

June 15, 2001

Mr. J. Morris Brown
Vice President - Operations
United States Enrichment Corporation
Two Democracy Center
6903 Rockledge Drive
Bethesda, MD 20817

SUBJECT: NRC INSPECTION REPORT 07007001/2001-005(DNMS) (PADUCAH)

Dear Mr. Brown:

On May 29, 2001, the NRC completed a routine resident inspection at the Paducah 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 inspectors discussed the findings with members of your staff.

Areas examined during the inspection period are identified in the report. Within these areas, the inspection consisted of a selective examination of procedures and representative records, interviews with personnel and observations of activities in progress.

No cited violations were identified during this inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures 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. 07007001
Certificate No. GDP-1

Enclosure: Inspection Report 07007001/2001-005(DNMS)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 07007001
Certificate No: GDP-1

Report No: 07007001/2001-005(DNMS)

Facility Operator: United States Enrichment Corporation

Facility Name: Paducah Gaseous Diffusion Plant

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

Dates: April 4, 2001, through May 29, 2001

Inspectors: Douglas S. Simpkins, Acting Senior Resident Inspector
Courtney A. Blanchard, Senior Resident Inspector
Stephen R. Caudill, Resident Inspector (Portsmouth GDP)
Mary L. Thomas, Resident 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 070-07001/2001-005(DNMS)

Operations

- The certificatee identified two instances of failing to follow procedures which resulted in two Nuclear Criticality Safety violations. (Section O1.1)
- The planned seasonal cascade reduction was well coordinated and conducted in a safe manner. (Section O1.2)
- The certificatee identified deficiencies in the training and qualification of Front Line Managers, as well as the training module for procedural usage. (Section O5.1)

Maintenance

- The Number 2 high speed purge and evacuation pump in the C-333 building catastrophically failed. The certificatee conducted a thorough investigation and has implemented corrective actions. (Section M2.1)

Engineering

- There were no issues identified in this area.

Plant Support

- The certificatee was properly implementing its contamination control program. Proper instrumentation was utilized, maintained and calibrated by trained personnel. (Section R1.1)
- The certificatee was properly implementing its respiratory protection program. (Section R1.2)
- The certificatee was properly maintaining its emergency preparedness equipment and facilities. (Section P1.1)
- The certificatee was properly implementing its emergency preparedness training program. (Section P1.2)

Report Details

I. Operations

O1 Conduct of Operations

O1.1 Failure to Follow Procedures

a. Inspection Scope (88100)

The inspectors reviewed the initial response, interim actions, the root cause investigation, and corrective actions taken in response to multiple instances of failing to follow procedures.

b. Observations and Findings

The certificatee identified two instances where personnel did not comply with procedural requirements for completing in-hand procedures, both of which resulted in Nuclear Criticality Safety (NCS) violations:

- On April 4 operators transferred R-114 freon from a tank car to a system drain tank in Building C-335, but subsequently overfilled the tank. To lower the tank level to an acceptable range, the operators put the excess freon into an evacuated cell which had previously contained uranium assay of greater than 1.5 percent. Procedure CP4-CO-CA2008, "Operation of the C-335 R-114 Station," required freon to be sampled for moisture content immediately after filling a cell if the cell had been previously used for uranium assay above 1 percent. Contrary to that requirement, the operators delayed eight hours before sampling the moisture content of the R-114.
- On April 6 operators were draining R-114 freon from a cell in accordance with Operations Functional Directive OP-01-003, "CAS-02 and 011 HAUP Oversight." The procedure required a review of required NCS controls prior to evacuating the cell. Contrary to that requirement, the operators did not verify that the cell was below 1 percent assay, which would require the Recirculating Cooling Water to be isolated and drained prior to conducting R-114 freon draining operations.

As a result of these non-compliances, the certificatee conducted a root-cause analysis and developed a list of short- and long-term corrective actions. Corrective actions included conducting training on the importance of procedural adherence and enhancement to current procedures.

