August 26, 2009

Mr. Steven A. Toelle
Director, Nuclear Regulatory Affairs
U.S. Enrichment Corporation
2 Democracy Center
6903 Rockledge Drive
Bethesda, MD 20817

SUBJECT: APPROVAL OF CERTIFICATE AMENDMENT REQUEST REGARDING DEPARTMENT OF ENERGY RADIOLOGICAL SURVEY, PADUCAH GASEOUS DIFFUSION PLANT (TAC NO. L32721)

Dear Mr. Toelle:

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the April 17, 2009, certificate amendment request (CAR), submitted by United States Enrichment Corporation (USEC or certificate holder), Paducah Gaseous Diffusion Plant (PGDP), regarding a radiological survey to be conducted by National Nuclear Security Administration, Department of Energy (DOE). Specifically, the proposed certificate amendment would provide a temporary revision to PGDP's plant operation, by allowing a helicopter fly over of its process support buildings and hazardous material storage areas in support of a DOE radiological survey. The CAR from USEC dated April 17, 2009, is available via NRC's Agencywide Documents Access and Management System (ADAMS) Accession Number ML091110328.

The NRC staff reviewed USEC's CAR dated April 17, 2009, and issued a request for additional information (RAI) by letter dated June 29, 2009 (ADAMS Accession Number ML091770469). USEC provided its responses to the staff's RAI by letter dated July 16, 2009 (ADAMS Accession Number ML092010125). The staff has completed the review of the CAR and the certificate holder's response to the RAI, and found the proposed revision acceptable. The staff's Certificate Evaluation Report is contained in Enclosure 1. Enclosure 2 contains Revision 2 to the PGDP's Certificate of Compliance reflecting the revision approved under this request.

Neither an environmental assessment nor an environmental impact statement is required for the proposed action because the requested amendment is subject to the categorical exclusion provided in the 10 *Code of Federal Regulations* (10 CFR) 51.22(c)(19) and will not have a significant impact on the human environment.

In accordance with 10 CFR, Section 2.390 of the NRC's Rules of Practice, a copy of this letter will be available electronically from the Publicly Available Records component of NRC ADAMS. ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions regarding this action, please contact Ms. Tilda Liu, at (301) 492-3217, or via e-mail to tilda.liu@nrc.gov.

Sincerely,

/RA/

Marissa G. Bailey, Deputy Director
Special Projects and Technical
Support Directorate
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated

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

cc w/enclosures: Vernon Shanks, USEC-Paducah
Randall M. DeVault, DOE-Oak Ridge

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DOCKET NUMBER: 70-7001

CERTIFICATE NUMBER: GDP-1

CERTIFICATE HOLDER: United States Enrichment Corporation
Paducah Gaseous Diffusion Plant
Paducah, Kentucky

SUBJECT: CERTIFICATE EVALUATION REPORT – CERTIFICATE AMENDMENT REQUEST SUPPORTING DEPARTMENT OF ENERGY RADIOLOGICAL SURVEY, PADUCAH GASEOUS DIFFUSION PLANT

1.0 PROPOSED CHANGES

By letter dated April 17, 2009 (Agencywide Documents Access and Management System [ADAMS] Accession Number ML091110328), as supplemented by letter dated July 16, 2009 (ADAMS Accession Number ML092010125), the United States Enrichment Corporation (USEC or certificate holder) submitted a certificate amendment request (CAR) for the Department of Energy (DOE) to perform an aerial radiological survey at the Paducah Gaseous Diffusion Plant (PGDP). Specifically, the proposed amendment would allow temporary revision to PGDP's plant operation, by allowing a helicopter fly-over of process support buildings and hazardous material storage areas in support of a DOE radiological survey. The radiological survey will be conducted by the DOE National Nuclear Security Administration using an Aerial Measuring System mounted in a Bell 412 helicopter. The flight pattern would direct some flights over PGDP facilities such as the cleaning buildings, maintenance facilities, cylinder storage yards, and other PGDP facilities.

2.0 REGULATORY REQUIREMENTS

Title 10 of the *Code of Federal Regulations* (10 CFR) 76.68, "Plant changes," Section (a), provides the regulatory basis in allowing changes to the plant or to the plant operations being made as described in the PGDP Safety Analysis Report[1] (SAR) without prior Commission approval provided that all the provisions in 10 CFR 76.68(a) are met. By its 10 CFR 76.68 evaluation performed in support of this activity, the certificate holder determined that the performance of the fly over is an unreviewed safety question and requires prior U.S. Nuclear Regulatory Commission (NRC) approval. Currently, the PGDP has a no fly zone restriction.

