

May 2, 2000

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

SUBJECT: NRC INSPECTION REPORT 70-7001/2000004(DNMS)

Dear Mr. Adkins:

On April 14, 2000, the NRC completed a training, radiation protection, and emergency preparedness inspection at your Paducah Gaseous Diffusion Plant (PGDP). The enclosed report presents the results of this inspection.

Your conduct of activities observed during the inspection at PGDP was generally characterized by safety conscious emergency preparedness controls, sound radiation protection policies and procedures and adequate radiological work controls. 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 placed in the NRC Public Electronic Reading Room (PERR) link at the NRC homepage <http://www.nrc.gov/NRC/ADAMS/index.html>.

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

Sincerely,

/RA/M. P. Phillips Acting for

Patrick L. Hiland, Chief
Fuel Cycle Branch

Docket No. 70-7001
Certificate No. GDP-1

Enclosure: Inspection Report 70-7001/2000004(DNMS)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 70-7001
Certificate No: GDP-1

Report No: 70-7001/2000004(DNMS)

Licensee: United States Enrichment Corporation

Facilities: Paducah Gaseous Diffusion Plant

Locations: 5600 Hobbs Road
P.O. Box 1410
Paducah, KY 42001

Dates: April 10-14, 2000

Inspectors: Darrel G. Wiedeman, Senior Health Physicist
Mary L. Thomas, Fuel Cycle Inspector

Approved By: Patrick L. Hiland, Chief
Fuel Cycle Branch
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

United States Enrichment Corporation Paducah Gaseous Diffusion Plant NRC Inspection Report 70-7001/2000004(DNMS)

Training Program

- The inspectors concluded that the training program at Paducah Gaseous Diffusion Plant (PGDP) met the applicable NRC requirements. The inspectors also noted that the training records reviewed for newly hired employees and emergency response organization were current. (Section O5.1 and P5.1)

Radiation Protection Program

- The inspectors concluded that the dosimetry program at PGDP was adequate for monitoring of onsite external exposure for routine and emergency response activities. (Section R1.1)

Emergency Preparedness Program

- The inspectors observed that the emergency preparedness staff maintained a good inventory of well-maintained emergency response equipment and supplies that were in a state of operational readiness. Additionally, the inspectors concluded that the public warning system maintenance and surveillance tests were performed in accordance with procedural requirements and the manufacturer's recommendations. (Section P2.2)
- The plant's Emergency Plan (PEP) and implementing procedures provided sufficient guidance for responding to plant emergencies, and the emergency response organization was effective for responding to emergencies. Emergency response personnel were adequately trained and were knowledgeable of emergency response procedures and equipment. (Section P2.1, P3.1 and P5.1)
- The overall organization and management structure of the PEP function was consistent with the PEP and implementing procedures. (Section P1.2)

Report Details

I. Operations

05 General Employee Staff Training and Qualification

O5.1 Training Requirements and Implementation

a. Inspection Scope (88010 and 88050)

The inspectors reviewed the incorporation and implementation of new employee related training requirements and emergency squad (E-Squad) training requirements, as specified in the Safety Analysis Report (SAR), into plant procedures and practices.

b. Observations and Findings

The inspectors 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 inspectors determined that the matrices incorporated all of the SAR-required training. Specifically, the training matrices for the E-Squad members and fire fighters (FF) included a requirement for testing and training for the use of self-contained breathing apparatus (SCBA), as required by the SAR. 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 inspectors 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 inspectors were 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 E-Squad and fire fighters (FF) along with the monthly training status reports, the inspectors determined that the employees met the training qualifications and requirements

The inspectors 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. Conclusion

The inspectors concluded that the training program at Paducah Gaseous Diffusion Plant (PGDP) met the applicable NRC requirements for training.