Technical Safety Requirement 3.9.1 requires, in part, written procedures shall be implemented for activities described in Section 6.11, Appendix A of the Safety Analysis Report (SAR). Section 6.11, Appendix A of the SAR describes Cascade Cells and Coolant as activities to be performed in accordance with written procedures. As a result of the plant staff's identification, followup and corrective actions, the failure to follow procedures is a certificatee-identified, non-repetitive and corrected violation of low safety significance and is being treated as a **Non-Cited Violation (NCV 70-7001/2001-005-01)**, consistent with Section VI.A.8 of the NRC Enforcement Policy.

c. Conclusions

Plant staff identified two examples of failure to follow procedures during operations involving the handling of R-114 freon. Corrective actions included training and procedure enhancements. The failure to follow procedures was treated as a non-cited violation.

O1.2 Seasonal Cascade Reduction

a. Inspection Scope (88100)

The inspectors observed seasonal cascade reduction activities to verify compliance with procedures and other certificate requirements.

b. Observations and Findings

The inspectors observed portions of the seasonal cascade reduction activities and noted that activities were well-coordinated and conducted in a safe manner. Operations management appropriately used its “infrequently performed test and evolution” process to ensure that adequate review and oversight was provided for major evolutions. The inspectors did not identify any issues, and the reduction was conducted without incident.

c. Conclusions

The inspectors concluded that the planned seasonal cascade reduction was well-coordinated and conducted in a safe manner.

O5 Operator Training and Qualification

a. Inspection Scope (88010)

The inspectors interviewed the Building C-331 Auxiliary Control Room (ACR) operators, front line manager (FLM), and FLM trainee, regarding training received for the increased assay production. The inspectors reviewed Report 01-004, “Human Performance Enhancement Evaluation,” and a memorandum from the Cascade Manager, “FLMs-In-Training,” dated May 1, 2001. These documents contained investigations and remedial actions associated with two certificatee-identified level II Nuclear Criticality Safety (NCS) violations, as discussed in section O1.1 of this report. One event was caused in part by lack of a formalized FLM trainee qualification standard and non-adherence to procedures.

b. Observations and Findings

On April 1, 2001, a FLM trainee authorized exiting a procedure before the process was in a stable condition, and a log entry explaining why the exit was necessary was not made. These actions did not comply with requirements in Procedure UE2-PS-PS1034, Rev. 4, “Use of Procedures,” which permitted exiting a procedure at any point, provided all related equipment was in a safe condition and the reason for exiting was documented in the FLM logbook. Furthermore, the FLM trainee did not have authority to authorize exiting a procedure in the middle of a section.

The FLM trainee had completed the cascade FLM training course as defined by training code 12.4.3 C79020, "Cascade FLM," and was assigned to on-the-job training, pending final qualification by operations management. Certificatee procedures did not delineate the on-the-job training period between completion of formal FLM training and full qualification, and the procedures did not identify the process by which the FLM trainee achieved full qualification. The certificatee identified the need for a formal qualification standard for FLM trainees and to develop a training module on UE2-OP-OP1030, "Use of Procedures." This issue will be tracked as **Inspection Followup Item IFI 70-7001/2001-005-02**, to verify the adequacy of corrective actions.

c. Conclusions

The certificatee identified deficiencies in the training and qualification of FLMs, as well as the training module for procedural usage. These issues were being addressed in the certificatee's corrective action plan associated with SCAQ-01-1827, "R-114 Activities Cause NCS Violations."

O8 Miscellaneous Operations Issues

O8.1 Certificatee Event Reports (90712)

The certificatee made the following operations-related event reports during the inspection period. The inspectors reviewed any immediate safety concerns indicated at the time of the initial verbal notification. The inspectors will evaluate the associated written reports for the events following submittal, as applicable.

<u>Number</u>	<u>Date</u>	<u>Status</u>	<u>Title</u>
38016	5/20/01	Open, Retracted on 5/23/01	Safety System Actuation, Building C-360, Autoclave No. 1, High Level Drain Secondary alarm on the Water Inventory Control System.

O8.2 Bulletin 91-01 Reports (90712)

The certificatee made the following reports pursuant to Bulletin 91-01 during the inspection period. The inspectors reviewed any immediate NCS concerns associated with the report at the time of the initial verbal notification. Any significant issues emerging from the inspectors' review are discussed in separate sections of this report; otherwise, the reports are considered closed.

