U.S. NUCLEAR REGULATORY COMMISSION

Observation Report No. 70-7002/96-203

Docket No. 70-7002

Facility Operator: United States Enrichment Corporation
3930 U.S. Route 23 South
P.O. Box 628
Piketon, OH 45661

Facility Name: Portsmouth Gaseous Diffusion Plant

Observations At: Piketon, OH

Observations Conducted: September 30 through October 4, 1996

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10/31/96
Date

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 routine and special inspection activities during the interim period before the NRC assumes regulatory responsibility, 59 FR 48648 (September 22, 1994). This inspection report is a summary of NRC activities for the period stated below. Each of the observations was communicated to the DOE site safety representative and USEC site staff during and at the end of the observation period to allow for their future followup and evaluation, as appropriate.

Enclosure

EXECUTIVE SUMMARY

PORTSMOUTH GASEOUS DIFFUSION PLANT
NRC INSPECTION REPORT
70-7002/96-203

Areas Inspected

NRC performed a routine, announced criticality safety inspection of the U.S. Enrichment Corporation (USEC) Portsmouth Gaseous Diffusion Plant (PORTS) at Piketon, OH from September 30 to October 4, 1996. The inspection was performed using staff from NRC Headquarters. The progress that the facility has made in achieving compliance with NRC regulations at the plant in the area of Nuclear Criticality Safety (NCS) was examined, and the readiness for DOE to NRC transition was reviewed. Also, information was obtained for use in developing criticality safety standards for the gaseous diffusion plants.

Major programmatic portions of the NCS program which were reviewed at PORTS included:

- Management and Administrative Practices for Nuclear Criticality Safety
- Nuclear Criticality Safety Function
- Plant Activities
- Nuclear Criticality Safety Configuration Control Program
- Nuclear Criticality Safety Change Control
- Operating Procedures
- Maintenance for Nuclear Criticality Safety
- Nuclear Criticality Safety Training
- Criticality Alarm Monitoring System

The inspection was conducted using the objectives of the draft Headquarters Inspection Procedure 88015.

Results

- As a result of this inspection, no significant safety issues were identified.

- For the systems inspected, USEC implementation of the overall NCS program was incomplete. Only 49 of 199 NCS Approvals (NCSAs) have been drafted in approximately two and one-half years. Of the 49, only 10 have been incorporated into procedures, walked down, and training completed. The facility has committed to complete the remaining 189 NCSAs by December 31, 1996. Plant management was requested to reexamine the feasibility of meeting this commitment date on time.

- The Plant Operations Review Committee (PORC) procedure does not indicate the method of approval (i.e., consensus, majority, etc.).

- The completed NCSAs that were reviewed were adequate and generally allowed a confirmatory review by knowledgeable individuals.

- Freezer sublimers which were not in use have not been removed from service in a manner that assures that they will not be inadvertently used.

- The configuration management system is highly fragmented and personnel dependent. The current system only covers design documents. The facility states that a new system is being developed that will centralize the process and may be in place by December 31, 1998.

- Control of Technical Safety Requirements (TSRs) and TSR-based surveillances is a concern. The system used is informally operated by an individual in the maintenance group.

- Adequate procedures have been developed for the 10 CFR 76.68 change control process. However, there is currently no mechanism in place to incorporate NCS requirements from newer NCSAs into the centralized tracking systems being developed.

- Flowdown of NCSA requirements into procedures that were available appears to be adequate. However, it was noted that specific NCSAs should be referenced in the procedures.

- All required training will be completed on Feed, Transfer, and Cascade Operations, but is not expected to be completed on balance-of-plant until after December 31, 1996. Other system training is being completed, at risk, pending final approval of the NCSAs.

- The current system for tracking existing training requirements was adequate.

- There is an adequate program for implementing and tracking NCSA-based training requirements and tracing those requirements back to a specific NCSA.

- NCS training for general employees, specific area operators, and first-line supervisors is adequate.

- Issue 10 of the PORTS Compliance Plan addressed training of organizational managers. There was no information available at the time of this assessment which indicated that this training had been developed or provided to the upper managers.

- The NCS staff appeared to be well qualified, but the inspectors expressed concern that the NCS staff may not be able to complete the remaining NCSAs on schedule while at the same time meeting routine requirements.

