70-7001

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 9, 1998

EA 98-239

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

SUBJECT: EXERCISE OF ENFORCEMENT DISCRETION AND SUMMARY REPORT OF THE JUNE 16, 1998, PREDECISIONAL ENFORCEMENT CONFERENCE (NRC INSPECTION REPORT 70-7001/98006 (DNMS) AND LETTER FROM DR. CARL J. PAPERIELLO TO MR. WILLIAM H. TIMBERS, DATED MAY 28, 1998.)

Dear Mr. Miller:

The NRC performed an in-office review of the United States Enrichment Corporation's (USEC) Safety Analysis Report Upgrade Project (SARUP) submittal and conducted a routine resident inspection from March 10 through April 20, 1998, at USEC's Paducah Gaseous Diffusion Plant, located in Paducah, Kentucky. The in-office review and onsite inspection identified two apparent violations associated with safety analyses and conclusions presented in the SARUP and a third apparent violation associated with a related safety analysis performed to update the current Safety Analysis Report (SAR) for an as-found condition. The SARUP and SAR safety analyses involved the liquid uranium hexafluoride accumulators used in the product and tails withdrawal processes. The NRC discussed one of the apparent violations with members of the Paducah Gaseous Diffusion Plant at the inspection exit meeting, conducted on April 20, 1998. The report documenting our inspection was sent to USEC by letter dated May 7, 1998. A letter summarizing the remaining two apparent violations was sent to USEC on May 28, 1998. An open predecisional enforcement conference was held in the NRC's Washington, D.C. office on June 16, 1998, to discuss the apparent violations, the root causes, and USEC corrective actions. The predecisional enforcement conference meeting summary is attached.

During the predecisional enforcement conference, USEC denied the two apparent violations associated with the SARUP submittal based upon a belief that it was reasonable and appropriate to consider the accumulators empty during the SARUP assessment of the accumulators' response to a seismic event. While the NRC staff recognized that previous seismic design requirements and accident analysis performed during the 1980s appeared to assume the accumulators were empty, such an assumption was inconsistent with current regulatory requirements. The NRC staff also recognized that neither the previous nor the current accident analysis design and consequence assumptions were clearly stated so as to easily preclude the submission of incomplete or inaccurate information. Also during the conference, USEC concurred with the NRC's position that the safety evaluation, performed to authorize a modification to the current Safety Analysis Report for the as-found condition of

increased accumulator capacities, was not well developed and documented. However, USEC disagreed that the as-found condition represented an unreviewed safety question, a condition that would have required a certificate amendment in order to permit continued plant operations. As indicated in the Confirmatory Order issued to USEC April 22, 1998, EA 98-156, the NRC considered continued operation of the accumulators, without certificate controls to ensure compliance with the current accident analysis, a condition inconsistent with the Certificate of Compliance.

Based on the information developed during our review of the SARUP submittal, during the referenced routine resident inspection, and the information USEC provided during the predecisional enforcement conference, the NRC determined that violations of NRC requirements occurred. Specifically, the NRC determined that the SARUP submittal did not consider operations at the maximum capacity of the accumulators, as required by the Compliance Plan and 10 CFR 76.85, "Assessment of Accident," and did not include complete and accurate information as to the potential accident consequences of the failure of full accumulators during a seismic event, as required by 10 CFR 76.9, "Completeness and Accuracy of Information." In addition, the NRC determined that a safety analysis, performed as required by 10 CFR 76.68 for the as-found condition of increased accumulator capacities, failed to identify a condition that would require a certificate amendment to allow continued operations. The NRC determined that the violations were caused, in part, by: 1) a continued application of old design assumptions to current analyses; and, 2) a lack of Compliance Plan clarity and USEC understanding as to how the current regulatory requirements were to be applied as a part of SARUP-related activities.

The violations are a significant regulatory concern because they indicate a lack of understanding of the current regulatory requirements, as specified in the Compliance Plan for the SARUP activities, and a lack of rigorous implementation of the regulatory requirements for dispositioning as-found conditions, as specified in the Compliance Plan and Part 76.68. The violations are a significant safety concern because, as a result of the violations, plant operations were incorrectly allowed to continue for approximately one year with unlimited use of the increased accumulator capacities. The occurrence of a seismic event below the design basis, concurrent with the accumulators being filled to capacity, could have resulted in significantly increased seismic accident consequences onsite and offsite. Therefore, the violations are classified in the aggregate in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," (Enforcement Policy), NUREG 1600, Rev.1, as a Severity Level III problem.

In accordance with the Enforcement Policy, a civil penalty was considered for this Severity Level III problem. However, I have been authorized, after consultation with the Director, Office of Enforcement and the Deputy Executive Director for Regulatory Effectiveness, to exercise enforcement discretion in accordance with Section VII.B.6 of the Enforcement Policy and not propose a civil penalty or issue a Notice of Violation in this case. Discretion was warranted because of: 1) the significant correlation between the current issues and previous (old) design practices which appeared to allow the seismic design and accident analysis assumptions used by USEC; 2) USEC's development and prompt implementation of compensatory measures and comprehensive plant design changes to resolve the seismic weaknesses, as identified in the Confirmatory Order issued April 22, 1998, EA 98-156; and 3) the corrective actions presented by USEC at the predecisional enforcement conference to improve the rigor and documentation of safety evaluations for as-found conditions. The NRC also determined that the corrective actions, in the Confirmatory Order and those committed to at the predecisional enforcement

conference were sufficient to address the violations. However, similar significant violations in the future could result in a civil penalty.

The NRC has concluded that the information regarding the reason for the violations; the corrective actions implemented and planned to correct and prevent recurrence of the violations; and the date when full compliance will be achieved are already adequately addressed on the docket in the Confirmatory Order and the attached Predecisional Enforcement Conference Summary. Therefore, you are not required to respond to this letter unless the description therein does not accurately reflect USEC's corrective actions or position. In that case, or if you choose to provide additional information, you should send the information to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region III, and a copy to the NRC Resident Inspector at the Paducah Gaseous Diffusion Plant, within 30 days of the date of this letter.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosures and your response, if any, will be placed in the NRC Public Document Room.

Sincerely,

[original signed by:]

Carl J. Paperiello, Director
Office of Nuclear Material Safety and Safeguards

Docket 70-7001
Certificate GDP-1

Enclosure: Enforcement Conference Meeting Summary

cc w/encls: H. Pulley, Paducah General Manager
L. L. Jackson, Paducah Regulatory Affairs Manager
J. M. Brown, Portsmouth General Manager
S. A. Toelle, Manager, Nuclear Regulatory Assurance and Policy, USEC
Paducah Resident Inspector Office
Portsmouth Resident Inspector Office
R. M. DeVault, Regulatory Oversight Manager, DOE
J. C. Hodges, Paducah Site Manager, DOE

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*See previous concurrence

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OFFICE	OGC	RIII:DNMS	RIII:DNMS	NMSS			
NAME	JGoldberg	RCaniano	BClayton	CPaperiello			
DATE	09/09/98	09/09/98	09/09/98	09/ /98			

DOCUMENT NAME: a:\98-239.lt6 OFFICIAL RECORDS COPY

Certificate Holder: United States Enrichment Corporation

Facility: Paducah Gaseous Diffusion Plant

Certificate No.: GDP-1

Docket No.: 070-07001

EA Number: EA 98-239

On June 16, 1998, representatives of the United States Enrichment Corporation (USEC) met with Nuclear Regulatory Commission (NRC) personnel at NRC Headquarters in Rockville, Maryland, to discuss apparent violations identified in NRC Inspection Report Number 070-07001/98006 (DNMS) and May 28, 1998, Mr. Carl J. Paperiello letter to Mr. William H. Timbers. The conference was held at the request of the Office of Nuclear Material Safety and Safeguards.

