March 28, 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 70-7001/2000001(DNMS)

Dear Mr. Adkins:

On March 6, 2000, the NRC completed a routine resident inspection at your Paducah Gaseous Diffusion Plant. The enclosed report presents the results of this inspection. During the period covered by the inspection report, the conduct of safety related activities at the Paducah Gaseous Diffusion Plant was generally adequate.

Based upon the information developed during the inspection, the NRC did not identify any cited violations. The findings indicated that your staff appropriately identified and took timely action to resolve non-conformances associated with safety and safeguards related activities.

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 Room (PERR) link at the NRC homepage, namely >http://www.nrc.gov/NRC/ADAMS/index.html.

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

Sincerely,

/RA/

Patrick L. Hiland, Chief
Fuel Cycle Branch

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

Enclosure: Inspection Report 70-7001/2000001(DNMS)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	70-7001
Certificate No:	GDP-1
Report No:	70-7001/2000001(DNMS)
Licensee:	United States Enrichment Corporation
Facilities:	Paducah Gaseous Diffusion Plant
Locations:	5600 Hobbs Road P.O. Box 1410 Paducah, KY 42001
Dates:	January 25, through March 6, 2000
Inspectors:	K. G. O'Brien, Senior Resident Inspector J. M. Jacobson, Resident Inspector W. G. Snell, Senior Decommissioning 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 70-7001/2000001(DNMS)

Plant Operations

- The inspectors identified some Building C-335 operators that were not knowledgeable of the limits and controls appropriate to operation of the Building C-335 Bottom Surge Drums. In addition, the inspectors identified that plant procedures and other documents associated with the Bottom Surge Drums were not developed, maintained, or implemented in a manner appropriate to the circumstances. (Section O1.1)

Maintenance

- The plant staff properly investigated and initiated corrective actions to operational and maintenance procedural inadequacies that contributed to a safety-related breaker failure to trip during off-stream operations. (Section M1.1)

Engineering

- The plant staff identified and initiated a number of corrective actions for a degraded condition of two criticality accident alarm system air horns in Building C-337A associated with a recent modification. After additional testing of various systems around the site, selectively observed by the inspectors, the plant staff concluded that the Building C-337 and Building C-337A system was not inoperable and reasonable assurance of continued operability for the other systems onsite existed. (Section E1.1)

- The plant staff initiated a project to remediate selected Department of Energy material storage areas containing uncharacterized potentially fissile equipment. The project was designed to address both the criticality safety program non-compliances and allow the plant staff access to those areas that needed to be completed for the seismic upgrade of Buildings C-331 and C-335 by the end of September 2000. (Section E1.2)

Plant Support

- The inspectors identified that the plant staff were not formally monitoring the radiological status of contamination areas, located outside the process buildings, and that plant procedures did not fully implement the Safety Analysis Report requirement for a program of routine surveys to ensure that contamination areas were properly identified, controlled, and posted. (Section R1.2)

- The plant staff identified two examples of a compromise of classified matter that occurred during the inspection period and were assessing the possible impacts as of the end of the inspection period. (Section S1.2)

Report Details

I. Operations

O1 Conduct of Operations

O1.1 Building C-335 Bottom Surge Drums

a. Inspection Scope (88100)

The inspectors reviewed the operations staff monitoring and control of the Building C-335 Bottom Surge Drums during the concurrent performance of seismic modifications to the building.

b. Observations and Findings

During routine tours of Building C-335, the inspectors identified several breaches in the walls surrounding the Bottom Surge Drums Room. The inspectors noted that the temperature and pressure of the uranium hexafluoride stored in the drums was monitored and controlled to maintain the materials in a gaseous phase. The room temperatures were normally maintained in the 130 to 150°F range, approximately 40 to 60°F warmer than the surrounding operating floor areas. The inspectors toured the room interior and noted that the two calibrated temperature gauges located in the room indicated a temperature of approximately 112°F.

The inspectors discussed the status of the Bottom Surge Drums Room with the Area Control Room (ACR) operations staff. The operations staff acknowledged the inspectors' observations and indicated that the room temperature had been lowered to facilitate ongoing seismic modifications to the building. The inspectors noted that a directive to lower the room temperature was included in the Daily Operating Instructions. The instructions directed that the room temperature should be regulated such that the uranium hexafluoride in the drums was maintained in a gaseous state according to a phase diagram included in Procedure CP4-CO-CN2007, "Operation of Surge Drums." The inspectors inquired with the operations staff what the lowest acceptable temperature was for continued use of the Bottom Surge Drums. The operations staff were unable to identify a lower controlling temperature and did not reference the inspectors to either a procedure or the uranium hexafluoride phase diagram as the controlling document for the current equipment status. In fact, the operations staff were not sure of which plant procedure governed operations of the Bottom Surge Drums. The building operations supervisor indicated to the inspectors that the drums were routinely connected to a portion of the cascade that operated at significantly less than 1 weight percent uranium enrichment.