IV. Plant Support

R1 Radiological Protection

a. Inspection Scope (83724 and 83822)

The inspectors reviewed selected data from the certificatee's 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 dose is monitored by means of thermoluminescent dosimeters supplied by an outside vendor. The dosimeter contains 4 lithium-fluoride (LiF) elements, 3 lithium (^7Li) for beta and gamma dose measurements and one lithium (^6Li) 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 site used a dosimetry service that was accredited by National Voluntary Laboratory Accreditation Program.

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. Records of radiation surveys of newly emptied cylinders show contact dose rates on the order of 300 - 500 mrem/hour {3-5 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 bremsstrahlung 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 inspectors showed gamma dose rates of the order of 400-600 milliroentgens/hour (mR/hr) {103-155 $\mu\text{C}/\text{kg}/\text{h}$ } at 30 cm and 10-20 mR (2.5-5.1 $\mu\text{C}/\text{kg}/\text{h}$) at 30 cm on 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

(500 mrem/quarter), in which case the exchange period is quarterly. At the site, the only workers who fall into the quarterly exchange period are the workers who handle uranium cylinders, especially those who handle freshly emptied cylinders. The dosimetry records from 1998 to 1999 indicated that 3,053 and 2,976, respectively, workers were issued dosimetry each year (dosimetry records prior to March 3, 1997, are maintained in accordance with Department of Energy requirements). The collective dose for the site had been steadily dropping, from about 46 person-rem in 1990 to 13 person-rem in 1998 and 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 359 for 1999. The number of workers that exceeded NRC's level requiring monitoring was three in 1993, two in both 1994 and 1995, and none for the years 1996 -1999.

A review of the 1999 external exposure records showed that 2,976 workers were monitored that year, and the collective dose for the site was 13.4 person-rem. Most of the collective dose was accumulated by workers in the C-400 Building, which is the decontamination and cylinder cleaning building, and the UF₆ handling shifts accumulated the second highest percent of the collective dose, with the health physics staff accumulating the smallest percent of the dose. These three groups combined accounted for over half of the site collective dose. The groups that accumulated the highest collective doses also showed the highest individual doses.

c. Conclusions

The inspector concluded that the dosimetry program at PGDP was adequate for monitoring of onsite external exposure for routine and emergency response activities.

P2 Status of Emergency Preparedness Procedures and Documentation

P2.1 Qualifications of First Responders to Emergencies

a. Inspection Scope (88050)

The inspectors reviewed the required training for E-Squad and FFs and the readiness of the E-Squad to assist the Incident Commander (IC) in mitigating an off-normal process condition.

b. Observation and Findings

The inspectors noted that Procedure CP2-EP-EP5046, "Emergency Operations Center," identified certain specified organizations that the IC can request to assist in the response to an emergency. Procedure CP2-EP-EP5032, "Plant Emergency Management Program," provided guidance for maintaining the E-Squad to assist the IC during an incident as needed. Site procedures required, in part, that E-Squad members successfully pass a SCBA training program and fit test. The inspectors requested a current list of E-Squad members from the plant shift superintendent. The E-Squad list presented consisted of 120 members. Subsequently, the inspectors reviewed a random sampling of training records for the E-Squad members and concluded that for those records that were reviewed, all E-Squad and FFs were current with their training and SCBA fit testing.

c. Conclusions

The inspectors concluded that for those reviewed, all E-Squad members and FFs were properly trained and fit tested for use of SCBA.

P2.2 Status of Emergency Preparedness Activities

a. Inspection Scope (88025 and 88050)

The inspectors toured the emergency operation center, emergency response vehicle (ERV), and emergency response room (ERR), to determine whether the emergency response equipment, instrumentation, and supplies located in these emergency repositories were maintained in a state of operational readiness. The field team monitoring kits were also inspected. The inspectors also reviewed the original design basis for audible coverage of the public warning system (PWS) and weekly, monthly, quarterly and semiannual testing and maintenance related to the testing of the PWS and controls.

b. Observations and Findings

The inspectors noted that the ERV and ERR contained the quantities and equipment identified in the emergency preparedness implementing procedures. Cabinets containing emergency equipment and field kits were clearly identifiable, contents were orderly, and well maintained. Survey meters examined were calibrated and operational, and self-contained breathing apparatus air tanks were full. In addition, the inspectors verified via documentation (in support of maintenance, periodic tests or surveillance) that inventory and operational checks were timely, and that equipment and instrumentation stored were operational and properly maintained.