DETAILS

1.0 Management and Administrative Practices for Nuclear Criticality Safety

a. Scope

Inspectors reviewed implementation of the NCS program to assure that commitments contained in the PORT SAR Chapter 5.2 are addressed.

b. Observations

The facility has established a technically adequate NCS function. However, implementation of the overall NCS program was incomplete. Only 49 of 199 NCS Approvals (NCSAs) have been drafted in about two and one-half years. Of the 49, only 10 have had their respective requirements incorporated into procedures, had the procedures reviewed in the plant (walked down), and completed staff training on the modified procedures. The facility has committed in Compliance Plan Issues 8 and 9 to complete the remaining 189 NCSAs by December 31, 1996. During interviews, the NCS staff did not appear confident that they could complete the assigned NCSAs because of the extended NCSA upgrade activities and the routine workload. Plant management was requested to reexamine the feasibility of meeting this commitment date on time.

The inspectors noted that final review of safety documentation such as NCSAs is delegated to the Plant Operations Review Committee (PORC). The PORC operates under a procedure which does not indicate the method of approval of the documents that are reviewed (i.e., consensus, majority, etc.). According to the NCS staff, the PORC has final approval authority over NCSAs/NCSEs. The administrative independence of the NCS function is a concern because the PORC is chaired by the head of production. Paragraph 3.b below cites a specific example of production involvement in safety analysis.

c. Conclusions

The NCS function was technically adequate but may not be administratively independent from process supervision as required by ANSI/ANS .1. Procedure development and approval is multi-disciplinary and meets requirements for management involvement in and support of the NCS program. The workload of the NCS staff did not appear conducive to completion of the NCSAs along with other routine activities such as surveillances.

2.0 Nuclear Criticality Safety Function

a. Scope

The NCS Manager, Senior NCS Engineers and NCS Engineers were interviewed. Draft procedures for NCS, NCS personnel qualification,

NCS calculations, NCS walkthroughs, and Field Verification of NCSAs/NCSEs were reviewed.

b. Observations

NCS staff were familiar with current standards and codes. Some NCS staff members were active in national professional organizations. All staff members possessed at least the minimum required academic credentials and had completed a company qualification program. The company qualification program appeared thorough and involved training in areas such as NCS calculations, alarm systems, and administrative NCS practices. The qualification program included problem exercises, the results of which were retained with the individual qualification documents after completion.

The professional NCS staff performs calculations, evaluations, approvals, walkdowns, and responds to problems. The NCS staff consisted of a part-time NCS manager and nine NCS engineers, three of whom were temporary employees. NCS staff referred to the draft plant NCS procedure, XP2-EG-NS1031, when responding to questions about their organization and function. The inspector noted that the procedure does not assign responsibility to the NCS function for NCS program implementation. Paragraph 6.8.1 of the procedure assigns all authority and responsibility for implementation of NCS to the PORC which then delegates this activity to an NCS subcommittee. This assignment of responsibility is a concern because it is not in accordance with ANSI/ANS 8.1 Chapter 4.1.1.

A major assumption in the safety basis at PORTS is that gaseous UF_6 cannot sustain criticality. NCS personnel could not provide documentation to support this assumption. In discussing the assumption concerning gaseous product, PORTS NCS staff stated that they were drafting a summary of the analysis but were not satisfied with it at this time. A second major assumption in the PORTS safety basis is that UO_2F_2 (the form of the uranium deposits in process equipment) cannot sustain criticality at enrichments below 7 percent without moderation. The NCS staff provided documentation of this second assumption which was adequate to support the safety basis.

NCSEs and NCSAs had been maintained, as controlled records by their owners, the NCS function, consistent with the description contained in Issue 29 of the Compliance Plan. This was verified by personnel involved with Document Control. The NCS staff stated that these documents were already being centrally managed by the Document Accounting and Record Management organizations. Inspectors noted that there is a commitment in the Compliance Plan for a centralized, secure records management program that would take over management of the NCSEs completely by December 31, 1998, but facility staff stated that this had already been accomplished for the NCSEs and NCSAs.

Several NCSEs and NCSAs indicated below were selected at random for review from the list of completed draft documents. The NCSAs reviewed

indicated that, for the most part, except as discussed below, the analyses appeared to be complete and properly documented. Postulated accident conditions appeared to be appropriate. Some operations are protected by a single contingency with multiple controls. Single contingency criticality analyses did not appear to include common mode failure analysis. With only a single contingency, common mode failure is a concern due to the possibility of a single failure defeating multiple controls. Analysis of single contingency operations is incomplete without a determination of whether the controls may be bypassed by a single failure.

c. Conclusions

Concerns remain regarding independence of the NCS function, completeness of single contingency criticality analyses, and documentation of assumptions supporting the plant's safety basis.

d. Inspector Follow-up Items

(IFI-70-7002/96-203-01) Confirm the adequacy of single contingency NCSAs.

