine the evacuation path used for the July 21, 1996, leak rate test. The inspectors learned that no problem report had been initiated, which was in nonconformance with plant procedures. The inspectors contacted the Department of Energy (DOE) Site Safety Representatives (SSR) and the plant Nuclear Regulatory Affairs (NRA) staff to inform them of the inspectors observations.

The SSRs and NRA staff initiated an investigation and determined that the X-333 EBS had been used to evacuate the LAW "A" vent return line as part of the July 21, 1996, leak rate test. The plant initiated a review to determine whether the small quantity of 4.4 wt% $U^{235}$ material which may have been in the line prior to or during the evacuation constituted a violation of the X-333 EBS OSR requirements. The facility's conclusion was that the OSR was not violated due to the small amount of material involved. DOE was assessing the potential OSR violation at the end of the inspection period.

One other aspect of the LAW vent system, which was identified during the SSR investigation, was that the LAW "B" vent return pressure indicator (PI) had failed on July 1, 1996. A maintenance service request (MSR) had been initiated to fix the PI, and a work-around had been established by valving the LAW "A" vent return PI into the LAW "B" vent path. No problem report had been initiated on the inservice failure of the LAW "B" vent return PI.

c. Conclusions

Poor material condition in the X-333 service system valves led to a potential OSR violation. Operations responded to the inservice failure of a PI by initiating a work-around. Neither of these conditions was promptly identified by problem reports. These are recurring areas of concern.

## 07 Miscellaneous Operational Issues

### 07.1 High Cylinder Pressure Event: GDC 70-7002/95005-01 (Closed)

In October 1995, two 2.5 ton cylinders of enriched feed material experienced short pressure excursions while they were being heated in preparation for hot liquid sampling. Inspector review of the root cause determination for these pressure excursions was identified as an

Observation Followup Item (GDC 70-7002/95005-01). The inspectors obtained, and reviewed a copy of Portsmouth's technical evaluation of the effected cylinders. Portsmouth determined, based upon chemical analysis of the effected cylinders and a review of similar events at the Paducah Gaseous Diffusion Plant, that the probable cause of the pressure excursion was the trapping of a small amount of liquid Uranium Hexaflouride in the cylinder pigtail. The corrective actions identified to prevent pigtail overpressurization appeared adequate. Based upon this information, the inspectors considered this item closed.

## II. Maintenance

### M1. Conduct of Maintenance and Surveillance

#### M1.1 General Comments

During routine tours of plant facilities, the inspectors observed the general physical condition of plant equipment and some in-progress maintenance activities. The inspectors also reviewed some maintenance records and maintenance-related nonconformance reports. The focus of the observations was to assess the overall performance of maintenance activities and their effectiveness in maintaining the material condition of the plant's facilities, systems, and equipment.

#### M1.2 Recirculation Cooling Water Pipe Break

a. Inspection Scope

The inspectors reviewed the circumstances associated with a break which occurred in a Recirculation Cooling Water (RCW) pipe.

b. Observations and Findings

Portsmouth experienced an underground water line break at approximately 0340 on July 17, 1996. The water line break created a geyser of water immediately adjacent to the X-530 Switchyard building. No electrical equipment was effected. The entry of water from the break into the X-530 building was halted by using the front end loader on a tractor to suppress the geyser. The original discharge rate was approximately 1,000 gallons per minute (gpm). The discharge rate was reduced to approximately 500 gpm late on the afternoon of July 17, 1996. The broken pipe was isolated, and the discharge was stopped at approximately 5:10 p.m. on July 18, 1996.

Plant staff identified that the break was in one of two 8 inch diameter supply lines for cooling water to the X-530 synchronous condensers which supply power to the X-330 and X-326 cascade compressors. This water is supplied from the X-630 RCW system.

The X-630 RCW system has two parallel, redundant distribution mains. The X-630 RCW system also supplies cooling water to the X-330 and X-326 cascade buildings.

Isolation of the line break was delayed significantly by the poor material condition of the RCW sectional valves. Three of twelve valves required for complete isolation of the leak could not be closed. The leak was ultimately isolated by installation of new valve devices into the affected line while it was pressurized (about 80 pounds per square inch gauge (psig)) and had flow.

No safety system degradation occurred as a result of the line break. RCW provides no direct safety system function. The plant water make-up system compensated for the lost RCW inventory. As a result of the leak, the plant reduced the cascade operating pressures in the X-330 cascade building. This reduced the cooling load requirements to the point that RCW distribution line pressures were reduced enough to decrease the leakrate by approximately one half on the afternoon of July 17, 1996.

The plant implemented additional inspections to ensure that the water line break did not affect underground power or control distribution systems.

Portsmouth initiated an extensive technical evaluation of the RCW system following this event to determine the cause of the pipe break. Results were not available at the conclusion of the inspection period.

The inspectors were concerned that a similar material condition could exist for the High Pressure Fire Water System sectional valves. The inspectors verified that those valves were being exercised during their annual surveillance.

c. Conclusions

The inspectors were concerned by the poor material condition of the RCW isolation valves. Although there was no direct nuclear safety consequence associated with this event, a major loss of RCW could cause major cascade upsets resulting in possible releases of freon and/or $UF_6$.