Subsequent to the discussions with the ACR operations staff, the inspectors reviewed the Safety Analysis Report (SAR), nuclear criticality safety evaluations (NCSE) and approvals, and plant procedures relative to the operation of surge drums, including the Bottom Surge Drums, and discussed the current and historical configuration of the Bottom Surge Drums with the plant staff. The inspectors determined that the SAR did not differentiate between surge drums located throughout the plant and the Bottom Surge Drums. In fact, the SAR did not specifically discuss operation of the Bottom Surge Drums. The NCSEs and approvals also did not discuss or differentiate between

surge drums located throughout the plant. As a result, the current nuclear criticality safety (NCS) approval potentially could, incorrectly, be used to realign the Bottom Surge Drums from the current and historical configuration as a surge volume buffer for the upper cascade to an offline storage volume. During discussions with the NCS staff of the weaknesses in the documentation, the staff concurred with the inspectors general observations and initiated immediate action to revise the applicable documentation.

The inspectors reviewed current plant procedures and determined that the procedures did not provide instructions appropriate to the circumstances to ensure that the Bottom Surge Drums were operated and controlled. Specifically, the inspectors noted that Procedure CP4-CO-CN2007, "Operation of Surge Drums," included controls and instructions for the operation of all plant surge drums with the exception of the Bottom Surge Drums. However, the procedure did not explicitly exclude application of its controls to the Bottom Surge Drums. Operation staff indicated that the Bottom Surge Drums were not considered surge drums; however, the inspectors noted that this position was inconsistent with other plant procedures and the SAR.

The inspectors reviewed Procedure CP4-CO-CN2025, "Operation of the C-335 Bottom Surge System," and determined that the procedure did not include controls or operating instructions for the Bottom Surge System. Instead, the procedure provided operating instructions for booster pumps associated with the Bottom Surge Drums. The inspectors also determined that a previous version of the procedure did include controls, instructions, and operating limits for the Bottom Surge Drums; however, these controls and limits were incorrectly removed during a 1998 revision to the procedure. The inspectors also determined that two other plant procedures, Procedure CP4-CO-CN1028A, "Administrative Requirements for Assay Limit Controls," and Procedure CP4-CO-CN1058, "Administrative Control of Cascade Assay," did not provide operating instructions or limitations on the cascade configuration to ensure that the Bottom Surge Drums were not realigned to store enriched uranium hexafluoride.

The Quality Assurance Plan, required in part, that procedures, appropriate to the circumstances, shall be developed, maintained, and implemented for the conduct of activities affecting safety, including operations. The failure to develop, maintain, and implement procedures appropriate to the circumstances for the operation and control of the Building C-335 Bottom Surge Drums is a violation. However, this violation is of minor safety significance, due in part to other non-related controls available and in effect to preclude inappropriate operation of the Bottom Surge Drums. Therefore, this violation is not subject to formal enforcement action.

c. Conclusion

The inspectors identified that some Building C-335 operators were not knowledgeable of the limits and controls appropriate to the operation of the Building C-335 Bottom Surge Drums. In addition, the inspectors identified a minor violation in that plant procedures and other documents associated with the Bottom Surge Drums were not developed, maintained, or implemented in a manner appropriate to the circumstances.

O8 Miscellaneous Operations Issues

O8.1 Unresolved Item 070-7001/99016-01 Control Room Alarms: The inspectors identified apparent anomalies between the operations staff handling of ACR alarms and the SAR assumptions. Specifically, the inspectors noted that the plant staff did not continuously monitor ACR panels when inoperable or locked-in motor load alarms caused other alarms to be silenced. In response to the inspectors' observations, the plant staff performed a review of current alarm response operating practices and guidance available to the operations staff. The inspectors reviewed the assessment and concluded that the inoperability of an individual motor load alarm would not cause a delay in the operations staff becoming aware of shifting of plant load or other conditions that may require an immediate response by the operator. Instead, a condition that may cause a motor load alarm for a single stage or cell would also impact adjacent stages or cells. Therefore, the operators would notice the problems without delay. During the review, the operations staff also identified that the current procedural guidance for handling inoperable or locked-in alarms could be significantly improved and documented the finding in the plant non-conformance reporting system for action. Based upon independent review of the information developed by the operations staff regarding current alarm response practices, the inspectors have no further questions and the Unresolved Item is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Building C-310 Breaker Testing

a. Inspection Scope (88102, 88103)

The inspectors reviewed the plant staffs post-maintenance testing practices for the Building C-310 motor breakers.

b. Observations and Findings

On February 15, during post-maintenance testing of Cell 9 in Building C-310, the plant staff identified smoke coming from one of the cell compressors and attempted to shut down the cell. However, motor breaker MB, one of the two cell motor breakers, would not open. As a result, the operators opened the two transformer secondary breakers in order to shut down the cell.

Subsequent to the breaker failure, the inspectors discussed the event with the operations staff and reviewed the normal cell startup procedures. The operations staff informed the inspectors that the breaker failure occurred while the involved cell was off-stream and evacuated of uranium hexafluoride. Therefore, the immediate safety significance was minimal. However, the inspectors also determined that the normal cell startup procedure did not include a post-maintenance testing of the trip circuit with actual breaker movement. Instead, the operations staff relied upon post-maintenance testing of the breaker, separate from the electrical bus. The inspectors noted that this approach to testing did not assure that the breaker operated properly immediately prior to being placed into service. In addition, because the plant procedures did not limit the time between when the staff could complete the preventive maintenance and when the

breaker was installed, a potential existed that a new or different problem could develop with the breaker.