(IFI-70-7002/96-203-02) Verify that the centralized document control system is functional with regard to the NCSEs and NCSAs.

3.0 Plant Activities

a. Scope

Walkthroughs of the Low Assay Withdrawal (LAW) Station at Building X333, the X333 Process Building, the X326 Process Building and the X705 Decontamination Building were performed to familiarize NRC inspectors with the facility and process, and to observe the extent of implementation of NCSA requirements.

b. Observations

Operations observed were being conducted in accordance with existing Operational Safety Requirements (OSRs) which were used to implement current NCS requirements. NCS requirements were not uniformly posted in the facilities. The NCS Manager stated that the NCS upgrade would include a review of all posting requirements and that areas with NCS controls could be expected to be posted.

The Freezer/Sublimer Station was inspected to assess its condition. The equipment was not in use and was tagged out with CAUTION Tags. According to DOE Order 5480.19 and facility procedure H&S SPP #M-5, CAUTION Tags are used to provide information about functional equipment. However, it was determined through discussions with operators that this equipment was not considered functional. Site management was questioned about other means of preventing inadvertent use of this equipment.

The Building 705 Chemical Cleanup/D&D Tunnel (Car Wash Tunnel) was inspected. The facility operating procedures have evaluated criticality safety requirements and are operating under OSR limits. Compliance Plan Issue 9 requires completion of procedure upgrades by December 31, 1996, which would include incorporation of TSR requirements.

The draft LAW facility NCSA was reviewed and was adequate based on the above assumptions. The Building 343 LAW facility and its control room were also inspected. It was noted that, operating procedures were at each of the various stations located in the control room. The pit below the LAW cylinders was also inspected. This pit contained Raschig rings to a depth of six inches. The decision to use six inches of Raschig rings in the pit was made by production staff because it was felt that the pit could not fill with more water than that and because a deeper bed of Raschig rings might interfere with operation of the cylinder load cell. Inspectors saw no evidence of independent verification of the validity of the production assumptions.

c. Conclusions

Little progress has been made in implementing NCSA requirements in facilities.

d. Inspector Follow-up Items

(IFI-70-7002/96-203-03) Determine that NCS requirements are uniformly posted throughout the plant as a result of completion of the NCS upgrade program.

4.0 Configuration Control Program

a. Scope

Inspectors examined selected plant systems for documentation of current NCS-significant requirements and for assurance that procedures, NCSEs, and NCSAs are kept current and secure, and to ensure that required maintenance, calibration, and surveillance activities are implemented.

b. Observations

There is no single comprehensive configuration control system at the PORTS facility associated with preventive maintenance, calibrations, surveillances, design changes, procedure changes, document control, or training. When changes are made to significant procedures or hardware, several different systems must be exercised upon the individual initiative of different people to determine which documents, drawings, procedures, maintenance tasks, calibrations, surveillances, must be addressed.

Facility staff are being trained in complying with the 10 CFR 76.68 change process, which includes elements of configuration control. However, the elements of the facility's Configuration Management System, involving NCS-significant components and procedures that are not already designated Q (see the discussion in paragraph 5 below), will be indicated in a new CM database as AQ-NCS. The term, AQ-NCS, does not appear in the training program yet, since the database is not complete. It is dependent on the schedule for completing the NCSAs, which are to be completed by December 31, 1996.

c. Conclusions

The mechanisms for configuration control at PORTS are fragmented. No plant-wide configuration control program is planned.

5.0 Nuclear Criticality Safety Change Control

a. Scope

Procedures and processes for controlling and documenting changes in systems important to NCS were examined. The recently added criticality alarm cluster at the XT-847 building was inspected. Also, the requirements for designation of NCSA-specified (AQ-NCS labeled) equipment were reviewed.

b. Observations

Surveillances for the criticality alarm clusters are entered into a system that schedules surveillances for safety systems. This system currently is maintained on a personal computer by a member of the maintenance organization for work order control purposes. It is restricted to track only surveillances associated with TSRs. Because the new cluster installation is not described in a TSR, surveillances for the new installation cannot be included with other surveillances for the facility's criticality alarm clusters in the scheduling system and, therefore, tracking of the alarm cluster surveillances is a concern.

Certain safety systems are designated Q by SAR Chapter 3.8. Q-designated equipment is labeled with distinct yellow tags indicating Q status. The facility committed in the Compliance Plan to treat AQ-NCS the same as Q. However, there is no plan to tag items on the floor as AQ-NCS. The facility configuration management staff stated that they would consider tagging for AQ-NCS items, and that they definitely planned to indicate such items on new drawings involving AQ-NCS items.

c. Conclusions

The current change control process is a concern. It is not clear that all NCS-significant surveillances are being tracked by any system.