M8 Miscellaneous Maintenance Items

M8.1 Followup on Compliance Plan Commitment Dates (Closed)

The inspectors were concerned that Portsmouth's planned milestones for implementation of effective maintenance programs, as outlined in the proposed Certification Compliance Plan, were not realistic based upon the magnitude of required effort. This issue was discussed in Observation Report 70-7002/96002 (DNMS), Section M6.1. The inspectors learned that Portsmouth had reviewed the recently agreed upon safety

related system boundaries, and had established approved commitment dates, which plant management believed were obtainable, for the implementation of maintenance programs.

M8.2 Safety System Valve Reliability: GDC 70-7002/96001-01 (Closed)

The inspectors identified concerns with the reliability of "air-to-close" pneumatic valves used as containment valves in autoclave safety systems. Significant failure rates, apparently associated with an "operate to failure" maintenance program, were not being addressed by Portsmouth plant management. This issue was identified as Observation Followup Item GDC 70-7002/96001-01.

The inspectors reviewed Revision 3 of the Certification Compliance Plan and determined that the reliability of autoclave safety system valves was being addressed by two committed actions. The first committed action was the replacement of "air-to-close" valves with valves which fail closed upon loss of air or power. The second committed action was the implementation of effective maintenance programs for safety related components. Based upon these commitments, the inspectors consider this item closed.

## III. Engineering

E1. Conduct of Engineering

Throughout the observation period, the inspectors observed facility engineering activities, particularly the engineering organization performance of routine and reactive site activities, including identification and resolution of technical issues and problems.

E2 Engineering Support of Facilities and Equipment

E2.1 Inadequate Evaluation of Scale Pit Sumps

a. Scope

The inspectors reviewed the circumstances surrounding a violation of double contingency Nuclear Criticality Safety (NCS) controls.

b. Observations and Findings

The Portsmouth scales used to obtain accountability weights for uranium hexaflouride cylinders are mounted in pits so that full cylinders can be positioned on the scale at floor level. The pits are of unfavorable geometry in order to contain the scale apparatus. If a cylinder were to rupture in the area around a scale, uranium would enter this pit.

While researching the status of NCS controls for X-340 complex scale pits, in response to an NRC certification question, an NCS engineer identified that two of the X-344 scale pits did not conform to the assumptions in the NCS evaluations. The larger scale pit sumps, together with the sump pump suction configuration, resulted in the pits containing more water than was anticipated or allowed. The presence of the as-found quantity of water (between two and four times the allowed) led to a loss of moderation control. This left the single controlled contingency of the $UF_6$ cylinder integrity in place.

The NCS engineer initiated a problem report and ensured that compensatory measures were implemented to reestablish double contingency controls. The plant reported the as-found condition using the current event report system.

Several aspects of this condition were of particular concern to the inspectors. The first was that the NCS evaluation was based upon inaccurate assumptions about the pit's water retention capabilities. The inspectors could not determine whether the pits were built before or after the NCS evaluation was performed. The inspectors were informed that this was an old NCS evaluation, and that it was already scheduled to be replaced as a part of the nuclear safety upgrades project.

The second aspect of concern was that the water in the scale pits was the result of an NCS required test. This test specified pouring water into the pits to verify sump pump operability. The test also appeared to be inadequate in that it had not identified the excessive water retention in the scale pits.

The final aspect of concern was that scale pit NCS control problems had been identified at the withdrawal stations in March 1996 (Observation Report 70-7002/96002, Section O7.2). Neither the NCS engineering staff nor the Operations staff had investigated the X-340 complex scale pits at that time.

c. Conclusions

Previous Observation reports have identified weaknesses in the establishment and implementation of NCS controls and a weakness in the effective communication of lessons learned between facilities.

This event again pointed to the need to ensure high quality NCS evaluations and suitable tests and maintenance programs for NCS controls. It also indicated the continued opportunity to improve the communication of lessons learned between the facilities.

## E3 Engineering Procedures and Programs

### E3.1 Program for Performing Safety Assessments

a. Inspection Scope

The inspectors reviewed a sampling of written safety assessments, including Unreviewed Safety Question Determinations (USQDs), to assess the plant's readiness for NRC regulatory oversight. The inspectors also met with the plant Safety Assessment Manager and with the Department of Energy (DOE) Site Safety Representatives (SSRs) to discuss the quality of current USQDs and planned program changes.

b. Observations and Findings

DOE identified examples of USQDs which may not conform to the current regulatory basis for technical content and thoroughness. The DOE findings will be addressed through the mechanisms of the Regulatory Oversight Agreement (ROA). Based upon the USQDs reviewed and those discussed with DOE, the inspectors concluded that the technical content and clarity had improved during the last two years, but that the DOE identified concerns would continue to be relevant following oversight transition to the NRC.

The inspectors noted that the plant staff had initiated problem reports during this observation period for two examples of modifications, which were implemented without the required safety assessments.