The maintenance staff also disassembled the breaker in order to further determine a root cause for the February 15 failure. Upon review of the dissembled breaker, the plant staff determined that the breaker trip lever failed to actuate due to the presence of old lubricant and paint residue on the trip lever rotational shaft. The inspectors reviewed the vendor's manual for the breakers and noted that the manual provided very limited guidance on the scope of preventive maintenance for the breakers. The inspectors noted that neither the vendor's manual nor the routine preventive maintenance procedure provided explicit instructions for lubricating and ensuring the free movement of the trip mechanism.

As corrective action to the findings, the plant staff initiated a change to the operations procedure to ensure that the breaker was functionally tested upon placement into the electrical bus space. The maintenance staff also initiated changes to the preventive maintenance procedure for the breakers. The inspectors noted that the initial maintenance procedure changes were not of the same detail or scope as similar instructions for similar breakers. The maintenance staff concurred with the inspectors findings and initiated a further revision to the procedure to ensure a comprehensive resolution of the procedural deficiencies.

Technical Safety Requirement (TSR) 3.9 and the Quality Assurance Plan require the plant staff to develop, maintain, and implement procedures, appropriate to the circumstances, for safety-related activities, including the operation and maintenance of safety-related electrical breakers. The failure to develop, and implement procedures, appropriate to the circumstances, for the functional testing of and for the proper maintenance and inspection of safety-related breakers used in Building C-310 is a violation. However, the certificatee identified and corrected the violation and it is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy.

c. Conclusion

The plant staff properly investigated and initiated corrective actions to operational and maintenance procedural inadequacies that contributed to a safety-related breaker failure to trip during off-steam operations. The inspectors noted that the initial corrective actions were not comprehensive; however, subsequent revisions to corrective actions were made to address the initial shortcomings.

M1.2 Missed Calibrations for Coolant Sensors

a. Inspection Scope (88102)

The inspectors reviewed the circumstances surrounding the identification that certain pressure and temperature switches that were augmented quality-nuclear criticality safety (AQ-NCS) components had delinquent calibrations.

b. Observations and Findings

On February 28, the plant staff identified that the coolant high temperature and low pressure switches for Building C-331 Unit 3 Cells 1, 2, 4, 6 8, 9 and 10 had out-of-date calibrations according to the current preventive maintenance (PM) program requirements. These components were relied upon in the NCSE for cells operating with enrichments above 1.0 weight percent ($^{w}/_{o}$) to alert operators to abnormal coolant system conditions which, if not corrected, could challenge the integrity of the coolant system piping. The coolant system piping was identified as a barrier to moderator (re-circulating cooling water) from entering the cell should there be a rupture or break in the coolant condenser tubes. The system barrier integrity was also protected (at a significantly higher pressure limit) by the coolant pressure relief system which was identified in the TSRs controlled as a quality (Q) system in accordance with the Quality Assurance Program. The current calibration requirements were that the high temperature switches be calibrated every five years and the low pressure switches every six years. The cells identified had operated for up to approximately 7 years since the last calibration.

The plant staff performed the calibrations over the next shift and did not identify any out-of-tolerance conditions for the involved switches. In following up on the issue, the plant staff identified that the switch calibrations had been tied to cell outage schedules in the work control database with other PMs normally conducted during a cell outage, such as electrical breaker PMs. However, since the cell outage dates had been updated when electrical breaker PMs were performed as corrective actions for another issue, the plant staff did not realize that the calibrations for the AQ-NCS components had not been properly flagged. Since the AQ-NCS switches would have performed their intended safety function of alerting operations staff of abnormal coolant conditions, the failure of the plant staff to perform the calibrations within the PM time frame constituted a violation of minor safety significance and is not subject to formal enforcement action.

The plant staff also indicated that the unit involved was one whose assay transitioned from less than 1.0 $^{w}/_{o}$ to greater than 1.0 $^{w}/_{o}$ depending on the power level at which the cascade was operating. The AQ-NCS components for other units, whose cells always operated above 1.0 $^{w}/_{o}$, had separate PM tasks identified in the work control database so that the calibrations would be readily flagged when they were due. Upon identification of the issue, the plant staff separated the PM schedules for the switches, since the calibrations could be performed with the cells running. The inspectors inquired as to what administrative controls the plant staff had in place to ensure that a change in the cascade gradient, which resulted in raising a cell or other cascade component above 1.0 $^{w}/_{o}$ assay, would flag the operations staff that the NCS requirements for fissile cascade components now applied. This would be particularly important if the plant went to high-assay (5.5 $^{w}/_{o}$) and higher-power operations as currently planned in the future. The plant staff were not aware of any specific administrative controls to address this issue. The inspectors considered this to be a shortcoming in the administrative procedures for controlling cascade assay.

c. Conclusion

The plant staff identified and corrected a situation in which pressure and temperature switches, relied upon to alert operators to abnormal cell coolant system conditions, were not identified for calibration. The inspectors noted that the plant procedures did not

include a mechanism for identifying to operators when a cascade gradient change would cause assumptions about the scope of potentially fissile cascade operations to change.