6.0 Operating Procedures

a. Scope

Selected operating procedures were examined for incorporation of NCSA requirements, and for technical adequacy; these included procedures for decontaminating process equipment which contains solid UO_2F_2 deposits, and for downblending highly-enriched uranium. Several procedures were reviewed for thoroughness and technical adequacy.

b. Observations

Supervisors and production staff were observed to be directly involved with, or responsible for, development of new operating procedures. There appears to be an adequate system for tracking NCSA requirements, which includes three elements: 1) marking those requirements that must be incorporated into the procedures by the NCS staff; 2) placing a "requirement stamp" in the operating procedures and specific references to completed NCSAs; and 3) review of the finished procedures by the NCS staff prior to approval. However, the specific precautions and limitations established in each NCSA appear in most instances to be copied verbatim into a section of the procedure that is separate from the action steps. This situation is a concern because there is a lengthy list of precautions that must be memorized, and the procedure must be followed in a step-by-step fashion. However, inspectors noted that there are some posting requirements specified in the NCSAs which partially cover these precautions and limitations.

The procedures that were reviewed were structured such that it was often necessary to reference other procedures during the operation, which could contribute to omitted or interchanged steps (*e.g.*, Procedure CA-MP 8.3, "Handling Equipment Containing Deposits of Uranium," requires use of four additional procedures during this operation).

When procedures are reviewed by the NCS staff, they are reviewed for content of the appropriate controls only; no attempt is made to perform a hazard analysis on the procedure or consider the criticality safety implications of possible human errors, as committed to in PORTS SAR Chapter 6.7. In addition, the facility has committed to follow ANSI/ANS-8.19, "Administrative Practices for Nuclear Criticality Safety," which requires that procedural deviations that could affect criticality safety shall be documented and investigated, and that operations shall be reviewed periodically to ascertain that procedures are followed. Problem Reports and Procedure Change Requests are usually initiated by the operations staff.

Operating procedures are currently maintained in a separate (ProNet) database system. The procedures clearly indicate the flowdown from

NCSA requirements through indicators in the margins of a printed procedure, and by listing the referenced NCSAs in another section of the procedure. Document Control distributes new or revised procedures to those requiring them, and the recipients are responsible for destroying the previous versions and sending back signed verification to Document Control that this has been done. An index of the current revisions is maintained and made available on the plant computer network and in each process building. Users are responsible for determining that they have the most up-to-date version of a procedure before they use it.

c. Conclusions

Operational procedures are technically adequate and adequately controlled but frequently contain unnecessary administrative complexity.

7.0 Maintenance for Nuclear Criticality Safety

a. Scope

Implementation of maintenance, calibration, and surveillance requirements from selected NCSAs was inspected.

b. Observations

Implementation of the maintenance, calibration, and surveillance requirements determined in NCSAs is the responsibility of the owners of the affected systems. These owners sign off on approved NCSAs and are expected to be aware of new and changed requirements. The requirements are tracked in centralized systems only if the owners act on their own initiative to cause them to be added to the appropriate databases. For example, one system contains NCSA surveillance requirements, but only if they coincidentally are also TSR requirements. Other preventive maintenance, calibration, and surveillance items are added to a centralized Maintenance Request System, but only if they are to be performed by maintenance personnel through Maintenance Service Requests. The NCS function itself does not maintain a database of NCSA requirements.

The upgraded NCSAs contain Surveillance Requirements (SR) on equipment necessary to maintain NCS controls. There is no integrated system which incorporates these SRs into the maintenance and calibration program. Work Control maintains a system for classifying equipment as NCS-related (which is either categorized as "Q" or "AQ-NCS" equipment), and tracking TSR-mandated SRs. NCS has issued SRs with the understanding that these SRs are tracked under the above-mentioned maintenance program, but inspectors could not determine how or if this tracking actually happens. The PORTS SAR Chapter 5.2 requires surveillance and reporting of NCS requirements in accordance with the PORT QA Plan.

c. Conclusions

There is no single database that includes all NCSA requirements, and NCS surveillance requirements are not centrally tracked.