The certificate holder's presentation was a denial of the apparent violation of Title 10 of the Code of Federal Regulations, Part 76.85 for an inadequate accident analysis, a denial of Title 10 of the Code of Federal Regulations, Part 76.9 (a) for incomplete and inaccurate information, and a challenge to the severity of the apparent violation of Part 76.68 for an inadequate safety evaluation regarding the seismic vulnerability of Building C-315 withdrawal facility and the as-found size error for the withdrawal accumulators. The denial of the first apparent violation (Part 76.85 inadequate accident analysis) was based, in part, on USEC's position that the NRC had previously reviewed and approved the accident assumption that the accumulators would be empty during the seismic event which was later challenged during the Safety Analysis Report Upgrade (SARUP) review process. USEC also denied the apparent violation because they felt that it was process of the submittal, NRC review and approval, and implementation of the SARUP that was intended to meet the requirements of Part 76.85. In addition, USEC denied that the information about the seismic vulnerability submitted with the SARUP was incomplete and inaccurate. The denial was based on their position that informing the NRC that there was an accumulator size error without stating the magnitude of the error was complete and their assessment that the seismic accident consequences were bounded by other accidents was accurate based upon the empty accumulator assumption which was only later challenged. The Part 76.68 inadequate safety analysis apparent violation severity was challenged because USEC believed that the as-found condition did not represent an unreviewed safety question. The certificate holder's view was that the size error required only changes to the SAR Chapter 3 system description to correct the value, that the change did not result in any change to plant operations, and that the accident analysis review did look at all the accidents and based upon the assumptions in those accidents, the size error had no impact on the consequences.

After USEC's presentation, the NRC asked several questions to clarify why USEC felt that the safety evaluation was adequate in view of the unreviewed safety question raised by rejecting the empty accumulator assumption and to ask if there were other examples in the Certification SAR and/or the SARUP where normal operation conditions were used to bound accident.

ENCLOSURE

The attendance list and the certificate holder's presentation are attached to this summary.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this summary and its enclosures will be placed in the NRC Public Document Room.

Attachments: 1. List of attendees
2. Certificate holder presentation

and the date when full compliance will be achieved are already adequately addressed on the docket in the Confirmatory Order and the attached Predecisional Enforcement Conference Summary. Therefore, you are not required to respond to this letter unless the description therein does not accurately reflect USEC's corrective actions or position. In that case, or if you choose to provide additional information, you should send the information to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region III, and a copy to the NRC Resident Inspector at the Paducah Gaseous Diffusion Plant, within 30 days of the date of this letter.

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Sincerely,

Carl J. Paperiello, Director
Office of Nuclear Material Safety
and Safeguards

Docket 70-7001
Certificate GDP-1

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J. M. Brown, Portsmouth General Manager
S. A. Toelle, Manager, Nuclear Regulatory
Assurance and Policy, USEC
Paducah Resident Inspector Office
Portsmouth Resident Inspector Office
R. M. DeVault, Regulatory Oversight Manager, DOE
J. C. Hodges, Paducah Site Manager, DOE

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OE 7-H-5

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OFFICE	OGC	RIII:DNMS	RIII:DNMS	NMSS			
NAME	JGoldberg	RCaniano	BClayton per tlf	CPaperiello			
DATE	09/09/98	09/09/98	09/ 9 /98	09/ /98			

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DATE	08/19 /98	08/ /98	08/ /98	08/ /98			

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Carl J. Paperiello, Director
Office of Nuclear Material Safety
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OFFICE	OGC	RIII:DNMS	RIII:DNMS	NMSS			
NAME	JGoldberg	CPederson	BClayton	CPaperiello			
DATE	08/ /98	08/ /98	08/ /98	08/ /98			

R Cantano

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NRC ATTENDANCE SHEET

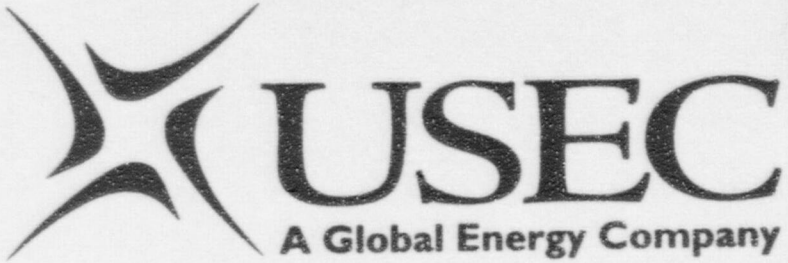
MEETING: USEC Pre-decisonal Enf. Conf. **DATE:** 1/16/98

Name	Affiliation	Phone
DAN E. MARTIN	NRC/NMSS/FSPB	301-415-7254
MALCOLM KNAPP	NRC/NMSS	(301) 415-7800
Liz Tenfuck	NRC/FCSS	30-415-721-
Bill Brach	NRC/FCSS	301-415-7213
Nader Mamish	NRC/OE	301-415-2740
SUSAN GREENE	NMSS/IMNS	
Drew Persinko	NRC/NMSS/SPB	301-415-6522
Merri Horn	NRC/NMSS/SPB	301 415-8126
Charles Cox	NRC/NMSS/SPB	301-415-6755
Ken O'Brien	NRC/RIII	740 289 3353

NRC ATTENDANCE SHEET

MEETING: USEC Pre-decisional Enf. Conf. **DATE:** 6/16/98

Name	Affiliation	Phone
MARK SMITH	USEC	301-564-3244
W DON DOTSON	USEC/LMUS	507-441-6707
GEORGE RIEAKES	USEC	301-564-3301
Steve Routh	USEC	301-564-3251
Jim Miller	USEC	301-564-3309
STEVE TOELLE	USEC	301-564-3250
Howard Pulley	LMUS	502-441-6301
GREG BAKER	LMUS	(301) 896-9479
LARRY L. JACKSON	LMUS	(502)-441-6130
JOHN DIETRICH	LMUS	(301) 896-9330



UNITED STATES ENRICHMENT CORPORATION
PADUCAH GASEOUS DIFFUSION PLANT
PRE-DECISIONAL ENFORCEMENT CONFERENCE

June 16, 1998

AGENDA

A. Restatement of Apparent Violation #1 - 10 CFR 76.85 & 10 CFR 76.9(a)

B. Restatement of Apparent Violation #2 - 10 CFR 76.68

C. Summary

D. Assumption of Empty Accumulators

E. SARUP Limitations and Inaccuracies

F. Response to Apparent Violation #1 - 10 CFR 76.85 & 10 CFR 76.9(a)

G. Response to Apparent Violation #2 - 10 CFR 76.68

Appendix A - Chronology

RESTATEMENT OF APPARENT VIOLATION # 1

Part A - 10 CFR 76.85

- The SARUP failed to meet 10 CFR 76.85.
- The SARUP did not perform an adequate analysis of potential accidents and consequences for Buildings C-310/310-A and C-315. The SARUP accident analysis did not consider the full range of operations, including operations at the maximum capacity contemplated. Rather, the analysis considered that a seismic event would occur with the accumulators empty which would be the minimum capacity contemplated.
- Had the SARUP accident analysis considered the maximum capacity of the C-310/310-A and C-315 accumulators, the consequences would have identified the need for an LCO or required a plant modification.

Part B - 10 CFR 76.9(a)

- The SARUP was not complete and accurate in all material respects as required by 10 CFR 76.9(a).
- The SARUP was not accurate when it stated that the overall consequences for liquid UF_6 releases from Buildings C-310/310-A and C-315 would be on the same order as reported in the Application SAR.
- These statements were material because had the NRC known the size of the error in the capacity of the Building C-315 accumulators (i.e., 21 tons versus 10 tons) or had USEC accurately assessed the consequence the USQ would have been identified at least 4 months earlier and resulted in the seismic risk being reduced earlier.

RESTATEMENT OF APPARENT VIOLATION # 2

- The 10 CFR 76.68 safety evaluation (SE) performed to correct the size of the C-315 accumulators in SAR Section 3.5.5 was incomplete. The SE focused on a single accident scenario in SAR Section 4.3.4.2.1 but did not assess the impacts on SAR Sections 4.3.3.1.2, 4.6, and 4.9.

- Increasing the size of the C-315 accumulators would increase the accident consequences reported in SAR Section 4.3.3.1.2. Increasing the size of the accumulators would have a direct impact on the operator's ability to evacuate the system within 5 minutes. Thus, the total material released would be greater than the 1,000 lbs assumed. Also, the assumed release of 1,000 lbs in SAR Section 4.3.3.1.2 is not consistent with SAR Section 4.3.2.4.1 which indicates that the accumulators can be completely filled during cylinder changes.

- SAR Section 4.6 and the source document did not consider the true size of the accumulators or the potential for UF_6 to be present in the accumulators. The presence of liquid UF_6 could change the seismic response of the accumulators and may have resulted in the capacity change being identified as a USQ.

- Failure of the accumulators during a seismic event could result in releases greater than twice the level assumed in SAR Section 4.9.

- USEC failed to evaluate the as-found condition, increased Building C-315 accumulator capacities, for all SAR accidents, and continued to operate, with increased consequences without prior NRC approval.