<u>Number</u>	<u>Date</u>	<u>Title</u>
37906	4/10/01	24-Hour Report - NCS violation; failure to ensure an Independent Assay Verification was <1% prior to evacuating R-114 from C-337 Unit 1 Cell 8.
38011	5/17/01	24-Hour Report - NCS violation; Independent Verification not performed.

II. Maintenance

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Failure of the C-333 Number 2 High Speed Purge and Extraction Pump (88101)

On May 9 operators in the C-333 building had started the Number 2 high speed purge and evacuation pump, and approximately two hours later the pump failed catastrophically. Subsequent investigations identified the pump impeller had begun to rub the casing, creating sufficient heat to melt the impeller blades. The certificatee conducted a thorough root cause investigation and had implemented corrective actions to preclude additional failures.

M8 Miscellaneous Maintenance Issues

M8.1 Bulletin 91-01 Reports (90712)

The certificatee made the following report pursuant to Bulletin 91-01 during the inspection period. The inspectors reviewed any immediate Nuclear Criticality Safety (NCS) concerns associated with the report at the time of the initial verbal notification. Any significant issues emerging from the review are discussed in separate sections of this report; otherwise, the report is considered closed.

<u>Number</u>	<u>Date</u>	<u>Title</u>
37999	5/16/01	4-Hour Report - NCS Violation; Potential Condenser Overpressurization when RCW is Isolated.

III. Engineering

E8 Miscellaneous Engineering Issues

E8.1 Certificatee Event Reports (90712)

The certificatee made the following engineering-related event report during the inspection period. The inspectors reviewed any immediate safety concerns indicated at the time of the initial verbal notification. The inspectors will evaluate the associated written reports for the event following submittal, as applicable.

<u>Number</u>	<u>Date</u>	<u>Status</u>	<u>Title</u>
38007	5/18/01	Open	24-Hour Report - Safety System Deficiency, Freezer/Sublimator Load Cells Non-Conforming

IV. Plant Support

R1 Radiation Protection

R1.1 Contamination Control

a. Inspection Scope (83822)

The inspectors reviewed the functioning and calibration of hand and foot monitors, as well as alpha and beta/gamma survey meters. The inspectors reviewed the training records for technicians responsible for calibrating survey instrumentation.

The inspectors reviewed the following procedures:

CP4-GP-RI6105, Rev. 2, "Calibration of the Bicron Frisk-Tech Rate Meter With PGM Probe," December 8, 2000;
CP4-GP-RI6107, Rev. 3, "Calibration of the Berthold Model LB 1043 Hand and Foot Monitor," December 28, 1999;
CP4-GP-RI6109, Rev. 1, "Calibration of the Bicron Frisk-Tech Rate Meter With Model A-50 Alpha Scintillation Probe," March 21, 2000;
UE2-HP-RP1032, Rev. 2, "Sealed Radioactive Source Control," June 27, 2000; and
UE2-HP-RP1033, Rev. 2, "Radiological Instrumentation," December 29, 2000.

b. Observations and Findings

The inspectors noted boundary control stations had functioning survey equipment, and employee practices for performing exit monitoring demonstrated adequate radiological training. All calibration and routine checks were performed as required. Calibration sources were traceable to the National Institute of Standards and Technology (NIST), and were stored in locked containers. All training requirements for health physics calibration personnel were met, and several technicians had been sent to vendor-sponsored training classes.

Procedures used to perform calibrations on radiation and contamination monitors were adequate and up-to-date.

c. Conclusions

The inspectors concluded contamination survey instrumentation was being utilized, maintained and calibrated by trained personnel in accordance with SAR and procedural requirements.

R1.2 Respiratory Protection

a. Inspection Scope (83822)

The inspectors toured the respirator issuance, testing and repair facility, and discussed various aspects of the respiratory protection program with Industrial Hygiene Technical Support personnel. The inspectors observed respirators in use at the C-310 withdrawal station, and self-contained breathing apparatus (SCBA) equipment stored in the fire department garage. The inspectors reviewed the operation, maintenance and calibration of low volume continuous air samplers.