8.0 Nuclear Criticality Safety Training - General Employee Training

a. Scope

Interviews were conducted with the PORTS training manager and staff members. Selected training procedures and records of training were reviewed.

b. Observations

Specific NCS training was provided for plant employees through the first-line supervisor level. NCS training is currently undergoing a transition to a four-tiered system to conform with Compliance Plan Issue 10. The four levels consist of: 1) General Awareness NCS appropriate for all plant personnel; 2) Basic NCS for fissile material handlers; 3) Job-Specific NCS; and 4) Supervisory NCS. It was observed that the same Supervisory NCS training is provided to line supervisors and plant management. This is in contravention to the Compliance Plan Issue 10 which requires training for management personnel distinct from that established for operations supervisors.

Job-specific training consists of either formal training modules or oral job briefings provided by training facilitators within the process buildings. The required modules and method of training are specified by the NCS staff in a "Training Matrix." The system for tracking job-specific training requirements is computer-based and generates a monthly list indicating individuals whose training is due within the next 60 days, 30 days, and those whose training is overdue. Those whose training is overdue are placed on work restrictions for specific tasks where there are criticality concerns. The system for tracking training requirements appears adequate.

As part of the NCSA Upgrade Program, job-specific training modules are being upgraded. Currently the upgrade is being performed concurrent with the NCSA upgrade, and is therefore considered "at risk," as all NCSAs and NCSEs may not be approved in their current state. Thus, meeting the completion date of December 31, 1996, is strongly dependent on maintaining the NCSA schedule. The training modules for the feed and transfer operations have been completed and the modules for cascade operations are nearing completion. Three modules out of 23 have been completed.

c. Conclusions

Based on the current schedule for NCSA development and training, it appears likely that training for feed and transfer and cascade

operations will be achieved, but that the training for the balance of the plant will not be achieved by the deadline.

The system for implementing and tracking NCSA based training is adequate, although some training may have to be redone to accommodate NCSA issues. NCS training that is currently conducted is adequate.

9.0 Nuclear Criticality Safety Training - NCS Staff Training

a. Scope

Interviews were conducted with the PORTS NCS manager and selected NCS engineers. Training and qualification records for all NCS staff and contractor personnel were reviewed.

b. Observations

Training for NCS staff consists of a variety of standard short courses in nuclear criticality as well as SCALE/KENO and MCNP courses. In addition, there is a residency requirement of one year for NCS Engineers and two years for NCS Senior Engineers. This is the only difference in training requirements for Engineers and Senior Engineers, except for some Emergency Response training. All NCS Engineers and Senior Engineers must also be qualified as an NCS Walk-Through Team Member to gain experience in observing plant operations. The training requirements follow a standardized qualification card and appear to be appropriate for nuclear criticality analysts. The length of time to complete qualification appeared to be well-correlated to the experience and education level of the analysts and did not appear to be shortened as the demands of the upgrade project increased. Prior to official qualification, analysts may perform NCSAs; however, their analysis must be independently reviewed by a qualified analyst in addition to the usual peer review.

c. Conclusions

NCS staff appeared to be well qualified. Generally, the training and qualification of the NCS staff and supervision of unqualified analysts appeared adequate.

10.0 Criticality Alarm Monitoring System

a. Scope

The Criticality Alarm System and document POEF-LUMS-10, Rev. 1, was reviewed. Criticality alarm equipment at selected plant locations was inspected during walkthroughs.

b. Observations

The plant uses a neutron detecting criticality alarm system. A cluster of three detectors is placed at each location. Two of the three detectors must trigger to indicate an accidental criticality.

Not all areas containing fissile material are covered by alarms. A revised document, POEF-LUMS-10, Rev. 1, is being prepared to request exemptions of areas at the plant that are not covered by the criticality alarm system (e.g., some of the cylinder storage areas).

c. Conclusions

Installation of several criticality alarms will be necessary to meet the requirements of 10 CFR 76.89.

MANAGEMENT MEETINGS

Exit Meeting Summary

Inspectors met with PORTS management representatives throughout the inspection. The exit meeting was held on October 4, 1996. No classified or proprietary information was identified. At the exit meeting, PORTS representatives disagreed that NCS training for upper management had not been conducted and stated that they would provide additional information. The following is a partial list of exit meeting attendees:

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
B. J. Rumble, NCS Manager

United States Enrichment Corporation (USEC)

L. Fink, Safety, Safeguards and Quality Manager

United States Department of Energy (DOE)

J.A. Crum, Site Safety Representative

Nuclear Regulatory Commission (NRC)

J. Roth, NMSS
D. C. Morey, NMSS
S. L. Bhatia, NMSS
C. S. Tripp, NMSS
L. J. Lessler, NMSS
D. J. Hartland, Region III