SUMMARY

Apparent Violation #1 - 10 CFR 76.85 & 10 CFR 76.9(a)

- Part A - 10 CFR 76.85

  USEC denies the violation.

- Part B - 10 CFR 76.9(a)

  USEC denies the violation.

Apparent Violation # 2 - 10 CFR 76.68

- USEC maintains that the 10 CFR 76.68 Plant Change Review and Safety Evaluation were rigorous but were not adequately documented.

- USEC disagrees that an unreviewed safety question was involved.

ASSUMPTION OF EMPTY ACCUMULATORS

The accident analyses in the Application SAR are based on the typical plant operating condition of empty accumulators in Buildings C-310/310-A and C-315. This basis was concluded to be appropriate by USEC, DOE, and the NRC during the initial certification.

Application SAR

- The SAR identifies the maximum capacity of the accumulators:

  C-310: 21,000 lbs & 4300 lbs
  C-315: Two at 42,000 lbs each (the original description of two at 20,000 lbs each was incorrect)

- The SAR describes the accumulators as normally empty consistent with typical operating conditions and states that the accumulators can be temporarily filled if necessary.

- The SAR accident analyses either assume no UF_6 is released or that a limited amount of UF_6 is released (e.g., 1000 lbs) from the withdrawal systems.

- The SAR seismic analyses assumed the accumulators to be empty in determining seismic capacity and in assessing the consequences of predicted failures.

- The SAR establishes that the amount of material assumed to be released for the purposes of accident analysis is independent of the maximum capacity of the accumulators.

ASSUMPTION OF EMPTY ACCUMULATORS

NRC Questions

- NRC Questions 4.0Q214 and 215 and USEC's responses clearly addressed the SAR basis and the assumption of empty accumulators.

Compliance Plan Issue 36

- The DOE JCO identifies the accumulators as normally empty. A limited amount of UF_6 is assumed to be released from postulated seismic failures in the withdrawal systems in Buildings C-310/310-A and C-315 (900 lbs & 2200 lbs, respectively).

- The Lawrence Livermore National Laboratory (LLNL) risk study supports the DOE JCO assumption of empty accumulators for seismic accident analysis.

Refer to the following items in the chronology:

9/15/95	Revision 1 of SAR Sections 4.3, 4.6, 4.7, 4.9
10/25/95	NRC Questions 4.0Q203, 204, 214, 215, 229
11/22/95	USEC responses to Questions 4.0Q203, 204, 214, 215
12/13/95	USEC response to Question 4.0Q229
1/17/96	NRC/USEC meeting to discuss Chapter 4 question responses
2/19/96	Application Revision 2
3/1/96	USEC revised responses to Questions 4.0Q214, 215, 229

ASSUMPTION OF EMPTY ACCUMULATORS

3/20/96	USEC submittal of EDAC reports
4/9/96	DOE outline for seismic JCO
5/1/96	NRC comments on DOE JCO outline
5/17/96	DOE detailed seismic JCO
5/31/96	Application Revision 3
6/19/96	NRC comments on DOE detailed seismic JCO
7/18/96	USEC submittal of Compliance Plan Issue 36
7/26/96	DOE submittal of revised detailed seismic JCO
9/13/96	NRC approval of Compliance Plan Issue 36 in CER
3/17/97	LLNL completes seismic risk study
6/30/97	USEC letter to NRC
7/31/97	USEC letter to NRC

SARUP LIMITATIONS AND INACCURACIES

The SARUP submittals were complete and accurate. Potential limitations or inaccuracies were identified including the seismic failures in Buildings C-310/310-A and C-315 and the incorrect C-315 accumulator capacity used by DOE. The potential significance of these limitations or inaccuracies was also identified.

8/14/97 NRC/USEC Senior Management Meeting and 8/18/97 SARUP Submittal

- Identifies the "C-315 accumulator capacity & line size," and the "C-310 and C-315 accumulators during LB as potential limitations or inaccuracies.

10/31/97 SARUP Submittal

- Table 1, Item 5, identifies the seismic failures in Buildings C-310/310-A and C-315 and that they are being evaluated as part of an assessment of dominant seismic risk (6/30/97 and 7/31/97 letters).

- Table 1, Item 14, identifies the incorrect values for the C-315 accumulator capacity and line size used by DOE in the analysis of a process line failure at compression discharge. Concludes that the impact on the threshold analysis is expected to be small and no changes to the SARUP TSRs are anticipated.

USEC/NRC Interactions on "00' Seismic Modifications (6/30/97, 7/31/97, 12/30/97 USEC Letters and 11/5/97 Senior Management Meeting)

- Questions whether the seismic modifications to Buildings C-331 and C-335 are an effective element in the management of seismic risk at PGDP.

SARUP LIMITATIONS AND INACCURACIES

- Identifies the postulated seismic failures in Buildings C-310/310-A and C-315 and that they may constitute a dominant seismic risk.
- Provides a copy of the LLNL seismic risk study.
- Suspends work on the C-331 and C-335 modifications, thus preserving resources until evaluations of dominant seismic risk and other analyses can be completed.

Refer to the following items in the chronology:

9/15/95	Revision 1 of SAR Sections 4.3, 4.6, 4.7, 4.9
6/30/97	USEC letter to NRC
7/22/97	NRC/USEC meeting
7/31/97	NRC/USEC meeting
7/31/97	USEC letter to NRC
8/12/97	NRC letter to USEC
8/14/97	NRC/USEC Senior Management meeting
8/18/97	USEC submittal of initial sections of SARUP
10/31/97	USEC submittal of the remaining sections of SARUP
11/5/97	NRC/USEC Senior Management meeting
12/8/97	NRC CER for '00' seismic modifications amendment requests
12/30/97	USEC petition requesting Commission review of 12/8/97 Director's Decision

RESPONSE TO APPARENT VIOLATION #1

Part A - 10 CFR 76.85

No violation of 10 CFR 76.85 occurred:

- In the apparent violation, the NRC states that an assumption of full accumulators during a seismic event would have identified the need for an LCO or a modification. While this may be the case, an assumption of full accumulators is not the basis of the Application SAR and Compliance Plan Issue 36. The assumption of empty accumulators for seismic analyses reflects the normal plant operating condition and was fully reviewed and determined to be appropriate by USEC, DOE, and the NRC.

- In February 1998, when USEC and the NRC agreed that an empty accumulator assumption was no longer appropriate for seismic accident analysis, immediate compensatory actions were taken by USEC. These compensatory actions assume the accumulators could be partially filled and establish a level of safety above the certification basis in the Application SAR and Compliance Plan Issue 36.

- Consistent with Compliance Plan Issue 2, the SARUP was prepared by DOE in accordance with DOE standards and orders. The NRC, DOE, and USEC intended that the SARUP would satisfy the requirements of 10 CFR 76.85 when reviewed, approved, and implemented. The NRC has not completed its review and approval of the SARUP and USEC has not implemented the SARUP. The SAR is not the currently approved certification basis for PGDP.

RESPONSE TO APPARENT VIOLATION #1

Part B - 10 CFR 76.9(a)

No violation of 10 CFR 76.9(a) occurred:

- The 8/18/97 and 10/31/97 SARUP submittals were complete and accurate.
- USEC identified potential SARUP limitations or inaccuracies in the 8/14/97 NRC/USEC Senior Management meeting and in the 8/18/97 and 10/31/97 SARUP submittals. These included:
  - The seismic failures in Buildings C-310/310-A and C-315 (SARUP Section 4.3.2.5).
  - The incorrect values for the C-315 accumulator capacity and line size used by DOE in the analysis of a process line failure at compression discharge (SARUP Section 4.3.2.2.12).
- USEC also identified the potential significance of these limitations or inaccuracies:
  - The potential significance of the seismic failures in Buildings C-310/310-A and C-315 was identified to the NRC in several letters addressing dominant seismic risk (June 30, 1997, July 31, 1997, and December 30, 1997). The issue was also discussed in the 8/14/97 and 11/5/97 NRC/USEC Senior Management meetings.
  - The significance of the incorrect accumulator capacity and line size was identified in Table 1, Item 14, of the 10/31/97 SARUP submittal. USEC concluded that the impact on the threshold analysis was expected to be small and no changes to the SARUP TSRs were anticipated.

RESPONSE TO APPARENT VIOLATION #1

- The NRC states in the apparent violation that the 10/31/97 SARUP submittal "was not accurate when it stated the overall consequences for liquid UF_6 releases from the Building C-310 and Building C-315 was on the same order as reported in the approved SAR."