The inspectors discussed Portsmouth's plans for implementing the requirements of 10 CFR 76.68, "Plant Changes," with the Safety Assessment Manager. He indicated that the Portsmouth procedure for safety assessments was being revised to address at least two new issues:

1) Safety assessment and USQDs would be integrated into the process for controlling plant changes, as required by 10 CFR 76.68. This would require greater integration of the safety assessment group's activities with such groups as Design Engineering, Construction Engineering, Work Control, and Maintenance. It would also require integration of safety assessment activities into new areas, such as the health physics program, the environmental protection program, and the nuclear criticality safety program, because the Program Descriptions contained in the Certification Application constituted a portion of the Safety Analysis Report (SAR) for the purposes of 10 CFR 76.68.

2) The safety assessment process for proposed modifications would be expanded to address the implementation of the modification (affect on work area and workers), and the affect of any sequencing of multiple modifications (establish expected plant conditions during implementation and post modification), as well as the plant configuration at the completion of the modification.

The inspectors considered the proposed changes appropriate and necessary based upon the requirements of 10 CFR 76.68. The inspectors pointed out that any work, either ongoing or newly initiated, being performed at the time of regulatory transition would be subject to the requirements of 10 CFR 76.68. This being the case, rapid implementation of the new program elements discussed above would appear appropriate to minimize the number of safety assessments performed under the existing program for modifications to be implemented under NRC regulation.

c. Conclusions

Portsmouth's safety assessment program and its implementation during this inspection period did not appear to control plant changes in a manner consistent with the requirements which will be in effect after NRC assumption of regulatory oversight. The plant has identified several important program changes which they intend to implement in order to obtain conformance with the NRC requirements. Timely implementation of the identified changes appeared to be appropriate.

## IV. Plant Support

P8 Emergency Planning Issues

P8.1 Emergency Squad Expired Fire Training

The inspectors reviewed the Plant Shift Superintendent (PSS) Log for July 24, 1996. An entry stated that restrictions were placed on the Emergency Squad per a referenced problem report. The inspectors found the reference to the problem report was in error and another problem report identified that the Emergency Squad's initial fire response training had expired. That problem report placed a restriction on the use of the Emergency Squad for initial fire response. The inability to use the Emergency Squad for fire response did not appear to be a problem since the facility had a full time fire department.

On July 26, 1996, the inspectors queried the PSS on the Emergency Squad restrictions. The PSS, who had just come back from four days off, had received his turnover. He was not aware of the restrictions until the inspectors pointed out the log entry from July 24, 1996. The inspectors also pointed out the appropriate problem report which clarified the

restrictions placed on the Emergency Squad. Because the PSS is the on-scene commander during emergency response, the PSS's lack of knowledge about the restriction was of concern. The inspectors noted that the restriction should have been a key turnover item when the PSS went on shift.

P8.2 Plant Control Facility Ventilation: GDC 70-7002/95005-02 (Closed)

The Plant Control Facility (PCF) in X-300 serves as the back-up Emergency Operations Center (EOC). The inspectors learned that the PCF ventilation system was not designed to allow building occupancy in the event that a chemical release occurred in the area (no protective filtration system). The adequacy of the existing ventilation system design was being tracked as Observation Followup Item GDC 70-7002/95005-02. The inspectors reviewed the Portsmouth Certification Application Accident Analysis and Emergency Plan to determine whether the lack of filtered ventilation impacted the assumptions or specified actions contained therein. The inspectors determined that the existing ventilation design did not invalidate the assumptions contained in the Accident Analysis. The inspectors also determined that the Emergency Plan did not take undue credit for the availability of the PCF in the event of a chemical release. The inspectors consider this item closed.

## X. Management Meetings

X1 Exit Meeting Summary

The inspectors met with facility management representatives and the DOE Site Safety Representatives throughout the observation period and on July 29, 1996. The likely informational content of the observation report was discussed. No classified or proprietary information was identified. No disagreement with observations or findings, as described by the inspectors at these meetings, was identified.

## Partial List of Persons Contacted

Lockheed Martin Utility Services (LMUS)

*D. I. Allen, General Manager
J. E. Shoemaker, Enrichment Plant Manager
*J. V. Anzelmo, Work Control Manager
*R. W. Gaston, Nuclear Regulatory Affairs Manager
*C. F. Harley, Engineering Manager
*G. S. Price, Maintenance Manager
*C. W. Sheward, Operations Manager

United States Enrichment Corporation

*J. H. Miller, USEC Vice President, Production
*L. Fink, Safety, Safeguards & Quality Manager

United States Department of Energy (DOE)

J. A. Crum, Site Safety Representative
*J. C. Orrison, Site Safety Representative

Nuclear Regulatory Commission (NRC)

C. R. Cox, Senior Resident Inspector
F. D. Brown, Resident Inspector
C. B. Sawyer, Project Manager

* Denotes those present at routine resident exit meeting held on July 29, 1996.

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

70-7002/95005-01
70-7002/95005-02
70-7002/96001-01

Discussed

None

Certification Issues - Closed

Section M6.1 - Compliance Plan Commitment Dates