II. Engineering

E1 Conduct of Engineering

E1.1 Degraded Criticality Accident Alarm System Air Horns

a. Inspection Scope (88100)

The inspectors reviewed the circumstances surrounding the discovery of degraded criticality accident alarm system (CAAS) air horns in Building C-337A which led to a declaration of system inoperability by the Plant Shift Superintendent (PSS). The discovery was reported to the NRC within the required 24 hours as an inoperable safety system on February 5, 2000 (Event Report 36662).

b. Observations and Findings

On February 4, the plant staff identified a CAAS air horn in Building C-337A which did not function during a routine surveillance of the CAAS system. The cause of the failure was identified as debris (either from initial construction in 1999 or from corrosion of the system internals) which had been blown to the horn location after repeated system actuation for acceptance and surveillance testing and then clogged the horn windway. After flushing the line and repairing the affected horn, the system was again tested. During this test, another horn on the same branch line was observed to have a reduced sound level. The plant staff repaired this horn and flushed this line and the system was finally successfully tested. The PSS determined that the surveillance results indicated that the system would likely not have performed as intended over some period since the previous CAAS surveillance and thus reported the event pursuant to 10 CFR 76.120.

The plant staff initiated a program to selectively test other CAAS systems onsite for audibility to determine the extent of the issue, including the system in Building C-333A which was most similar to that in Building C-337A. The testing involved sounding the horns for the required 2 minutes, then removing and disassembling selected horns and examining the debris collected when the system was blown down. All the horns passed the surveillance testing (sounded for greater than two minutes) and the amount and type of debris found were not similar to that discovered in Building C-337A. (During construction in 1999, one of the air reservoirs or accumulators associated with Building C-337(A) had been left open to atmosphere, and thus moisture in the air, for an extended period of time which may have resulted in some corrosion products in this system prior to the moisture being purged for final acceptance.) As a result, the engineering staff and PSS concluded that there was reasonable assurance that the CAAS systems onsite remained operable for the audibility function.

The plant staff indicated that the preliminary root cause of the event was inadequate acceptance criteria for the modification acceptance testing that was done prior to the system turnover for operations. The inspectors reviewed the modification package and noted that the package required that the CAAS air system be purged and flushed. However, although there were requirements to verify an acceptable moisture content, there were no requirements for what constituted acceptable debris cleanliness or how

long or at what flow flushing was to be performed. The original acceptance testing requirements were taken from an old specification which did not have any specifics on how to ensure an adequate system flush was performed. As corrective actions for the issue, the plant staff developed a new procedure based on industry standards to flush all the recently modified CAAS air systems. The procedure was being performed as CAAS quarterly surveillances were due, or sooner if possible. The results would establish that the systems were acceptably free of debris as well as establish baseline data for future reference. In addition, design engineering management conducted briefings on the lessons learned and had a procedure revision under review to more clearly delineate expectations for acceptance testing requirements and baseline data gathering.

On March 1, the inspectors observed the plant staff conduct a special test of the Building C337/337A CAAS horns with the degraded horns valved out. The plant staff then checked the audibility of the CAAS system in Building C-337A and surrounding areas. In all areas of the 12-rad zone where the CAAS was required to be audible in accordance with the Paducah TSRs, the CAAS alarm could be distinctly heard. As a result, the plant staff concluded that the CAAS system had not actually been inoperable during the period in question and retracted the event report. Based on the results of the special test, the inspectors concluded the certificatee's assessment was reasonable. Because the CAAS system would have performed its intended safety function, the failure of the plant staff to develop adequate post-modification acceptance testing requirements in accordance with the Quality Assurance Program constituted a violation of minor safety significance and is not subject to formal enforcement action.

c. Conclusion

The plant staff identified during a routine surveillance the degraded condition of two criticality accident alarm system air horns in Building C-337A that were associated with a recent modification. After additional testing of various systems around the site, selectively observed by the inspectors, the plant staff concluded that the Building C-337 and Building C-337A system was not inoperable and reasonable assurance of continued operability for the systems existed, although the air system cleanliness criteria for the modification acceptance were not adequate. The plant staff initiated a number of corrective actions for the issue to ensure that adequate post-modification acceptance testing would be performed for future modifications.

E1.2 High-Priority Material Storage Area Project

a. Inspection Scope (88100)

The inspectors reviewed the plant staff's progress on characterizing materials in the Department of Energy Material Storage Areas (DMSA) that were leased to the certificatee subsequent to an agreement between NRC and the Department of Energy (DOE).

b. Observations and Findings

On February 21, the plant staff received approval from DOE to assume control of several DMSAs in the process buildings. The DMSAs contained legacy equipment and other articles which were not properly characterized, i.e., the amount of enriched

uranium and assay were not known or properly documented. As a result, DOE had concern that the NCS risk of continuing to store this equipment was not well understood. As part of an agreement between the NRC and DOE, the plant staff had developed a plan to assume control of the areas and characterize and space the equipment in accordance with United States Enrichment Corporation (USEC) NCS approvals and procedures for handling legacy equipment.

