July 20, 2000

Mr. James N. Adkins
Vice President - Production
United States Enrichment Corporation
Two Democracy Center
6903 Rockledge Drive
Bethesda, MD 20817

SUBJECT: PORTSMOUTH INSPECTION REPORT 70-7002/2000008(DNMS)

Dear Mr. Adkins:

On July 13, 2000, the NRC completed a routine inspection at your Portsmouth Gaseous Diffusion Plant. The purpose of the inspection was to determine whether activities authorized by the certificate were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the inspector discussed the findings with members of your staff identified in the enclosed report.

The inspection included a review of your health physics and training programs. Within these areas, the inspection consisted of a selective examination of procedures and representative records, interviews with personnel, and observations of activities in progress.

Your conduct of activities observed during the inspection was generally characterized by sound radiation protection policies and procedures and training program. No violations of NRC requirements were identified during the course of the inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure will be available **electronically** for public inspection in the NRC Public Document Room **or** from the *Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from* the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

/RA/

Patrick L. Hiland, Chief
Fuel Cycle Branch

Docket No. 70-7002
Certificate No. GDP-2

Enclosure: Inspection Report 70-7002/2000008(DNMS)

See Attached Distribution

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U.S. NUCLEAR REGULATORY COMMISSION
REGION III

Docket No:	70-7002
Certificate No:	GDP-2
Report No:	70-7002/2000008(DNMS)
Facility Operator:	United States Enrichment Corporation
Facility Name:	Portsmouth Gaseous Diffusion Plant
Location:	3930 U.S. Route 23 South P.O. Box 628 Piketon, OH 45661
Dates:	July 11 through 13, 2000
Inspector:	Darrel G. Wiedeman, Senior Health Physicist
Approved By:	Patrick L. Hiland, Chief Fuel Cycle Branch Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

United States Enrichment Corporation
Portsmouth Gaseous Diffusion Plant
NRC Inspection Report 70-7002/2000008(DNMS)

Radiation Protection

- The internal and external dosimetry programs were effectively implemented in accordance with the conditions of the certificate and 10 CFR Part 20. The inspector concluded that the As-Low-As-Reasonably-Achievable (ALARA) Program for 1998-1999 was effectively implemented based on exposure results. (Section R 1.1).

- The certificatee was effectively implementing the radiation survey instrument calibration programs. Health physics staff were knowledgeable of current plant operating conditions and conducted surveys and sample analyses in accordance with site procedures. (Section R 1.2)

- The health physics staff demonstrated adequate knowledge of contamination monitoring, radiation detection equipment and the appropriate procedures to follow in the event of either a personnel or vehicle contamination incident. (Section R 1.3)

- Annual lapel air sample results for representative employees generally compared with fixed air sampler results. During 1998-1999, no regulatory limits were exceeded. (Section R 1.4)

Training Program

The inspector concluded that the training program at PORTS met the applicable NRC requirements. The inspector also noted that the training records reviewed for the health physics technicians were current. (Section O5.1)

Report Details

I. Operations

05 General Employee Staff Training and Qualification

O5.1 Training Requirements and Implementation

a. Inspection Scope (88010 and 88050)

The inspector reviewed the incorporation and implementation of new employee related training requirements and health physics technician training requirements, as specified in the Safety Analysis Report (SAR), into plant procedures and practices.

b. Observations and Findings

The inspector reviewed the system and records used by the plant training organization to document training requirements and completed training. The system included a matrix of training requirements, by position, and the current training status of individuals assigned to the respective positions. The system appeared well organized and comprehensive. Based upon a sampling review of the matrices, the inspector determined that the matrices incorporated all of the SAR-required training. Specifically, the training matrices for the health physics technicians included a requirement for training module X00675 “Uranium Enrichment Process”. According to the HP staff this 1.5 day classroom training program is required for all HP technicians. In addition, the training requirements for newly hired employees included general employee training a requirement for basic radiation worker training, a training course necessary for unescorted access to radiologically controlled areas of the plant.

The inspector also reviewed a random sample of monthly training reports, issued by the training organization to plant managers, which documented the training status of all plant staff. Plant procedures direct the management to use the report information to ensure that plant staff do not perform work following the expiration of required training. The report is distributed approximately one week prior to the end of the month and indicates training qualifications that expire at the end of the month, in 30 days, and in 60 days. During discussions with the training staff, the inspector was informed that plant managers are expected to review the training status of their staff and to issue work restriction memorandums for individuals with expired training requirements. This expectation was consistent with documented SAR and procedural requirements.