The violation appears to refer to the following wording in the SARUP:

Enclosure 2, Item 4, of USEC Letter GDP 97-0188 dated 8/18/97

"...Although the SARUP analysis results in different probabilites and consequences of specific postulated accidents compared to the existing SAR, the SARUP results are not substantially different than those currently evaluated in the SAR, with the exception of the seismic hazard analyses.

The DOE seismic analyses predict new failures in the C-310 and C-315 withdrawal facilities which result in liquid UF_6 release. Other failures are consistent with and are bounded by results in the SAR. However, overall consequences are on the same order as reported in the SAR.

The analysis of accidents associated with plant activities and conditions did not identify any significant increase in the probability of occurrence or consequences of previously evaluated accidents. However, the evaluation methodology and criteria are significantly different from what is employed in the current Application SAR. As such, the new analyses represent a significant change in the safety basis for plant operation."

This SARUP statement is accurate. Similar to the SAR, the DOE SAR Upgrade assumed the accumulators in Buildings C-310/310-A and C-315 to be empty for the seismic accident analysis. Thus based on the assumption of empty accumulators, the overall consequences from postulated seismi failures reported in SARUP Section 4.3.2.5.3 are similar to those reported in SAR Sections 4.6 and 4.7

RESPONSE TO APPARENT VIOLATION #2 (10 CFR 76.68)

USEC Position

- USEC maintains that PCR-C-97-0867 and SE 97-060 performed to evaluate the SAR Section 3.5.5 correction to the Building C-315 accumulator capacity were rigorous but did not adequately document the evaluation of Compliance Plan Issue 36 and SAR Sections 4.3.4.1.1, 4.3.4.1.3, 4.6, 4.7, and 4.9.

- USEC disagrees that an unreviewed safety question was involved:

  - Correcting the capacity of the C-315 accumulators in SAR Section 3.5.5 did not result in any physical change to the plant. Only the words in SAR Chapter 3 were corrected.

  - The correction to SAR Section 3.5.5 did not result in any change to plant operations. The accumulators are normally empty.

  - Correcting the accumulator capacity has no impact on the consequences of any SAR Chapter 4 accident analyses. The accident analyses are based on the typical plant operating condition of empty accumulators. This assumption is unaffected by the capacity of the accumulators.

    SAR Section 4.3.4.1.1, "Failure of Compression Components"

    - Same scenarios as described in Section 4.3.3.1.1 for Building C-310.

    - The maximum 250 lb source term is unaffected by the accumulator capacity because the UF_6 detection system would automatically shut down the Normetex pump.

RESPONSE TO APPARENT VIOLATION #2 (10 CFR 76.68)

USEC Position (cont'd)

SAR Section 4.3.4.1.2, "Condenser and Accumulator Failure"

- The analysis states that normally only a small amount of UF_6 is maintained in the accu ulator which minimizes the potential outleakage in the event of a leak at the cylinder connections from fatigue failure.
- The analysis states that the accumulator can be completely filled if necessary during cylinder changeout.
- Accumulator failure is characterized by a UF_6 leak from a severed 1/4" instrument line.
- The maximum release evaluated is 1,000 lbs which is only consistent with an empty accumulator. Since the accumulator is empty, the accumulator capacity has no effect on the size of the release.

SAR Section 4.3.4.1.3, "Valve and Pigtail Failure"

- The maximum release is 660 lbs.
- The analysis states that the worst-case accident scenario considered possible is a comple upture of the drain manifold to cylinder pigtail with the accumulator partially full.

RESPONSE TO APPARENT VIOLATION #2 (10 CFR 76.68)

USEC Position (cont'd)

- The partially filled accumulator assumption ensures sufficient head pressure and liquid UF_6 piping inventory to make this scenario credible.
- The maximum release is unaffected by the accumulator capacity because the UF_6 release detection system would automatically isolate the line.

SAR Section 4.6, "Natural Phenomena"

- The EDAC seismic/structural analyses and consequence analyses are based on npty accumulators.
- The results of these analyses therefore are unaffected by the accumulator capacity.

SAR Section 4.7, "Consequences of Postulated Toxic Material Releases"

- As discussed for Sections 4.3 and 4.6, the consequences evaluated in this section are un. fected by the accumulator capacity.

SAR Section 4.9, "Residual Risk"

- As discussed for Sections 4.3 and 4.6, the consequences reported in this section are unaffected b. the accumulator capacity.

RESPONSE TO APPARENT VIOLATION #2 (10 CFR 76.68)

Root Cause

The root cause for the inadequate documentation in the PCR and SE is similar to that identified in USEC's response to NOV 97004-10 which stated that the reason for the violation was:

> "The reason for the violation was that the level of detail and technical rigor contained within the Plant Change Review (PCR) documentation for the proposed changes were inadequate to fully convey the logic used to reach the conclusions."

Corrective Actions

- As noted in USEC's response to NOV 97004-10, USEC took the following actions to address the lack of "technical rigor contained within the Plant Change Review (PCR) documentation:"
  - At a PORC meeting on 8/19/97, management standards and expectations for technical rigor and level of detail were discussed. Attendees at this meeting included the managers of Nuclear Safety and Nuclear Safety Analysis.
  - On 9/3/97, PGDP issued a memorandum to preparers, reviewers, and approvers of PCR documentation re-emphasizing the management standards and expectations for the technical rigor and level of detail required to adequately assess proposed plant changes.
  - Refresher training on lessons learned from instances of inadequate PCRs (and related safety evaluations) for all PCR evaluators, reviewers, and approvers was completed on 10/31/97.

RESPONSE TO APPARENT VIOLATION #2 (10 CFR 76.68)

Corrective Actions (cont'd)

- A review of completed PCRs was incorporated into the internal surveillance program in accordance with CP2-QA-QS1031, "Conduct of Internal Surveillances," to verify that the technical content and logic are adequate.

- On 9/3/97, in response to NOV 97004-10, the Manager of Engineering - Nuclear Safety issued a memorandum to preparers and reviewers of safety evaluations (USQDs) re-emphasizing the management standards and expectations for the level of detail and technical rigor required for the performance of safety evaluations.

- The General Manager has initiated a new plant Performance Indicator (PI). This PI will present data indicative of the quality and technical adequacy of PCRs being performed by various plant organizations. The PI will present pass/fail performance data based on the PCR reviews performed by Nuclear Safety Analysis. This PI will be used by the applicable functional organization managers to continually improve the quality of PCRs performed for compliance with 10 CFR 76.68. This new PI will be implemented by July 10, 1998.

- By 7/31/98, PCR-C-97-0867 and SE 97-060 will be revised to specifically address Compliance Plan Issue 36 and SAR Sections 4.3.4.1.1, 4.3.4.1.3, 4.6, 4.7, and 4.9.

RESPONSE TO APPARENT VIOLATION #2 (10 CFR 76.68)

Mitigating Factors

- USEC believes that the deficiencies in the PCR and SE are similar to a previous violation that the NRC issued on 8/5/97 (NOV 97004-10) in that:
  - The PCR and SE were approved during the inspection period for IR 97004.
  - The root cause for the deficiencies is similar to that described in NOV 97004-10 (i.e., the level of detail and technical rigor contained within the Plant Change Review (PCR) documentation for the proposed changes were inadequate to fully convey the logic used to reach the conclusions).
  - The orrective actions taken for NOV 97004-10 are appropriate to address the inadequate documentatio in PCR-C-97-0867 and SE 97-060.
- Thus, USEC believes that the inadequacies in PCR-C-97-0867 and SE 97-060 should be considered as an additional example of NOV 97004-10 since they occurred in the same time and have similar root causes and corrective actions.

APPENDIX A

CHRONOLOGY

APPENDIX A - CHRONOLOGY

Date	Description
9/15/95	USEC submits Revision 1 of the Certification Application for NRC review.

- SAR Section 3.4.4 for Building C-310/310-A:

  "Two UF_6 liquid accumulators serve the withdrawal system. The product accumulator is a 21,0[illegible] capacity nickel-lined tank used in the top product system. The side accumulator is monel-lined steel [illegible] a 4,300-lb capacity. The accumulators located on the second floor below the condensers provide su[illegible] volume by "floating" on the drain line..."