The plant staff notified the NRC of the change in ownership of the areas via a Bulletin 91-01 event report (Event Report 36712). The report indicated that the uncharacterized potentially fissile materials did not comply with USEC NCS program requirements. The plant staff were committed to remediating the high-priority DMSA areas as well as moving any materials necessary to ensure the ongoing seismic upgrade project in Buildings C-331 and C-335 was complete by the end of September 2000. The plant staff developed a weekly progress report which was provided to the inspectors and DOE staff to monitor the work being performed.

In addition to the change in the lease agreement, USEC and DOE approved a memorandum of understanding which included provisions for handling any condition in which the amount of special nuclear material in a piece of equipment was determined to exceed the USEC possession limits as a Category III facility. The memorandum indicated that if such a condition were to occur, USEC would immediately notify NRC and DOE and arrange to transfer the object(s) back to DOE. The transfer would occur by de-leasing the area containing the object(s) within 7 days. As of the end of the inspection period, this condition had not occurred.

c. Conclusion

The plant staff initiated a project to remediate selected DOE material storage areas containing uncharacterized potentially fissile equipment. The project was designed to address both the criticality safety program non-compliances and allow the plant staff access to those areas needed to complete the seismic upgrade of Buildings C-331 and C-335 by the end of September 2000.

V. Plant Support

R1 Radiation Protection

R1.1 Worker-Advisor Project

a. Inspection Scope (88100)

The inspectors reviewed the plant staff's documentation and closure of issues developed as a part of an internal self-assessment effort, the Worker-Advisor Project (WAP).

b. Observations and Findings

The inspectors reviewed the documentation and closure of issues developed as a part of the WAP. The stated purpose of the project was to increase the staff's awareness of

and compliance with regulatory, policy, and procedural requirements. Although the project addressed a wide variety of issues, the inspectors noted that a majority of the findings were related to health physics controls.

Through a review of documentation developed by the staff overseeing the project, the inspectors determined many health physics related issues were identified. The documentation clearly provided evidence that the individual issues, once identified, were corrected through one-on-one counseling and through small group discussions with the affected work forces. In addition, the oversight staff held periodic meetings with management and provided monthly documented summaries of their findings. The inspectors did not identify clear evidence that the individual findings were included in the plant corrective action system.

The inspectors discussed with some project members and plant management the handling of those findings developed by the project after March 3, 1997, the date of NRC assumption of regulatory authority. The inspectors were informed the project was developed with an intention of not specifically entering each project finding into the corrective action system. Instead, issues developed by the project would be corrected on the spot with the involved individuals and trends or common problems would be developed based upon discussions among the oversight members and resolved during future project activities. Plant management also indicated that some of the issues were reviewed for generic implications and trends. In reviewing the documentation developed by the staff involved in the project, the inspectors did not identify any issues of immediate safety concern. The inspectors also concluded that plant management or project staff had implemented corrective actions for the issues.

The Quality Assurance Plan and plant procedures required the plant staff to document conditions adverse to quality using the plant non-conformance reporting system. Plant procedures defined conditions adverse to quality to include the plant staff failing to adhere to policies, procedures, or regulatory requirements. The failure during 1997 of plant management to ensure that conditions adverse to quality, identified as a part of the WAP, were documented in the plant non-conformance reporting system is a violation. However, this violation is of minor safety significance and is not subject formal enforcement action.

c. Conclusion

The inspectors identified a minor violation, in that, the plant staff failed to document in the non-conformance program conditions adverse to quality that were a part of the WAP. The inspectors determined that corrective actions were developed and implemented for the issues identified as a part of the project.

R1.2 Radiological Surveys of Outside Contaminated Areas

a. Inspection Scope (88100)

As a followup to issues developed in NRC Inspection Report 70-7001/99013, the inspectors reviewed the plant staff's implementation of contamination monitoring and control methods for areas located within the plant controlled access area (fence line) but outside of the process buildings.

b. Observations and Findings

The inspectors discussed with the plant health physics staff the current practices for monitoring and controlling the spread of contamination from areas of known contamination that were located outside of the normal process buildings. The health physics staff described to the inspectors initial radiological surveys of the outside areas that were conducted in preparedness for NRC regulation of the plant and informal surveys of some of the outside areas. The purpose of the informal surveys was to assess the spread of contamination and to identify the potential for transporting contamination offsite. The health physics staff indicated that routine periodic surveys of other areas of the plant were also conducted that would be expected to indicate a spread of contamination. The inspectors were informed that, to date, none of the informal surveys indicated that contamination had been spread to clean areas or transported offsite. However, the inspectors noted that the informal survey process did not include a re-evaluation of the status of the contamination boundaries for the areas located outside of the process buildings.