Based upon a cursory review of training records for health physics technicians along with the monthly training status reports, the inspector determined that the employees met the training qualifications and requirements

The inspector performed a further sampling review of training records for newly transferred, hired, or temporarily assigned staff and determined that plant management implemented work restrictions for the involved individuals prior to their appointment to the positions or following issuance of the most recent monthly training status report.

c. Conclusions

The inspector concluded that the training program at PORTS met the applicable NRC requirements for training.

IV. Plant Support

R1 Radiation Protection

R1.1 Radiation Protection Controls

a. Inspection Scope (83822)

The inspector reviewed selected data from the certificatee's internal and external dose monitoring program for calendar years 1998-1999, reviewed technical basis documents, and discussed program implementation and results with cognizant personnel.

b. Observations and Findings

External Radiation Monitoring

External dose is monitored by means of thermoluminescent dosimeters (TLD) badges supplied by an outside vendor. The dosimeter contains 4 lithium-fluoride (LiF) elements, 3 lithium (^{7}Li) for beta and gamma dose measurements and one lithium (^{6}Li) for neutron measurements. The filtration over the elements was approximately 350 milligrams per square centimeter (mg/cm^2) for eye dose assessment, 1,000 mg/cm^2 for the deep dose, 17 mg/cm^2 for the shallow dose, 310 mg/cm^2 for the neutron and eye doses. The stated lower limit of detection for gamma dose measurement was 10 millirem (mrem) {100 μSv }. The dosimetry service that provided the dosimeters to the site and processed the dosimeters at the end of the badging period is accredited by National Voluntary Laboratory Accreditation Program (NVLAP).

The major sources of external radiation photons onsite were the uranium cylinders, with the highest dose rates coming from newly emptied cylinders. Spectra taken by the certificatee of the gamma radiation emitted by these empty uranium cylinders showed three prominent peaks: 185 keV from uranium-235, and about 700 and 1,000 keV from protactinium (Pa-234^{m}). Some material is left behind in the cylinders after the solid UF_6 is heated in the autoclave, liquefied, and then drawn off as a gas into the cascade. The remaining material consists of some leftover uranium and uranium decay products and also trace quantities of transuranics that may have been in the feed material. Records of radiation surveys of newly emptied cylinders show contact dose rates on the order of 300 - 400 mrem/hour {3-4 mSv/hr}, with the dose rates dropping off to around 20 - 30 mrem/hour at 30 centimeters (cm). The dose rates decay rapidly, reaching half these values in about 3 weeks.

Spectra from full cylinders showed a greater proportion of continuous distribution, believed to be partly scattered radiation from the main gamma rays and partly bremstrahlung from the absorption of beta radiation emitted by uranium daughters. Because of a self-shielding effect, the dose rates from the full cylinders are much lower.

Surveys of newly emptied cylinders by the inspector showed gamma dose rates of the order of 180-190 milliroentgens/hour (mR/hr) {46.3-48.9 μC/kg/h} on contact with the cylinder and 10-20 mR (2.5-5.1 μC/kg/h) at 30 cm from a full cylinder. The inspector's radiation measurements were consistent with the certificatee's measurements when appropriate corrections were made to account for instrument response, detector geometry and sensitive volume of the detector.

The dosimeter exchange period at the site is yearly for most workers, except for certain workers with the potential for higher than site average external exposures (100 mrem/year), in which case the exchange period is quarterly. At the site, the only workers that fall into the quarterly exchange period are the workers that handle uranium cylinders, especially those who handled freshly emptied cylinders. The dosimetry records from 1998 to 1999 indicated that 3,097 and 2,584, respectively, workers were issued dosimetry each year (dosimetry records prior to March 3, 1997, are maintained in accordance with DOE requirements). The collective dose for the site had been steadily dropping, from 13 person-rem in 1998 to 6.47 person-rem in 1999. The annual dose for the highest exposed individual had shown the same declining trend, and ranged from 440 mrem in 1990, to a high of 800 mrem in 1994, and about 183 mrem in 1999. The number of workers that exceeded NRC's level requiring monitoring was 3 in 1993, 2 in both 1994 and 1995, and none for the years 1996 -1999.

The certificatee indicated that the vendor was NVLAP accredited, and as such met the requirements in ANSI Standard HPS N13.11-1993, "Personnel Dosimetry Performance - Criteria or Testing."

A review of the 1999 external exposure records that showed 2,584 workers being monitored that year and the collective dose for the site was 6.47 person-rem. Most of the collective dose was accumulated by workers in the cylinder cleaning building, and the UF_6 cylinder handling shifts. These groups thus accounted for over half of the site collective dose. The same groups that accumulated the highest collective doses also showed the highest individual doses.