- SAR Section 3.5.5 for Building C-315:

  "Two 10-ton nickel-lined steel accumulators located downstream from the condensers in the tails withdrawal system permit gravity flow of the liquid tails material from the condensers into the accumulators and into the tails storage cylinder. Each accumulator can be used for short-term storage of the liquefied tails material while a cylinder is valved off or being changed. Normally, only a small amount of UF_6 is maintained in the accumulators, which merely float on the line ready for immediate use if required (during cylinder changes, etc.)..."

- SAR Section 4.3.3.1.2 on condenser and accumulator failures in C-310/310-A:

  "The rupture of a withdrawal system component containing liquid UF_6 could result from a fatigue failure of an instrument line on the accumulator of the fatigue failure of the drain line from the accumulator. The worst case in either of these low probability accidents would occur if the accumulator was partially filled during the change out of UF_6 drain cylinders at the withdrawal station.

APPENDIX A - CHRONOLOGY

Date Description

The instrument line break is characterized by a leak from a severed 1/4 in. diameter copper tube. In this instance, the UF_6 is estimated to leak out of the system at a rate of 133 lb/min. A leak on the drain line could be larger depending on the location and type of break, but in no case would the total leak be greater than 1,000 lb of UF_6."

- SAR Section 4.3.3.1.3 on valve and pigtail failures in C-310:

"The worst-case accident scenario considered possible at the product withdrawal station is a complete rupture of the drain manifold to cylinder pigtail with the accumulators partially full..."

"...Assuming a 5 sec response time for the UF_6 detection unit, a 1 sec closure time for the manifold block valves, and 10 sec for the cylinder valve closer to operate, the total outleakage for this medium probability accident is 140 lb of UF_6..."

- SAR Section 4.3.4.1.2 on condenser and accumulator failures in C-315:

"...Tests have shown there has been no appreciable loss of metal from either the C-310 or C-315 accumulators. Normally, a minimum inventory is maintained in the accumulator to minimize the potential outleakage in the event of a leak at the cylinder connections or from fatigue failure. However, during the period of switching from one cylinder to another, the accumulator inventory may increase. As in Section 4.3.3.1.2 an accumulator failure is characterized by a UF_6 leak from a severed instrument line at a rate of 133 lb/min.

The UF_ letection safety system would detect the leak and alarm in the local control room and in the C-331 ACR. The worst case is postulated to be the release of approximately 1,000 lb of UF_6 before the block valves and UF_6 drain cylinder valve are closed. The probability of such an accident is considered to be low."

APPENDIX A - CHRONOLOGY

Date Description

- SAR Section 4.3.4.1.3 on valve and pigtail failures in C-315:

  "The worst-case accident scenario considered possible at the tails withdrawal station is a complete rupture of the drain manifold to cylinder pigtail with the accumulators partially full..."

  "The UF_6 detection safety system operates identical to that in Section 4.3.3.1.3 and is relied upon to l it the release of this medium probability accident to 140 lb."

- SAR Section 4.6:

  - Describes the original seismic/structural analyses that included the C-310/310-A and C-315 liqui UF_6 components. Evaluates a range of seismic activity between 0.01g and 0.33g (EBE = 0.18g).

  - Section 4.6.1.3 (Table 4.6-3) estimates a total of 720 lbs of gaseous UF_6 would be released from the casc piping in C-310.

  - Section 4.6.1.3 concludes that:

  "Other system damage caused at the EBE will be inconsequential to on-site or off-site health and safety."

- SAR Section 4.7:

  - Analyzes a 64,000 lbs UF_6 release for a seismic event based on Section 4.6.

APPENDIX A - CHRONOLOGY

Date	Description
	• SAR Table 4.9-1: ▸ 64,000 lb release for seismic event ▸ 1000 lb release for fatigue failure of accumulator instrument line or drain line ▸ 250 lb release for fatigure failure on discharge of Normetex pump ▸ 140 lb release for fatigue/break of pigtail
10/25/95	NRC issues questions on the accident analyses related to Buildings C-310/310-A and C-315 and requests co[illegible]s of the original seismic analyses (Questions 4.0Q203, 204, 214, 215, and 229).
11/22/95	USEC responds to Questions 4.0Q203, 204, 214 and 215. • The responses to Questions 4.0Q203 and 204 were deferred to the SARUP. **4.0Q203** PGDP, §4.3.3.1.2, 4th paragraph It is not clear what the total UF_6 release amount would be if the release rate approached 133 lbs/min and the operator could not take mitigative actions which would include isolation and evacuation of the system.

Date Description

4.0Q204

PGDP, §4.3.3.1.2, 3rd paragraph
Does the maximum source term of 1,000 pounds account for the operator error discussed in the last paragraph of 4.3.3.2?

- The responses to Questions 4.0Q214 and 215 are repeated below.

4.0Q214

PGDP, §4.3.4 1.2, page 4.3-40, 1st paragraph
State the minimum inventory maintained in the accumulator. If this quantity is 100 pounds, then rephrase the sentence to say: "Not more than 100 pounds of UF_6 is maintained..."

Response:

No material is "maintained" in the accumulator. The accumulator merely floats on the drain line from the condenser to the cylinder. When there is no cylinder to withdraw into, during cylinder changeouts, the accumulator provides a temporary storage until the next cylinder is connected. When the next cylinder is connected, the accumulator empties.

Application Revision:

SAR Section 4.3.4.1.2, first paragraph, fourth sentence, will be revised to read as follows:

Normally, no appreciable inventory is in the accumulator which minimizes the potential outleakage in the event of a leak at the cylinder connections or from fatigue failure.

Date Description

4.0Q215

PGDP, §4.3.4.1.2, page 4.3-40, 1st paragraph
State the highest allowable UF_6 inventory for the accumulator.

Response:

The accumulator sizes are described in SAR Sections 3.4.4 and 3.5.5. The accumulators are allowed to be completely filled if necessary during cylinder changeouts. Therefore, the maximum accumulator inventory is limited only by its volume.

Application Revision:

No revision is required.

APPENDIX A - CHRONOLOGY

Date	Description
12/13/95	USEC responds to Question 4.0Q229.

4.0Q229

PGDP, §4.6.1.1, page 4.6-1
Reference is made to an analysis of the above systems' response to a range of seismic activity from 0.01g to 0.33g peak ground acceleration. Provide the analysis.

Response:

It appears that the reviewer is requesting the EDAC reports prepared to support the development of the DOE 1985 FSAR. These reports are available on site for NRC review. Also see the response to Question 4.0Q10.

Application Revision:

No revision required.

1/17/96	NRC/USEC meeting held 1/17/96 and 1/18/96 to discuss USEC's responses to SAR Chapter 4 questions. The responses to Questions 4.0Q203, 204, 214, and 215 were specifically discussed and the NRC requested that these responses be revised (see Questions 4.0Q263 and 4.0Q264 in the NRC letter dated 1/29/96).
2/19/96	Revision 2 of the certification application is issued which incorporates the SAR Section 4.3.4.1.2 changes identified in the 11/22/95 response to Question 4.0Q214.

APPENDIX A - CHRONOLOGY

Date	Description
3/1/96	USEC revises the responses to Questions 4.0Q214, 215, and 229.

4.0Q214

PGDP, §4.3.4.1.2, page 4.3-40, 1st paragraph
State the minimum inventory maintained in the accumulator. If this quantity is 100 pounds, then rephrase the sentence to say: "Not more than 100 pounds of UF_6 is maintained..."

Response:

No material is "maintained" in the accumulator. The accumulator merely floats on the drain line from the condenser to the cylinder. When there is no cylinder to withdraw into, during cylinder changeouts, the accumulator provides a temporary storage until the next cylinder is connected. When the next cylinder is connected, the accumulator empties. As stated in Section 3.5.5, the C-315 Tails Withdrawal Facility contains two 10-ton capacity accumulators. The accumulators are allowed to be completely filled if necessary during cylinder changeouts. Therefore, the maximum accumulator inventory is limited by its capacity.

Application Revision:

SAR Section 3.5.5, third sentence, will be revised to read as follows:

Normally, only a small amount of UF_6 is contained in the accumulators, which merely float on the line ready for immediate use if required (during cylinder changes, etc.).

Date Description

SAR Section 4.3.4.1.2, paragraph 1, sentence 4, will be revised to read as follows:

> Normally, only a small amount of UF_6 is in the accumulator. This minimizes the potential outleakage in the event of a leak at the cylinder connections or from fatigue failure. The accumulators can be completely filled if necessary during cylinder changeout.