The inspectors reviewed the following procedures and documents:

CP2-SH-IH-1036, Rev. 1, "Respiratory Protection Program," November 29, 1999; and Training Module 503.09.08 CR, Rev. 1, "(Instructor Guide) General Respiratory Protection and Use of an APR."

b. Observations and Findings

Staff at the respirator issuance and repair facility were cognizant of testing and repair criteria for respirators and SCBA equipment, and were aware of the need to maintain a database of issued respirators. Respirators in use in the facility were stored properly. SCBA tanks were checked regularly for hydrostatic testing dates and breathing air levels.

Personnel in the respiratory protection program were scheduled for annual medical evaluations and fit tests. The certificatee tracks due dates, and identifies those individuals whose testing is due or has expired. The respirator issuance facility staff ensured that personnel issued respirators had current medical exams and respirator-fit tests.

Although it was possible for respirators issued to operators to remain in the field indefinitely without being returned for periodic testing, the certificatee stated that users were trained to examine the facepiece and filter cartridges and to conduct pressure checks prior to donning. Respirators which fail these checks were to be returned.

The air sampler filters were changed twice each week, with subsequent analysis performed within 24 hours. A follow-up analysis was conducted 72 hours later to allow for radon decay. The results are monitored using a commercial software package. The inspectors noted the air samplers are checked with NIST-traceable rotometers for flow rate, and pumps are calibrated with NIST-traceable volumeters.

c. Conclusions

The respiratory protection program was maintained in accordance with the SAR and applicable procedures.

P1 Conduct of Emergency Preparedness Activities

P1.1 Emergency Equipment and Facilities

a. Inspection Scope (88050)

The inspectors toured the Emergency Operation Center (located within the C-300 Plant Control Facility), Emergency Response Vehicle Garage, and C-102 Hospital to determine whether adequate emergency response equipment and supplies were maintained in a state of operational readiness. The inspectors reviewed Procedure CP2-EP-EP5058, Rev. 3, "Maintenance of Emergency Facilities and Equipment," dated February 12, 2001.

b. Observations and Findings

The inspectors noted that the required quantity of emergency response equipment, as specified in CP2-EP-5058, was in the correct locations. Cabinets containing emergency equipment and field kits were clearly identifiable and well maintained. Emergency response staff was familiar with the operation and location of equipment. The inspectors also noted that the medical services staff were familiar with response procedures for emergencies requiring radiological decontamination and treatment of hydrogen fluoride exposure. The inspectors audited records to verify inventory; operational and communications checks were performed on a regular basis per procedural requirements. One minor discrepancy was identified with two field monitoring team kits that contained expired chlorine detector tubes, but was immediately corrected by replacing the tubes, and an Assessment and Tracking Report (ATR) was issued to require checking expiration dates as well as quantities of chemical detector tubes.

c. Conclusions

The emergency preparedness equipment and facilities were maintained in accordance with the SAR and applicable procedures.

P1.2 Emergency Preparedness Training and Staffing (88050)

a. Inspection Scope

The inspectors reviewed training records for a cross-cutting sample of fifteen emergency response personnel from all five shifts. The records selected for review included the positions of incident commander, safety officer, production and non-production managers, fire operations, police operations, technical advisory group member, crisis manager, and plume modeler. The inspectors also reviewed course content for training given to off-site responders and local hospitals.

The inspectors reviewed the following documentation:

CP2-EP-EP5051, Rev. 3, "Emergency Response Training," September 7, 2000;
CP2-EP-EP5044, Rev. 3, "Off-site Emergency Response Assistance,"
September 9, 2000;
KY/H-317, "Letters of Agreement with Off-Site Emergency Response Assistance
Organizations," February 28, 2001; and
Agendas from off-site responder and local hospital training courses.

b. Observations and Findings

Emergency response personnel were trained in accordance with procedures. The Emergency Management staff maintained a database tracking system to monitor when training, including medical and respirator fit testing, was due or expired. The inspectors noted a minor discrepancy with regard to hazardous materials awareness training for police officers. A lesson plan for that course had been discontinued, and the replacement lesson plan did not appear in the training matrix. Furthermore, the replacement lesson plan was only a 30 minute briefing, although a two hour course was specified in the procedure. The certificatee filed an ATR to correct this discrepancy.