Internal Dose Monitoring

The inspector reviewed the internal dosimetry program procedures and noted that the procedures implemented the internal dosimetry program as described in Procedure XP2-HP-RP1034 (dated 12/8/99) of the SAR. Plant staff whose routine duties require entry into radiological contaminated areas or duties requiring direct contact with radioactive material and/or contaminated areas participated in the routine bioassay program. Employees scheduled for sampling submitted routine urine samples every four weeks or a frequency as directed by the health physics group.

The inspector verified that plant employees, who did not submit urine samples within the applicable scheduled test date, were reminded by their respective supervisor until the routine bioassay was collected. Delinquent staff were also issued delinquency reminder cards until routine bioassays were collected. The delinquency rate was less than 10%. Procedure XP2-HP-RP1034 lists scheduling criteria, frequencies and protocols for the bioassay program. The inspector reviewed the current list of plant personnel

participating in the internal dosimetry program and found the practices to be in accordance with the procedural requirements. Internal dosimetry logs indicated routine and special bioassays were conducted according to the criteria described in the procedure.

Appendix A of Procedure XP-HP-RP1034 establishes two administrative action levels (flags) for routine and special uranium bioassay exposure results. The limits are 0.5 and 5.0 micrograms per liter of uranium (μg/L). Bioassay results greater than 450 μg/L/day requires investigation. Routine bioassay results in excess of 20 μg/L requires work restrictions and investigation and an intake restriction evaluation, in addition to daily re-sampling until bioassay results return to levels below 0.5 and/or 5.0 μg/L. The inspector reviewed several corresponding investigation reports of bioassay results that exceeded the "flag" values (0.5 and/or 5.0 μg/L) from January 1999 to December 1999. The inspector determined the investigations were thorough and extensive in determining the root cause of the uptakes. In all cases, the investigation results determined that the intakes were less than the toxicity limit for soluble uranium of 10 milligrams/week required by 10 CFR 20.1201(e).

Several other investigations for bioassay results above 480 μg/L/day were also reviewed and determined to be equally thorough and extensive. All re-samples for bioassays above administrative limits were conducted until a final result below the "flag" values were observed.

A review of 1999 dosimetry data for the plant indicated that the average Committed Effective Dose Equivalent was 0.13 millirem . The Total Effective Dose Equivalent (TEDE) administrative limit of 500 mrem was not exceeded for calendar years 1998-1999. The TEDE averages were within 10 percent of the 10 CFR 20 maximum dose limits for radiation workers. The inspector determined that the As-Low-As-Reasonable-Achievable (ALARA) Program for 1998-1999 was effectively implemented based on exposure results.

c. Conclusions

The inspector's review of the dosimetry program at PORTS concluded that it was adequate for most monitoring situations onsite for routine and emergency response activities.

R1.2 Survey Instrument Calibration Program

a. Inspection Scope (83822)

b. Observations and Findings

The inspector reviewed records of daily, weekly and monthly contamination surveys and accompanied the health physics staff while performing vehicle and overpack radiation surveys. The inspector also reviewed records of instrument calibrations, and observed the use of radiation survey instruments.

The inspector noted that routine facility alpha contamination surveys are performed in accordance with the frequency and action levels specified in Table 3.2.6, "Surface

Contamination Monitoring," of the certificatee's procedures. The inspector reviewed Procedure No. XP2-HP-RP1030, dated April 24, 2000, "Contamination Control", and accompanied a health physics staff member during routine vehicle and overpack contamination surveys. The inspector also observed the health physics staff member appropriately analyze smears taken on the overpack and the HP staff members explained how smear results are interpreted and generated by the counting instrument. For routine contamination surveys inside the process buildings, the health physics staff highlighted that smears above the administrative limits are scheduled for decontamination and subsequently resurveyed. A selected review of records from January 3, 2000 to June 21, 2000 of routine plant smear surveys indicated that some monthly smears were above the administrative limit. The affected areas were decontaminated in a timely manner and re-surveyed. Health physics staff were knowledgeable of process hazards when performing surveys, and activities observed by the inspector were conducted in accordance with the HP procedures.

Frequency of calibration and instrumentation operability was adequately tracked by the HP staff. During facility and HP laboratory tours by the inspector, the inspector observed that survey instruments in use appeared operational and were within the current calibration period.

Also during the facility tours, the inspector noted that radioactive material, radiation and airborne radioactivity areas were adequately posted in accordance with the requirements of 10 CFR Part 20. Labeling of radioactive materials and containers were consistent with 10 CFR Part 20, and the posting requirements in Procedure No. XP2-HP-RP1030.

c. Conclusions

The licensee was effectively implementing the contamination survey and instrument calibration programs. Health physics staff were knowledgeable of current plant operating conditions and conducted surveys and sample analyses according to site procedures.