4.0Q215

PGDP, §4.3.4.1.2, page 4.3-40, 1st paragraph
State the highest allowable UF_6 inventory for the accumulator.

Response:

The accumulator sizes are described in SAR Sections 3.4.4 and 3.5.5. The product and side accumulators have capacities of 21,000 lb and 4,300 lb, respectively. The two tails accumulators each have a 10-ton capacity. The accumulators are allowed to be completely filled if necessary during cylinder changeouts. Therefore, the maximum accumulator inventory is limited only by its capacity.

Application Revision:

SAR Section 4.3.4.1.2, first paragraph, fourth sentence, will be revised as indicated in the response to Question 4.0Q214.

Date Description

4.0Q229

PGDP, §4.6.1.1, page 4.6-1
Reference is made to an analysis of the above systems' response to a range of seismic activity from 0.01g to 0.33g peak ground acceleration. Provide the analysis.

Response:

It appears that the reviewer is requesting the EDAC reports prepared to support the development of the DOE 1985 FSAR. The EDAC reports will be sent under separate cover and are not part of the application. Also see the response to Question 4.0Q10.

Application Revision:

No revision required.

3/20/96 USEC submits the EDAC reports requested by the NRC in Question 4.0Q229.

- KY/G395, prepared in 1981, evaluates the C-310 and C-315 facilities.
- For Building C-310 equipment:
  - Damage to the product condensers and side accumulator can occur at 0.10g.

Date	Description

- For Building C-315 equipment:
  - Page 7-5 of KY/G395 describes the C-315 accumulators:

"...There are two 10-ton liquid accumulators located downstream from the condensers in the tails withdrawal system that permit gravity flow of the liquid tails material from the condensers into the accumulators and into the tails storage cylinders. Normally, no uranium hexaflouride is maintained in the accumulators, which merely ride on the line ready for immediate use if required..."

  - No failures in the condensers or accumulators are predicted.

4/9/96 DOE submits an outline of its planned justification for continued operation (JCO) with regard to failures in Buildin C-331 and C-335 during a seismic event to the NRC for review and comment.

"Status and projected releases from the remaining hazard related facilities are identified to include the co-incident releases that would constitute a part of the bounding consequences."

"The co-incident releases from other predicted failures as determined from current SAR Upgrade analysis or from 1985 SAR analysis if available."

APPENDIX A - CHRONOLOGY

Date	Description
5/1/96	NRC provides comments on the DOE JCO outline. "4. Potential simultaneous releases from other sources should be identified and considered, including building tie-lines, expansion joints, and accumulators and condensers in buidings C-310 and C-315. Results should be provided such that the contribution from rocker failure and releases from C-331 and C-335 can be identified separately."
5/17/96	DOE submits the JCO to the NRC. • Co-incident releases in Buildings C-310 and C-315, the '000' buildings, and the tie-lines are evaluated and summed with the C-331 and C-335 building failures to include all release sources that may occur during a seismic event. • The accumulators in Buildings C-310/310-A and C-315 are identified as normally empty. Product ... ks into the accumulators during a cylinder change or during an emergency if cylinder filling is terminated. The ... ure sizes in Buildings C-310/310-A and C-315 are identified as small. • Consequences from the failures in Buildings C-310/310-A and C-315 are estimated at: C-310/310-A: 900 lbs released at 6.7 lbs/sec resulting in 0.4 mgU, 0.67 ppm HF C-315: 2200 lbs released at 6.7 lbs/sec resulting in 1 mgU, 1.6 ppm HF • Consequences considering all failures are determined to be acceptable.
5/31/96	Revision 3 of the certification application is issued which incorporates the SAR Sections 3.5.5 and 4.3.4.1.2 change identified in the 3/1/96 response to Question 4.0Q214.

APPENDIX A - CHRONOLOGY

Date	Description
6/19/96	NRC provides comments on the DOE 5/17/96 JCO. • The description of the piping between the cascade and the fill point should be clarified to say that it routinely contains gaseous UF_6 above 1 atm and liquid UF_6. • The "weak links" for the Building C-310/310-A and C-315 accumulators should be identified.
7/18/96	DOE submits Compliance Plan Issue 36 to USEC, and USEC submits it to the NRC. • The 5/17/96 detailed DOE JCO is referenced directly in the CP Issue 36 JCO on page 3.
7/26/96	DOE submits the revised detailed JCO. • Essentially unchanged from the 5/17/96 version of the JCO. • Accumulator failures in Buildings C-310/310-A and C-315 are clarified to be "unrestrained cylinders."
9/13/96	NRC issues the Compliance Evaluation Report for PGDP. • CER Section 4.3 for C-310/310-A: "...Two UF_6 liquid accumulators serve the withdrawal system. The product accumulator is a 21,000 lb capacity nickel-lined tank used in the top product system. The side accumulator is monel-lined steel with 4,300-lb capacity. The accumulators provide surge volume by "floating" on the drain line..."

APPENDIX A - CHRONOLOGY

Date Description

- CER Section 4.4 for C-315:

  "...Two 10-ton nickel-lined steel accumulators are located down stream from the condensers in the tails withdrawal system. Each accumulator can be used for short-term storage of the liquefied tails material while a cylinder is valved off or being changed. Normally, only a small amount of UF_6 is maintained in the accumulators, which float on the line ready for immediate use."

- CER Section 5.2.1 identifies the SAR accident consequences for C-310 and C-315:

  "...(2) UF6 cylinder pigtail failure - 660 lbs liquid;...(4) withdrawal compressor (Normetex Pump) failure - 250 lbs;...(6) condenser/accumulator/withdrawal manifold piping failure - 1,000 lbs liquid;..."

  "...Based on the information provided in the USEC application, the staff has determined that the scenarios described appear to constitute a reasonable spectrum of postulated accidents and that the safety controls for preventing significant UF_6 releases are adequate..."

- CER Chapter 15 related to Compliance Plan Issue 36:

  "The staff concludes that the justification for continued operation, the plan of action and the schedule are acceptable."

2/14/97 DOE completes preparation of the site-wide SAR Upgrade (KY/EM-174).

- Section 2.3.4.3.1.3 for C-310/310-A:

  "Two UF_6 liquid accumulators serve the withdrawal system. The product accumulator is a 10.5-ton (9.5-t) capacity, nickel-lined tank used in the top product system. The side accumulator is monel-lined steel with

Date Description

a 2.1-ton (1.9-t) capacity. The accumulators located on the second floor below the condensers provide surge volume by "floating" on the drain line..."

- Section 2.3...3.1.5 for C-315:

"Two 10-ton (9-t) nickel-lined steel accumulators located downstream from the condensers in the tails withdrawal system permit gravity flow of the liquid tails material from the condensers into the accumulators and into the tails storage cylinders. Each accumulator can be used for short-term storage of liquefied tails material while a cylinder is valved off or being changed. Normally, only a small amount of UF_6 is maintained in the accumulators, which merely float on the line ready for immediate use if required (...ring cylinder changes, etc.)..."

- Section 3.4.2.1.2.13 for scenario of process line failure at compression discharge:
  - The release was modeled as resulting from a one-inch diameter breach in the bottom of a vertical cy...ndrical tank 60 inches in diameter and 120 inches tall containing 21,000 lbs of liquid UF_6.
  - The total flow rate was estimated to be about 8 lb/sec (1.3 lb/sec vapor, 6.7 lbs/sec liquid) resulting in a ...tal release of about 25,000 lbs.
- Section 3.4.2.1.6.3 for a seismic event:

"...During this withdrawal phase, the source term includes the contents of the condensers and backflow from the cylinder being filled. No UF_6 would be released from the accumulators, which are normally ...mpty during the withdrawal operation. The contents of the accumulator are bounded by the contents ... the cylinder."