The inspectors reviewed the SAR and plant procedures and noted that the SAR required the routine survey program to determine the effectiveness of contamination control measures. However, plant procedures for the monitoring and control of contamination areas did not require initial or periodic surveys of the outside contamination areas. Therefore, the plant staff could not determine if the posted contamination areas had increased in size due to weathering issues or activities conducted within the areas. In addition, the procedures did not include formal requirements for the radiological surveys of the plant exit portals, though the plant staff used this data to conclude that contamination was not being spread to clean areas.

The health physics staff concurred with the inspectors findings and initiated efforts to determine the current status of the outside contamination areas and to revise the plant procedures to formalize many of the informal surveys now being conducted. As a result of the remonitoring of the outside areas, the health physics staff determined that some previously posted outside contamination areas had grown in size such that the areas were no longer properly posted or controlled. The size growth was perceived to be the result of weathering impacts on the areas. Based upon the survey results, the areas were reposted and minor modifications were made to the areas to minimize future weathering of the areas. In addition, the health physics staff implemented changes to plant procedures to formalize the scope and frequency of all contamination areas and exit portal surveys.

TSR 3.9, “Procedures,” requires, in part, that the plant staff shall develop and implement procedures for activities described in the SAR. The failure to develop and implement plant procedures to ensure that contamination areas, including those located outside, were properly monitored, posted and controlled, including the performance of routine radiological surveys, are considered violations. However, these violations are of minor safety significance and is not subject to formal enforcement action.

c. Conclusion

The inspectors identified minor violations, in that, the plant staff were not formally monitoring the radiological status of contamination areas, located outside the process buildings, and that plant procedures did not fully implement the SAR requirement for a

program of routine surveys to ensure that contamination areas were properly identified, controlled, and posted.

R8 Miscellaneous Radiation Protection Issues

By cover letter to C. D. Pederson from J. Adkins, Jr., dated December 22, 1999, USEC provided the NRC with a written response to each of the seven Inspector Follow-up Issues (IFIs) identified in Inspection Report 70-7001/99013(DNMS). That document, along with other documents as listed and additional discussions with USEC personnel, were used as a basis to address and close the following IFIs.

R8.1 (Closed)IFI No. 70-7001/99013-01: During USEC's site characterization numerous outdoor areas were identified and posted as contaminated areas, with the expectation that these areas were to remain unremediated until the site was decommissioned. There was a concern that this was contrary to As-Low-As-Reasonably-Achievable (ALARA).

USEC's review of these outdoor radiological areas indicated that these areas presented dose rates of less than 50 microrem per hour (μrem/hr) at one meter perpendicular to the ground. These areas are controlled by Radiation Work Permits which provide entry and exit requirements. Because they are contaminated areas, the grass is not cut and there is seldom any reason for anyone to enter these areas. As such, the contribution to individual or collective site dose to workers from these areas is sufficiently small to not warrant remediation for ALARA purposes. However, USEC should continue to monitor these areas such that if future work is scheduled in or near to these areas, a reevaluation for ALARA considerations may be necessary.

During subsequent discussions with the plant staff regarding this item, the inspectors were informed that the plant management and procedures would require the staff to identify, control, and remediate newly created contamination areas. The plant management indicated that timing of remediation efforts would be consistent with the safety impact but would not be expected in any case to exceed a year. The inspectors had no further questions and this item is closed.

R8.2 (Open) IFI No. 70-7001/99013-02: The SAR provided criteria for radiological postings and boundary controls for fixed and removable contamination that was related to the percentage contribution of transuranics by alpha activity to the total activity. USEC was using criteria that assumed the transuranic contribution was less than two percent, but could not provide a basis for their decision.

USEC provided the NRC with the results of isotopic analysis from low volume air samples collected from March 3, 1997 through October 1999. Out of approximately 53,000 air samples analyzed, only 16 contained any measurable transuranics. Of these, only one sample contained transuranics in excess of two percent (2.08%) of the total activity in the sample, while the average percent contribution of transuranics was 0.43%. Considering only one sample in approximately 53,000 actually exceeded two percent, and then only minimally, using the SAR criteria for posting and boundary controls for fixed and removable contamination assuming the transuranics contribute less than two percent of the total activity is acceptable.

The inspectors were also informed that the plant staff had initiated a program of radiological surveys and smears of plant buildings with the intent of providing a more complete characterization of the current site radiological contamination status, including transuranics. The staff indicated that the program will involve all of the process and normal work areas, will include smears conducted as a part of routine work efforts, and will include specially designated smears. The plant staff indicated that the survey will be completed by December of 2000.

The inspectors will continue to track the progress made by the plant staff in this area. This item remains open.

R8.3 (Closed) IFI No. 70-7001/99013-05: The site dosimeters had not been tested to verify that the vendor's (ICN Worldwide Dosimetry Service) algorithm for converting thermoluminescent output to dose equivalence was sufficiently accurate when used in the radiation environment at the Paducah Gaseous Diffusion Plant (PDGP) site.