3.0 DISCUSSION

The staff's evaluation of the proposed activity found that USEC had adequately described the operational changes so that potential accidents resulting from those operations could be evaluated. The staff found that the accident of concern for the aerial survey is a helicopter crashing into one or more of the process support buildings and/or hazardous material storage areas at the PGDP site.

[1] Paducah Gaseous Diffusion Plant Safety Analysis Report, Revision 65, February 22, 2002.

3.1 Crash Probability

The staff noted that, in its assessment, USEC used the probability of the survey helicopter crashing into the PGDP from empirical data on the rate at which helicopters crash. In Section 4.2.1.1 of the SAR, Table 4.2-1, "Initiating Event Frequency Categories," it is stated that a credible event has a probability of occurrence of greater than 10^{-6}. An event that has a probability of occurrence of less than 10^{-6} is not considered to be credible.

In general, the probability (Pr) of an event, given its rate, is determined according the following equation:

$$\Pr(crash) = 1 - e^{-\lambda t} \qquad [1]$$

where λ = rate
t = mission time

The staff noted that USEC chose, instead, to implement the rare event approximation to that of equation [1], which is a common practice when the probability is small, as follows (i.e., equation [2]):

$$\Pr(crash) = 1 - e^{-\lambda t} \approx \lambda t \qquad [2]$$

And the event rate is determined with the following equation:

$$\lambda = \frac{N}{T} \qquad [3]$$

where N = number of events
T = time during which the events occurred

In equation [3], the event would be a crash of a helicopter and the time would be the flight hours over which the helicopter crashes have occurred.

The probability that a helicopter would impact a process building is proportional to the area of the building, relative to the survey area. The area that will be surveyed is 25 square miles. The area presented to an aircraft is a function of both the area and height of the building. For a helicopter, the glide ratio is steep, making the height less of a factor. But during the aerial survey, the helicopter will be at a low altitude, making the height a more significant factor. USEC used both the area and the height of the largest process building to determine the area presented to the survey helicopter. Specifically, the certificate holder used the following equation to determine the probability of a helicopter crashing into a process building during the aerial survey.

$$\Pr(crash) = \lambda t \left(\frac{A_B}{A_T} \right) \qquad [4]$$

where A_B = effective building area
A_T = total area of the aerial survey

The staff noted that USEC used the available data from the Helicopter Association International, which is based on National Transportation and Safety Board Preliminary Accident Report Data contained in U.S. Civil Helicopter Safety Statistics – Summary Report (1997 - 2006). USEC stated that a Bell helicopter, which is a type of multi-turbine helicopter, will be used for the survey. The data from the ten year period of 1997 through 2006 indicates that 145 crashes of multi-turbine helicopters occurred during 4,291,000 hours of flight time. With these data, equation [2] above yields a crash rate of 3.38 per 100,000 hours of flight.

The use of empirical data gives rise to uncertainty in the failure rates. In this case, the failure rates would be the number of crashes in a given amount of time. The certificate holder constructed its statistical evaluation using Poisson parameter methodology[2] described in NUREG-1475, "Applying Statistics," published in February 1994, to model the failure rates, and calculated the upper confidence interval on the crash rate to be 95 percent. Though the Commission does not have a policy on a confidence interval which may apply to this scenario, 95 percent confidence interval is considered an acceptable level in many technical applications. This upper interval was used by USEC in its subsequent calculations. Thus, the crash rate at the 95 percent confidence interval is 3.87 per 100,000 hours of flight.

The aerial survey is expected to take approximately eight hours to complete. USEC accounted for uncertainty in the duration of the aerial survey by bounding this mission time with a value that is twice the time expected for the survey. Thus, the mission time for the helicopter flight operations required to complete the proposed survey, *t*, as shown in equations [2] and [4], is 16 hours, versus eight hours.

Using equation [3], the number of events at the 95 percent confidence interval, and the mission time of twice the expected survey duration, the crash probability would be slightly greater than 10^{-6}. USEC chose to view a survey helicopter crash as a credible event. Therefore, the consequences of a crash of the survey helicopter were also assessed.