APPENDIX A - CHRONOLOGY

Date	Description
	"The entire contents of the condensers (two in building C-310/310-A and three in building C-315) are assumed to be released into the withdrawal buildings in a very short time (120 s or 2 minutes). The total amount of liquid UF_6 released into building C-310/310-A would be about 1500 lb (683 kg), with about 3600 lb (1677 kg) released into C-315..."
	"...Approximately 1100 lb (500 kg) would be released from the 48X cylinder located in Bldg. C-310/310-A, with slightly more, 1110 lb (505 kg) released from the 48G cylinder located in Bldg. C-315..."
3/17/97	Lawrence Livermore National Laboratory (LLNL) completes preparation of seismic risk study for DOE.
	"In addition to the four process buildings, gaseous and liquid UF_6 is contained in cylinders inside buildings C-315, C-310a, C-333A, C-337A, and C-360 where feed, product, or tails material is introduced or withdrawn from the system. Some liquid-filled cylinders are also located outside these buildings... On a temporary basis, liquid UF_6 may also reside in the accumulators used to control the inventory in the process systems. This study did not consider the contributions to the source terms from possible damage to these cylinders or other facilities. This omission is judged to be insignificant to the risk estimates because of the low probability of an earthquake occurring simultaneously with high inventories in containers that are vulnerable to damage..."
4/13/97	Problem Report PR-CO-97-1929 written. The APSS identifies the potential for the C-315 accumulators to have a capacity greater than 10 tons as a result of field walkdowns.
4/23/97	A calculation of accumulator volume, EV-C-820-97-014, is initiated.
4/25/97	EV-C-820-97-014 is completed which concludes that the capacity of each C-315 accumulator is about 42,000 lbs of UF_6. The system engineer recommends a review of structural/floor load calculations.

APPENDIX A - CHRONOLOGY

Date	Description
4/25/97	PCR-C-97-0867 (10 CFR 76.68 review of as-found accumulator volume) is initiated. SE 97-060 (USQD [illegible] as-found accumulator volume) is initiated.
4/28/97	RAC 97C0105 to change the SAR Section 3.5.5 discussion of accumulator capacity is initiated.
6/25/97	RAC 97C0105, PCR-C-97-0867, and SE 97-060 are approved by the PORC.

- SAR Section 3.5.5 is revised to read as follows:

  "Two approximately 21-ton nickel-lined steel accumulators located downstream from the condensers [illegible] the tails withdrawal system permit gravity flow of the liquid tails material from the condensers int[illegible] he accumulators and into the tails storage cylinder. Each accumulator can be used for short-term storage of [illegible] liquefied tails material while a cylinder is valved off or being changed. Normally, only a small amount UF_6 is maintained in the accumulators, which merely float on the line ready for immediate use if require (during cylinder changes, etc.)..."

- The USQD evaluates the impact on SAR Section 4.3.4.1.2 (condenser and accumulator failure) and conclude[illegible] hat there is no adverse impact on the probability of a failure, the assumed size of the leak, the leak rate, the tir[illegible] to mitigation, or the amount released. Concludes that no USQ is involved.

- The PCR and SE do not address the potential impacts on Compliance Plan Issue 36 and SAR Sections 4.3.4.1. (failure of compression components), 4.3.4.1.3 (valve and pigtail failure), 4.6 (seismic), 4.7 (consequences), a[illegible] 4.9 (residual risk).

APPENDIX A - CHRONOLOGY

Date	Description
6/30/97	USEC submits letter GDP 97-0101 to the NRC. • Questions whether the seismic modifications to Buildings C-331 and C-335 are an effective element in the management of seismic risk at PGDP. • "The DOE upgraded analysis identifies a seismic vulnerability for the liquid UF_6 condensers and accumulators at the withdrawal facilities. These facilities would not benefit from the modifications being made to the C-331 and C-335 buildings, yet these postulated failures may constitute a dominant risk sequence for the EBE. USEC is currently reviewing these analyses." • Provides a copy of the LLNL seismic risk study. • Suspends work on the C-331 and C-335 modifications, thus preserving resources until evaluations of domina. seismic risk and other analyses can be completed.
7/14/97	The NRC Resident Inspector conducts an exit meeting at PGDP for a routine inspection performed from 6/3/97 to 7/14/97. A violation of 10 CFR 76.68(a) is identified concerning deficient safety evaluations that were approved on 4/2/97 and 6/20/97 concerning SAR changes: (a) an increase in the possession limits; and (b) deletion of the five-year surveillance frequency for the cell trip function.
7/22/97	NRC/USEC meeting at PGDP to discuss SARUP. Potential limitations with the SARUP submittal are identified. Inaccuracies in SAR Chapter 3 are discussed in detail.
7/31/97	NRC/USEC meeting to discuss inaccuracies in SAR Chapter 3.

APPENDIX A - CHRONOLOGY

Date	Description
7/31/97	USEC submits letter GDP 97-0136 to the NRC in followup to 6/30/97 letter. • Amends USEC's 4/23/97 amendment request related to the USQs associated with the Buillding C-331/C-335 seismic modifications. • Requests Compliance Plan Issue 36 be revised to include consideration of SARUP-identified seismic failures.
8/5/97	NRC issues Inspection Report 70-7001/97004 which contains violation NOV 97004-10.
8/12/97	NRC letter to USEC. "Your SARUP is due to the NRC by August 17, 1997, the date to which you are committed accord to the Compliance Plan. You should include in your submittal a discussion of any SARUP limitations, ch as known or suspected inaccuracies, along with your plan to rectify these deficiencies..."
8/14/97	NRC/USEC Senior Management meeting. • The status of the SAR Update is discussed. • The following are identified as known limitations or inaccuracies against SARUP Section 4.3.2 and are br. ght discussed at the meeting: "PGDP C-315 accumulator capacity & line size" "PGDP C-310, C-315 accumulators during EBE"

APPENDIX A - CHRONOLOGY

Date	Description
8/18/97	USEC submits initial sections of SARUP by letter GDP 97-0147.

- In Enclosure 1, the following are identified as known limitations or inaccuracies against SARUP Section 4.3.2:

  "PGDP C-315 accumulator capacity & line size"
  "PGDP C-310, C-315 accumulators during EBE"

9/4/97 USEC responds to NOV 97004-10. Commits to completing corrective actions by 11/1/97.

10/31/97 USEC submits remaining sections of SARUP by letter GDP 97-0188.

- Scenarios are similar to DOE SAR Upgrade (KY/EM-174).
- Table 1 identifies limitations, inaccuracies, and required modifications associated with the SARUP submittal:

Table 1, Item 5 (SARUP Sections 3.15.9.1.3, 3.15.4.5, 4.3.2.5)

"...The DOE SAR Upgrade also concludes that the UF_6 condensers, accumulators, and the Normetex pump discharge piping in both the C-310A and the C-315 withdrawal facilities do not have adequate capacity to withstand the evaluation basis earthquake.

The resolution of the C-331 and C-335 seismic modifications and the other seismically-induced failures identified by the DOE SAR Upgrade are being evaluated by USEC as part of an assessment of dominant seismic risk at PGDP. (Refer to USEC Letters GDP 97-0101, dated June 30, 1997, and GDP 97-0136, dated July 31, 1997)."

APPENDIX A - CHRONOLOGY

Date	Description

Table 1, Item 14 (SARUP Sections 4.3.2.2.1, 4.3.2.2.12)

"The DOE SAR Upgrade (KY/EM-174) performed threshold analyses to determine the amount of UF_6 release necessary to reach Evaluation Guideline consequences at the site boundary. One case analyzed e C-315 accumulator but used incorrect values for the capacity and a size of the discharge line. The impa on the threshold analysis is expected to be small and no changes to the SARUP TSRs are anticipated.

The affected consequence analysis will be revised to use the correct values for accumulator capacity and line size. The results of the revised calculations, including any necessary changes to the SARUP, will be submitted to the NRC by December 31, 1998."

11/5/97 NRC/USEC Senior Management meeting.

- Related to the 4/23/97 and 7/31/97 amendment requests for the '00' seismic modifications, USEC asks the NRC needs any additional information related to the dominant seismic risk issue and the seismic failures id ified in SARUP. The NRC responds that no additional information was needed at that time.

12/8/97 NRC issues the CER for the '00' seismic modifications amendment requests.