The inspector reviewed the following documents: 1) *Technical Basis for the Use of the ICN TLD 760 at PGDP to Measure External Dose,* 2) *ICN Dosimetry Service Technical Specifications for ICN TLD 760,* 3) *NIST Handbook 150-4, National Voluntary Laboratory Accreditation Program, Ionizing Radiation Dosimetry, August 1994,* and 4) the National Voluntary Laboratory Accreditation Program (NVLAP) Internet web site Accreditation listing on January 26, 2000, for ICN Worldwide Dosimetry Service. Reference 1 (Reference 1) summarized the primary sources of ionizing radiations at the plant and their energy levels. Reference 2 provided the vendor specifications that showed that the dosimetry used at the plant adequately bounded these energy levels, and should therefore be an acceptable dosimeter for use at the plant. Reference 3 provided the requirements for NVLAP Accreditation, including the requirement that a NVLAP laboratory have procedures for software validation and verification for dose algorithms. Also included was the NVLAP Assessor's Checklist that specified that satisfactory documentation of the dose assessment algorithm must exist to indicate the validity of the algorithm for dose interpretation. Reference 4 showed that the dosimetry vendor (ICN) used by the plant had received their NVLAP Accreditation for Ionizing Radiation Dosimetry, and it was valid through June 30, 2000. This item is closed.

R8.4 (Open) IFI No. 70-7001/99013-06: The assumption that there was a zero contribution from the transuranics in the internal assessment of dose did not appear to be supportable.

Based on a review of the results of approximately 53,000 isotopic analyses from low volume air samples collected from March 3, 1997 through October, USEC concluded that the average percent contribution of transuranics was 0.43% for samples where measurable transuranics were detected. As a result of this determination, USEC intends to apply a value of 0.50% transuranics in the internal dose assessment program, except in those cases where they can definitively rule out transuranics, or where the Committed Dose Equivalent from the intake of uranium exceeds 50 millirem. In addition to this change, USEC will continue to evaluate additional sampling and analysis protocols that will be incorporated into the health physics program on an ongoing basis.

The inspectors will continue to monitor the plant staff's efforts to further characterized the plant's radiological contamination status and its contribution to internal doses as described in Section R8.2 above. This item will remain open.

R8.5 (Closed) IFI No. 70-7001/99013-07: Internal dose assessments were based on urine analysis performed using the standard ICRP biokinetic models with the assumption that the intake occurred three days prior to collection of the urine sample. The justification for this 3 day time period should be reassessed.

Based on a reassessment, USEC concluded that the assumption that the intake occurred 3 days prior to collection of the urine sample was appropriate for the plant. When intakes occurred there were normally other identifiable events that allowed for a recognition of an actual or potential intake and a determination of the actual time of the intake. In these situations urine samples were collected following the event and the actual time between intake and sample collection was used in the models to calculate a worker dose. In addition, due to the high solubility of the chemical forms of uranium at the plant, experience had shown the urinary concentration of uranium was less than the minimum level of detection after only 2 to 3 days post intake. Assuming that the intake was measurable but that no significant event was recognized to have occurred to cause the intake, it was therefore conservative to presume it had occurred 3 days prior to sample collection. Dose calculations also showed that the assumption of 3 days provided the best fit with the ICRP model using actual data as opposed to a mid-point time period (i.e., 15 days). After the review, the inspectors had no further questions and this item is considered closed.

S1 Security

S1.1 Conduct of Post Security Activities

a. Inspection Scope (88100)

The inspectors observed the security staff's routine implementation of the physical security plan.

b. Observations and Findings

The inspectors observed the security staff's conduct of routine security activities at the entrance and exit portals to the plant and at vehicle access points into the controlled access area. During the observations, the inspectors noted a wide variance in the rigor of staff implementation of the security procedures. Specifically, the inspectors noted that some security staff did not always review the status of an individuals general employee training, prior to granting access to the plant, and did not conduct access activities at some of the vehicle entrance points in a consistent manner. As a result, the inspectors noted that some plant staff were unsure as to how security operations were to be conducted and what actions were necessary to ensure proper access to the plant.

The inspectors reviewed the Physical Security Plan and noted that the security staff were required to have procedures for the conduct of activities and that the procedures were to include specific operating instructions for the individual posts. The inspectors reviewed the current security procedures and noted that the procedures included a general level of instructions; however, some did not include details describing how the Posts should be operated. For example, the Procedure CP4-SS-SP2211, "Post Operations," provided specific instructions for vehicle access involving Posts with motorized gates and without pedestrian lobbies; however, the procedure did not provided a similar level of instruction for vehicle access Posts involving motorized gates

with pedestrian lobbies. Most vehicle traffic enters the plant through a Post with a motorized gate with a pedestrian lobby.

The inspectors noted that during the inspection period, a vehicle entered the controlled access area through Post 15, a motorized gate and pedestrian lobby entry portal. The vehicle was driven onto the site by an individual that did not stop to allow the security staff to confirm that the driver was authorized and properly trained to have unescorted access to the site. Through discussions with the staff, the inspectors determined that the vehicle entered the site, in part, due to inconsistent implementation of access controls by the security staff and inadequate adherence to posted controls by the driver. Specifically, the inspectors were aware that often the security staff did not specifically provide access directions at the Post. However, the inspectors also noted a sign outside the Post which clearly stated that drivers should only proceed upon direction of the security staff.