The inspectors reviewed the 1997 PWS audible test results conducted by the certificatee's contractor (SSI Services) and verified the results met audible coverage contained in ANSI 512.14.1992 protocol.

The inspectors interviewed the emergency response manager (ERM) and discussed the design bases to support that the PWS audible capacity had not degraded since the original system installation. The ERM indicated that audible test results showed no degradation in PWS performance between 1998-1999. The inspectors verified that the certificatee tested the PWS system backup-battery voltage and current during the daily and quarterly surveillance tests.

The inspectors reviewed the PWS daily, monthly, quarterly and semiannual surveillance tests for compliance with Procedure CP4-SF-SF2102 (Revision 2/14/00), "Operation and Testing of the Public Warning System," and the manufacturer's testing recommendations. Through record review, the inspectors identified that the certificatee performed a PWS surveillance test in accordance with the procedures for the period reviewed (1999). The inspectors noted that the certificatee's battery load test for the PWS batteries per Procedure CP4-GP-IM6271, "Public Warning System Maintenance," followed good industrial practice for testing batteries for degradation.

c. Conclusions

The emergency preparedness staff maintained a good inventory of well-maintained emergency response equipment and supplies that were in a state of operational readiness. Additionally, the inspectors identified that the PWS maintenance and surveillances were performed in accordance with procedural requirements and manufacturer's recommendations.

P3 Emergency Preparedness Procedures and Documentation

P3.1 Criticality and Radiation Emergency Assembly Points

a. Inspection Scope (42700 and 88050)

The inspectors reviewed the directions for plant staff's response to an unplanned criticality accident alarm system (CAAS) activation. The inspection consisted of reviews of applicable documents and procedures, verification of required assembly point signs, and interviews with emergency preparedness and operations staff.

b. Observations and Findings

Procedure CP2-EP-EP5038, "Criticality and Radiation Emergencies," prescribed the actions plant staff were required to take in the event of a CAAS activation. Upon activation of the CAAS, plant staff were required to immediately evacuate an area according to the specific building action plan and proceed to designated assembly points, as identified in Appendix B of Procedure CP2-EP-EP5038. Signs documenting the assembly points for a specific building were required to be posted on the access doors to the specific building. The inspectors verified selected assembly point locations and signs posted on building entrances during the course of the inspection. The inspectors noted that the assembly point signs on building entrances were present and consistent with the assembly point location information in Procedure CP2-EP-EP5038. The inspectors also determined through interviews, that plant staff were knowledgeable of the assigned assembly point location. However, one procedural weakness was identified regarding the Assembly Points listed in Appendix B of Procedure CP2-EP-EP5038. Personnel in the C-720-J Airlock, on the east end of the C-720 Building, were directed to assemble at Assembly Point 5, the C-744 Building, whereas the rest of the east end of the C-720 Building were directed to assemble at Assembly Point 2, the northwest corner of the C-200 Building. This weakness would have placed any personnel from the C-720-J Airlock in a neutron flux resulting from a criticality accident in the C-409 Building. An Assessment and Tracking Report (ATR) was issued to revise this procedures and other associated procedures that were affected by this revision.

The inspectors then reviewed the PGDP Site Access Orientation Handbook, and General Employee Training (GET) Study Guide. The Plant Access Orientation Handbook is required to be read by all visitors entering the plant, and GET is required for all employees upon initiation of employment and every 24 months thereafter for the duration of employment. Both documents provided the Paducah Plant assembly point list (Appendix B of Procedure CP2-EP-EP5038) for the visitor's and employee's review and use. The training organization was responsible for the coordination and upkeep of both the Site Access Handbook, and GET Study Guide. In discussions with the training

manager, the inspectors noted that a process existed for other organizations to notify training when procedural or policy changes required the revision of either the handbook or study guide.

c. Conclusions

The inspectors noted that CAAS assembly area signs were properly posted on the entrances of specific buildings onsite with the correct assembly point area information. The inspectors concluded that the Site Access Handbook and GET Study Guide were current and up to date.