Staff review of (a) final design, (b) 3 USQs, (c) SARUP seismic analysis, (d) updated seismic hazard

"Therefore, the staff recommends approval of the schedule to complete the modifications 18 months after the staff approves the USQs (II(b)) and recommends denying that the schedule be based on satisfying conditions described in Sections II(a) [staff review of final design], II(c) [review of SARUP seismic analyses], and II(d) [review of updated seismic hazard] above." *Items in [ ] added for clarity.*

APPENDIX A - CHRONOLOGY

Date	Description
	LLNL Study
	"The study that the certificate holder wishes to add to the JCO reviewed the health risks to workers and to the public from potential UF_6 releases due to a seismic event. The staff did not review the report, nor was it requested to review the report. The staff has not relied on this report to reach its conclusions. Since the amendment request, as proposed, implies that the staff reviewed and approved the report as part of the JCO, approval of the amendment will not include the reference to the report and this request is denied."
12/30/97	USEC files a petition requesting Commission review of those items denied in the 12/8/97 Director's Decision by letter GDP 97-0224. USEC's petition describes the SARUP-predicted failures in the liquid UF_6 withdrawal areas in Buildings C-310/310-A and C-315.
2/5/98	NRC issues questions on the SARUP submittals.
	"Our review of your application has identified additional information that is needed. The initial review has verified the statement in your letter (GDP 97-0244) to NRC Secretary, John Hoyle, dated December 30, 1997, that the liquid withdrawal areas of Buildings C-310 and C-315 at the Paducah Gaseous Diffusion Plant are susceptible to seismically induced damage. You further implied that analysis of modifications in C-310 and C-315 is underway. Your letter further implied that the C-310 and C-315 may contribute significantly to the overall seismic risk at Paducah. Based on this information, the staff requests answers to the following questions, as they apply to Buildings C-310 and C-315:
	1. Provide a detailed description of the structural and equipment failures that occur, as listed in Table 3.15.8, "Seismic Capacities of Buildings C-310/C-310-A Piping Equipment and Components" and Table 3.15-9 "Seismic Capacities of Building C-315 Piping Equipment and Components."

Date	Description

2. In terms of releases, provide an analysis of and describe in more detail the potential consequences, both onsite and offsite, associated with those failures. Include the bases of the assumptions made in Section 4.3.2.5.3.c, "Source Term Analysis."

3. Describe the analysis of modifications that are underway. When will those analyses be completed and provided to NRC?

4. Provide a justification for continued operation of these buildings, given their susceptibility to seismically-induced damage and the potential consequences. Consider in your answer your responses to the above questions."

Week of 2/16/98 — Numerous telephone conversations between NRC and USEC are conducted to discuss this issue. The p[rimary] issue discussed is how much UF_6 should be assumed to be in the accumulators. The NRC informs USEC th[at] the JCO for Compliance Plan Issue 36 is not applicable to this issue.

2/19/98 — USEC verbally notifies the NRC of potential nonconservative assumptions in the SARUP and SAR in accorda[nce] with 10 CFR 76.9.

2/20/98 — USEC provides written notification in accordance with the requirements of 10 CFR 76.9 by letter GDP 98-1013.

"Question 2 of the NRC's February 5, 1998 letter requests USEC to provide the bases for the above assumptions. Preliminary information from our research into the assumption bases indicates that the source term assumed in the SAR Update for the postulated seismic failures in the liquid withdrawal areas may be nonconservative. As identified above, the UF_6 release in Buildings C-310/310-A and C-315 is assumed in the SAR Update to be about 1500 lbs (683 kg) and 3600 lbs (1677 kg), respectively. In Building C-3[1]0/310-A, the total capacity of the 3 condensers is about 1500 lbs (683 kg) and the capacities of the product [s]ide accumulators are approximately 21,000 lbs (9525 kg) and 4300 lbs (1950 kg), respectively. In Buildi[ng] C-

Date Description

315, the total capacity of the 3 condensers is about 2000 lbs (907 kg) and the capacity of the two accumulators is approximately 40,000 lbs (18,050 kg) each. Based on our preliminary reviews of the product and tails withdrawal operations in these buildings, the total release assumptions in the SAR Update may be nonconservative considering the potential for higher volumes of liquid UF_6 to exist in the two overall systems including the condensers, accumulators, and connecting piping. In addition, the consequences of postulated seismic failures currently reported in Chapter 4 of the Application SAR and Compliance Plan Issue 36 may be increased. Although it may be unreasonable to assume that all of the above components are filled to capacity for the analysis of the Evaluation Basis Earthquake (EBE), our preliminary review of the operating information suggests that consideration of operating volumes greater than the SAR Update assumptions of 1500 lbs (683 kg) in Building C-310/310-A and 3600 lbs (1677 kg) in Building C-315 may be appropriate."

2/24/98 NRC/USEC telephone conversation. USEC informs the NRC that a postulated seismic event resulting in a release of liquid UF_6 from the Building C-310/310-A and C-315 accumulators was outside the SAR accident analysis.

2/25/98 USEC requests enforcement discretion in letter GDP 98-0031.

"In the process of responding to NRC questions on USEC's October 31, 1997, SAR Update (SARUF submittal, a review of operations in the Building C-310/C310-A product and Building C-315 tails withdrawal areas has concluded that the current release assumptions made in the SAR Section 4.6 analysis of the consequences of postulated seismic failures are no longer valid. Specifically, the SAR analysis assumes only a limited UF_6 release from the C-310 withdrawal facility. However, during the normal course of operations in Buildings C-310/310-A and C-315, these facilities contain varying amounts of liquid UF_6 depending on withdrawal rates and maintenance and operational activities. The amount of UF_6 that could be released from these facilities during a postulated seismic event exceeds that assumed in the current SAR analysis."

APPENDIX A - CHRONOLOGY

Date	Description
2/26/98	NRC issues questions on USEC's 2/25/98 request for enforcement discretion.

"(1) Proposed Commitments do not include a commitment to control and minimize at all times the U-6 inventory in the C-315 on-line accumulator. As proposed the limit is effectively the full volume of one accumulator.

(2) No compensatory actions are proposed for limiting accumulator inventory in Building C-310/310-A (purge and product withdrawal building). This is supposedly based on low probability of having inventory present. That is an unacceptable basis given the supporting information in the JCO. Must propose limits and a mechanism to ensure that these limits are adhered to."

2/27/98	USEC responds to the NRC's 2/5/98 questions by letter GDP 98-0019.
2/27/98	USEC responds to the NRC's 2/26/98 questions by letter GDP 98-0036.
3/3/98	NRC/USEC meeting to discuss the NRC comments on the request for enforcement discretion.
3/5/98	USEC responds to the NRC comments from the 3/3/98 meeting by letter GDP 98-0041.
3/11/98	USEC submits an action plan for the postulated seismic failures in Buildings C-310/310-A and C-315 by letter GL 98-0046.

"As a result of analyses performed in response to the NRC's February 5, 1998 request for information, USEC determined that conservative assumptions may not have been utilized in the SAR Update accident analysis and, as a result, the potential consequences of postulated seismically-induced failures in the liquid withdrawal facilities (Buildings C-310/310-A and C-315) could be increased over those previously reported

Date	Description
	in the SAR Update. USEC also concluded that the consequences of postulated seismic failures could be more severe than currently reported in Chapter 4 of the Application SAR and Compliance Plan Issue 36..."
	"Following a thorough evaluation of both the safety and operational concerns involved, the best course of action for final resolution of this issue is to prevent the occurrence of the predicted seismic failures in the withdrawal areas of Buildings C-310/310-A and C-315. The postulated failures in these facilities have been determined to be the dominant contributor to overall seismic risk at PGDP. USEC has, therefore, concluded that modifying this equipment to increase its seismic capacity is the most effective and cost-justifiable means of reducing the overall risk to workers and the offsite public of postulated seismic events at PGDP."
3/19/98	The Commission denies USEC's 12/30/97 petition requesting Commission review of the Director's decision.
	"...According to USEC, the SARUP information indicates that areas of two other buildings (i.e., two product withdrawal buildings, Buildings C-310 and C-315) are also susceptible to seismic-induced damage. The petitioner argues that the SARUP information shows that the planned modifications are not, by themselves, effective in reducing the seismic risk at PGDP since the C-331 and C-335 failures do not dominate seismic risk at the site..."
	"It is possible that the staff's review of the SARUP could result in the requirement for modifications to other buildings and equipment; however, this has no bearing on the currently planned modifications...As stated above, the presence of greater risks from other sources would not obviate the need for the already planned upgrades..."
3/27/98	USEC submits a revised request for enforcement discretion by letter GDP 98-0060.
3/27/98	NRC requests USEC consent to Confirmatory Order.

APPENDIX A - CHRONOLOGY

Date	Description
4/1/98	USEC submits consent to Confirmatory Order by letter GDP 98-0066.
4/22/98	NRC issues Confirmatory Order Modifying Certificate.
5/7/98	NRC issues Inspection Report 70-7001/98006 (DNMS).
5/28/98	NRC issues "Apparent Violation of 10 CFR 76.85 Concerning the Seismic Accident Analysis in the Paducah Certificate Amendment Request, Dated August 18, 1997, Update of the Application Safety Analysis Report, and Apparent Violation of 10 CFR 76.68 Concerning the C-315 Withdrawal Accumulators Size"