The inspectors discussed the findings with the security management. The managers concurred with the inspectors' findings and indicated that corrective actions had been initiated to address several of the identified deficiencies. The corrective actions included revisions to the plant procedures to improve the level of direction provided for Post operations and detailed training of the security staff, including all management on all of the procedural requirements. Management also planned to change some of the vehicle entry protocols to ensure a more positive control of the Post by the assigned security staff. Finally, security management was initiating surveillances of ongoing post operations by security managers and others to ensure a consistent and rigorous implementation of the improved procedural direction.

TSR 3.9 requires, in part, that procedures shall be developed, maintained, and implemented for activities described in the SAR, including security and visitor control. The failure to include specific instructions in the security procedures on the operations of some Posts and the failure to implement the training and access checks required for all individuals accessing the site is a violation. However, this non-repetitive, certificatee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy.

c. Conclusion

Plant management took prompt corrective action for inadequacies in the security procedures and inconsistent security staff implementation of the procedures.

S1.2 Compromise of Classified Information

a. Inspection Scope (88100)

The inspectors reviewed the circumstances surrounding two compromises of classified material that occurred during the inspection period.

b. Observations and Findings

During the inspection period, plant management informed the inspectors of two incidents that resulted in a compromise of classified information. In both cases, plant security staff initiated immediate corrective actions to minimize the impact of the

compromise and to determine the possible impacts of the compromise. As of the end of the inspection period, the plant staff had not completed the impact assessments for both of the compromises. Therefore, pending the inspectors review of the completed impact assessments, this issue will be tracked as an **Unresolved Item** (URI 70-7001/2000001-01).

c. Conclusions

The plant staff identified two examples of a compromise of classified matter that occurred during the inspection period and were assessing the possible impacts of the examples as of the end of the inspection period.

EP8 Miscellaneous Emergency Preparedness Issues

EP8.1 (Closed) Compliance Plan Issue 31: Public Address System: The public address system coverage did not provide assurance that all onsite personnel could be notified of immediate protective action recommendations because of dead spots. In addition, the system was experiencing reliability problems. Additional public address speakers were required to be installed outside and in Buildings C-400 and C-720 to ensure full area coverage. The inspectors reviewed the modification documentation and acceptance testing for the public address system upgrade. The modification included installation of a new control console and new speakers in outside areas of the plant and in Buildings C-400 and C-720. The plant staff performed audibility checks of the new speakers in both the outside areas and all areas of Buildings C-400 and C-720. In addition, the plant staff performed a 30-day system test to check the reliability of the upgrade, after which the new components were tied into the old system and the system was declared operable before the April 30, 1997, due date. Based on the review, the inspectors considered the issue closed.

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of the certificatee's staff and management at the conclusion of the inspection on March 6, 2000. The certificatee staff acknowledged the findings presented at the meeting. The inspectors asked the certificatee staff whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

United States Department of Energy

G. A. Bazzell, Site Safety Representative

United States Enrichment Corporation

*M. A. Buckner, Operations Manager
*L. L. Jackson, Nuclear Regulatory Affairs Manager
*J. A. Labarraque, Safety, Safeguards and Quality Manager
*S. R. Penrod, Enrichment Plant Manager
*H. Pulley, General Manager

U.S. Nuclear Regulatory Commission

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

*Denotes those present at the exit meeting March 6, 2000.

Other members of the plant staff were also contacted during the inspection period.

INSPECTION PROCEDURES USED

IP 88020:	Nuclear Criticality Safety
IP 88100:	Plant Operations
IP 88102:	Surveillance Observations
IP 88103:	Maintenance Observations

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

70-7001/2000001-01	URI	Two Examples of Compromised Classified Information.

Closed

70-7001/99016-01	URI	Control Room Alarms.
70-7001/99013-01	IFI	Unremediated Outside Contamination Areas.
70-7001/99013-05	IFI	Vendor Algorithm For Dosimetry Systems.
70-7001/99013-07	IFI	Assumption Used For Internal Dose Assessments.
Compliance Plan Issue 31		Public Address System.

Discussed

70-7001/99013-02	IFI	Posting and Control of Radiological Areas.
70-7001/99013-06	IFI	Contribution of Transuranics to Internal Assessment of Dose.

LIST OF ACRONYMS USED

ACR	Area Control Room
ALARA	As Low As Reasonably Achievable
AQ-NCS	Augmented Quality - Nuclear Criticality Safety
CAAS	Criticality Accident Alarm System
CFR	Code of Federal Regulations
DMSA	Department of Energy Material Storage Area
DNMS	Division of Nuclear Materials Safety
DOE	Department of Energy
IFI	Inspector Followup Item
IP	Inspection Procedure
NCS	Nuclear Criticality Safety
NCSE	Nuclear Criticality Safety Evaluation
NMSS	Nuclear Materials Safety and Safeguards
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
PDR	Public Document Room
PGDP	Paducah Gaseous Diffusion Plant
PM	Preventive Maintenance
PSS	Plant Shift Superintendent
Q	Quality
SAR	Safety Analysis Report
TSR	Technical Safety Requirement
USEC	United States Enrichment Corporation
WAP	Worker Advisor Project