R1.3 Contamination Monitoring

a. Inspection Scope (83822)

The inspector observed employees, visitors and contractors performing self-monitoring for contamination prior to leaving the Restricted Area.

b. Observations and Findings

Radiological survey instrumentation for exiting the plants restricted area is located by the exits from the restricted areas. Selected survey instrumentation used for exit monitoring satisfied the required calibration frequency. Observations of employee practices for performing self-monitoring indicated that radiological training appeared adequate in the use of radiation detection equipment. Interviews with several employees at the exit stations indicated that they were familiar with the appropriate actions and procedure to contact HP in a contamination event.

Observations and interviews with health physics technicians indicated that the HP program for training personnel on contamination surveys was effective. This was demonstrated on several occasions during the inspection. The inspector interviewed selected health physics staff and determined that they were knowledgeable in the use of radiation detection equipment and the appropriate procedure to follow in the event of either personnel or vehicle contamination.

c. Conclusions

Employee and health physics personnel demonstrated adequate knowledge of contamination monitoring, radiation detection equipment and the appropriate procedure to follow in the event of either a personnel or vehicle contamination. All surveys observed were performed in accordance with Procedure No. XP2-HP-RP1030 of the certificatee's health physics procedures.

R1.4 Lapel Air Sampling

a. Inspection Scope (83822)

The inspector reviewed lapel air sample records for the period January through December 1999 to verify the results and determine compliance with the requirements in 10 CFR Part 20.

b. Observations and Findings

Procedure XP2-HP-HO1031, Revision 2, dated April 24, 2000 requires, in part, that HP management evaluate air sample results to determine if proper radiological controls are in place for certain jobs and areas. Employee lapel air samplers are worn in areas with known airborne contamination and is used to verify the estimated intake of contaminated air breathed by the worker. These results are compared with the results of fixed air samplers located in the same work area. The certificatee utilizes approximately 17 fixed-location, continuous air samplers located in certain strategic areas of the plant to determine airborne radioactivity levels in various uranium-processing areas. The licensee monitors airborne activity levels to determine whether or not respirators are required for work in those areas. The licensee also uses the air sampler results to identify areas where process upsets or spills have occurred. The inspector reviewed and compared the average lapel air sample results with the average fixed air sample results. The results indicated that the average lapel air sample results were slightly higher than the average fixed air sampler values. However, the inspector noted that the average lapel air sample results were below the certificatee established limits. Since the certificatee did not rely on general air samples for calculating internal exposure, the difference in air sample results was not a significant concern based on the guidance in Regulatory Guide 8.25, "Air Sampling in the Workplace," but nevertheless gave an indication that the licensee's fixed air samplers in the uranium processing areas were generally measuring the uranium concentrations to which workers are exposed.

c. Conclusions

Annual lapel air sample results for representative employees generally compared with fixed air sampler results and were below the Annual Limit of Intake (ALI) limits specified

in 10 CFR Part 20.

V. Management Meetings

X1 Exit Meeting Summary

The inspector presented the inspection results to members of the facility management on July 13, 2000. The facility staff acknowledged the findings presented and indicated concurrence with the facts, as stated. The inspector asked the plant staff whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified. The inspector also discussed Reduction-in-Force (RIF) transition issues as it applies to the health physics and instrument maintenance and calibration staffing. No significant deficiencies were noted in the area of staffing at this time; however, this issue will be reviewed again during the next scheduled inspection.

PARTIAL LIST OF PERSONS CONTACTED

United States Enrichment Corporation

M. Brown, General Manager
*T. Conley, Training Group Manager
*J. Thompson, Health Physics
*T. Profitt, Radiation Calibration FLM
*R. Holliday, NRA, Regulatory Compliance Manager
*R. Lawton, Nuclear Safety and Quality, Manager
*J. Shewbrooks, Nuclear Safety and Quality
*T. Taulbee, Health Physics
*M. Cade, NRA, Compliance Engineer

*Denotes those present at the exit meeting on July 13, 2000.

INSPECTION PROCEDURES USED

IP 83822:	Radiation Protection
IP 85408:	Recordkeeping
IP 88061:	Training
IP 90712:	In-office Reviews of Written Reports on Non-routine Events

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

none

Closed

none

Discussed

Reduction in Force (RIF) transition issues as it applies to each area inspected.

LIST OF ACRONYMS USED

ANSI	American National Standards Institute
CEDE	committed effective dose equivalent
CFR	Code of Federal Regulations
DNMS	Division of Nuclear Material Safety
FLM	First Line Manager
IFI	Inspector Followup Item
No.	Number
NRC	Nuclear Regulatory Commission
PERR	Public Electronic Reading Room
PPE	Personal Protective Equipment
SAR	Safety Analysis Report
TEDE	total effective dose equivalent
UF_6	Uranium Hexafluoride
VIO	Violation
μC/kg/h	microcoulomb per kilogram per hour