Using the consequence analysis contained in PGDP SAR, Section 4.2.6.3, "Hazard Evaluations," Table 4.2-11, "Initiating Events," USEC included an aircraft crash as an external event. PGDP SAR Section 4.3.2.2.6,"Handling of a Cylinder with Excessive UF_6 (Pressure Increase)," specifically identifies an aircraft crash as a potential initiator for the large fire associated with the cylinder hauling, cylinder storage, withdrawal, feed, toll transfer and sampling operations. The analysis assumed that a large fire initiated during cylinder handling operations could generate enough heat to compromise the physical integrity of the uranium hexafluoride (UF_6) cylinders. PGDP's proposed work plan will use a Bell 412 helicopter, which would contain a maximum of 344 gallons of combustible fluids (e.g., aviation fuel, oil, etc.). PGDP SAR Section 4.3.2.2.6 assumes that the 800 gallons of combustible liquids carried in cylinder hauling equipment as a credible source of fuel for the large fire event in a UF_6 cylinder storage yard. The amount of combustible fluid in the helicopter used for the aerial survey operation is considerably less than that postulated for the cylinder yard large fire event evaluated in the PGDP SAR. Therefore, the consequences of a large fire in the cylinder yards resulting from a helicopter crash occurring during aerial survey operations would not exceed the consequences of the large fire event in a UF_6 cylinder storage yard currently evaluated in PGDP SAR.

[2] NUREG-1475, Applying Statistics, Chapter 18, Poisson Experiments, Dan Lurie and Roger Moore, February 2004.

3.2 Flight Restrictions

The certificate holder stated that its proposed flight pattern for the aerial survey project excludes the main PGDP process buildings and certain selected facilities. The flight plan will require the pilot to maintain a 50-foot buffer zone around these selected buildings and facilities. All flights performed by the helicopter will be under visual flight rules throughout the survey operations. Visual flight rules are a set of aviation regulations under which a pilot may operate an aircraft in weather conditions sufficient to allow the pilot, by visual reference to the environment outside the cockpit, to control the aircraft's attitude, navigate, and maintain safe separation from obstacles such as terrain, buildings, and other aircraft.

3.3 Physical Security

The certificate holder stated that, during the survey, the Plant Shift Superintendent (PSS) will oversee the flight mission. Prior to the flight, the credentials of the flight crew will be verified and the flight path will be established. Potential hazards will be identified to the flight crew. The PSS will maintain radio contact with the flight crew while the helicopter is in flight. If, at any time, the PSS determines that the flight should be aborted, the flight crew will return to a local airport. The physical security requirements at the site will be maintained during the helicopter survey. USEC further stated that the proposed activities do not reduce the effectiveness of the security controls in place to protect Special Nuclear Material of Low Strategic Significance and classified matter contained within the USEC leased area.

3.4 Other Considerations

USEC stated that DOE contractors will perform activities to coordinate the aerial survey with Federal, State, and local authorities so that the helicopter would not be mistakenly taken as an aircraft threat. USEC stated that it will notify the NRC Operations Center and the Paducah-McCracken County Office of Emergency Management of the pending flight as required by its plant procedures.

4.0 FINDINGS

The staff has reviewed the proposed temporary revision to PGDP's operation by allowing a helicopter radiological survey, including the crash probability analysis, the consequence analysis, the flight restrictions, the action of the PSS, and the offsite coordination, and finds that there is reasonable assurance that the proposed action would not have a significant impact on public health and safety, security, or the protection of the environment, and therefore, is acceptable.

The approval of this amendment request is documented in the Certificate of Compliance GDP-1 by the addition of a reference to the April 17, 2009, letter from USEC regarding the CAR for the helicopter radiological survey.

5.0 ENVIRONMENTAL REVIEW

Issuance of the requested amendment to Certificate of Compliance GDP-1 is subject to the categorical exclusion provided in 10 CFR 51.22(c)(19) and will not have a significant impact on the human environment. Therefore, in accordance with 10 CFR 51.22(b), neither an environmental assessment nor an environmental impact statement is required for the proposed action.

6.0 CONCLUSION

Based on its review and evaluation of the information provided by USEC in its CAR dated April 17, 2009, as supplemented by letter dated July 16, 2009, the staff finds that the proposed action would not have a significant increase in risk to the worker, and would continue to provide adequate protection of public health, safety, safeguards, security, and the protection of the environment. Therefore, the staff concludes that the proposed action is acceptable and consistent with the requirements of 10 CFR Part 76.

PRINCIPAL CONTRIBUTOR

Christopher Ryder