P5 Staff Training and Qualification in Emergency Preparedness

P5.1 Emergency Plan and Implementing Procedures

a. Inspection Scope (88050)

The inspectors reviewed a random sample of training records for the emergency response organization (ERO) personnel. Additionally, the inspectors reviewed the qualifications of FFs and E-Squad members (first responders to an emergency) for mitigating an off-normal process condition.

b. Observations and Findings

The inspectors reviewed training records for ERO personnel for compliance with training requirements of Procedure CP2-EP-EP5051, "Emergency Response Training." The inspectors determined that the site qualified crisis, response, and regulatory liaison managers had completed, and were current, with the required emergency response training courses as required by Procedure CP2-EP-EP5051.

The inspectors discussed with the ERM the qualification of the FF and Health Physics personnel in responding to off-normal plant conditions during an emergency.

c. Conclusion

The inspectors concluded that the site qualified crisis, response, and regulatory liaison managers, E-Squad and fire fighters were current with required ERO training.

P1.2 Offsite Support Agencies

a. Inspection Scope (88050)

The inspectors evaluated the Plant Emergency Plan (PEP) staff's involvement with offsite support agencies as described in the PEP and implementing procedures.

b. Observations and Findings

Current agreement letters with offsite agencies for response or assistance during emergency events were maintained in accordance with the PEP and implementing procedures. The PEP staff had formally notified all applicable local, county, state, and federal support agencies regarding the full scale biennial participation emergency

exercise that occurred on April 1, 1998, as required. The PEP staff maintained letters of agreement to twelve independent organizations that included local fire departments and local hospitals and points of contact.

c. Conclusions

The PEP staff maintained adequate support from offsite agencies for responding to or assisting during an emergency event.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of the plant staff and management on April 14, 2000. Plant staff acknowledged the findings presented. The inspectors asked the plant staff whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

United States Enrichment Corporation (USEC)

*O.W. Cypret, Health Physics
*D.G. Elrod, Emergency Management
*C.V. Hicks, Site and Facilities Supervisor
*L. L. Jackson, Nuclear Regulatory Affairs Manager
*D.E. Page, Plant Shift Supervisor
*H. Pulley, General Manager
*V.J. Shanks, Production Support
*R.B. Starkey, Training

U.S. Nuclear Regulatory Commission

*J. M. Jacobson, Resident Inspector
*K. G. O'Brien, Senior Resident Inspector

*Denotes those present at the April 14, 2000, exit meeting.

INSPECTION PROCEDURES USED

IP 42700: Plant Procedures
IP 83724: External Occupational Exposure Control and Personal Dosimetry
IP 83822: Radiation Protection
IP 88025: Maintenance and Surveillance Activities
IP 88050: Emergency Preparedness - Training and Retraining
IP 88050: Emergency Preparedness - Activities
IP 92701: Follow up

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Discussed

None

Closed

None

LIST OF ACRONYMS USED

CAAS	Criticality Accident Alarm System
CFR	Code of Federal Regulations
DNMS	Division of Nuclear Materials Safety
E-Squad	Emergency Squad
ERM	Emergency Response Manager
ERO	Emergency Response Organization
ERR	Emergency Response Room
ERV	Emergency Response Vehicle
FF	Fire Fighter
GET	General Employee Training
IC	Incident Command
NRC	Nuclear Regulatory Commission
PEP	Plant Emergency Plan
PGDP	Paducah Gaseous Diffusion Plant
PWS	Public Warning System
SAR	Safety Analysis Report
SCBA	Self-Contained Breathing Apparatus
USEC	United States Enrichment Corporation