The inspectors noted off-site emergency responders were trained in site-specific issues, including radiological response. Many off-site responders also received incident command system training. Local hospitals have decontamination rooms, and personnel were trained on types of radiation exposure and health effects, as well as decontamination theory and practice.

The inspectors noted many emergency response and firefighter staff held positions in off-site fire departments or local and state emergency committees, which provided relevant on-the-job training beyond what the SAR required. The inspectors also noted the on-site fire department received Certified Industrial Firefighter status by the State Fire Commission.

c. Conclusions

The emergency preparedness training program was conducted in accordance with the SAR and implementing procedures. Further evaluation of hazardous material awareness training for emergency squad police officers and production managers will be tracked as **Inspection Followup Item IFI 70-7001/2001-005-03**. This followup will include a review of the revision to CP2-EP-EP5051, an evaluation of the course materials, and a verification by records audit and interviews that personnel received adequate training on hazardous materials awareness.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented inspection results to members of the facility management on May 29, 2001. The facility staff acknowledged the findings presented and indicated concurrence with the facts, as stated. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

United States Enrichment Corporation

- *M. Buckner, Operations Manager
- *A. Canterbury, Maintenance
- *S. Chappelle, NS&Q
- *S. Cowne, Nuclear Regulatory Affairs
- *S. Germain, "OO" Building Manager
- *S. Gunn, "OOO" Building Manager
- *R. Helme, Engineering Director
- *E. Hickman, Health Physics and Industrial Health Manager
- *L. Jackson, Nuclear Regulatory Affairs Manager
- P. Jenny, Plant Services Manager
- *C. Jones, NS&Q
- *J. Labarraque, Nuclear Safety and Quality Manager
- *M. Mack, Cascade Operations Manager
- *J. Martin, NCS
- *D. Page, Shift Operations
- *S. Penrod, Enrichment Manager
- *H. Pulley, General Manager
- *V. Shanks, Production Support
- *R. Starkey, Training Manager
- *D. Stadler, Nuclear Regulatory Affairs
- *J. Wittman, Work Control

U.S. Department of Energy

- G. Bazzell, DOE Facility Representative
- D. Seaborg, DOE Paducah Site Manager

*Denotes those present at the exit meeting on May 29, 2001.

INSPECTION PROCEDURES USED

- IP 88010: Operator Training/Retraining
- IP 88050: Emergency Preparedness
- IP 88100: Plant Operations
- IP 88101: Configuration Control
- IP 83822: Radiation Protection
- IP 90712: In-office Reviews of Written Reports on Non-routine Events

ITEMS OPENED, CLOSED, AND DISCUSSED

<u>Opened</u>	<u>Type</u>	<u>Summary</u>
70-07001/2001-005-02	IFI	Develop a formal FLM Qualification Standard and Develop a Training Module for the Use of Procedures
70-07001/2001-005-03	IFI	Evaluate the Hazardous Material Awareness Training for Emergency Squad Police Officers and Production Managers
37906	CER	Failure to Ensure an Independent Assay Verification was <1% Prior to Evacuating R-114 from C-337 Unit 1 Cell 8
38011	CER	Independent Verification Not Performed.
37999	CER	Potential Condenser Overpressurization when RCW is Isolated.
38007	CER	Freezer/Sublimator Load Cells Non-Conforming
<u>Closed</u>		
70-07001/2001-005-01	NCV	Failure to Follow Procedures

Discussed

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
ATR	Assessment and Tracking Report
CER	Certificate Event Report
CFR	Code of Federal Regulations
DNMS	Division of Nuclear Material Safety
DOE	Department of Energy
FLM	Front Line Manager
GDP	Gaseous Diffusion Plant
HAUP	High Assay Upgrade Project
IFI	Inspection Followup Item
NCS	Nuclear Criticality Safety
NCV	Non-Cited Violation
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PERR	Public Electronic Reading Room
SAR	Safety Analysis Report
SCBA	Self-Contained Breathing Apparatus
USEC	United States Enrichment Corporation

