Department of Energy
Washington, D.C. 20585

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Mr. Paul S. Check, Director
CRBR Program Office
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Check:

INFORMATION TO SUPPORT NRC'S ASSESSMENT OF THE POTENTIAL EFFECTS OF A CRBRP TYPE PLANT ON K-25.

Per the telephone conversation between our staffs on July 20, 1982, we are providing additional information to support your assessment of the potential effects of a Clinch River Breeder Reactor type plant on the Oak Ridge Gaseous Diffusion Plant (K-25). The following describes K-25 and its operational requirements, our latest assessments of the consequences of siting a reactor of the general size and type as CRBRP near K-25, and the importance of K-25 to national security and enriched uranium supply.

Description of K-25

The Oak Ridge Gaseous Diffusion Plant (K-25)is located on a level 640 acre tract of land near the junction of Poplar Creek and the Clinch River approximately 3 miles north-northwest of the CRBRP site. The K-25 complex includes five large diffusion process facilities plus administration, data processing, laboratories, decontamination and uranium recovery facilities, fabrication and maintenance equipment, the diffusion cascade barrier manufacturing plant, the nickel plating facility, the fluorine plant, hydrogen fluoride storage area, gas centrifuge projects, a fossil fueled steam plant, supply stores and other support services. The current K-25 work force is about 4400. Of this number, about half are associated with research and development activities, and half are directly involved in diffusion plant operations. Should an evacuation of non-essential personnel become necessary, a skeleton force of about 65 workers can provide needed security, emergency support, and operational capability to continue production operations or to operate the enrichment cascade in a recycle mode. Placing the cascade in a recycle mode results in recirculating UF_6 with no feed or withdrawals. Less than one hour is required to accomplish this task.

Shutdown of the enrichment cascade will normally take less than two weeks, based on a rate of withdrawal of UF_6 from the cascade and a related power reduction of 5 MW/hr. Restart would take a similar length of time unless the shutdown were prolonged, e.g., several months duration, in which case equipment failure could delay a return to production in all or part of the cascade depending on the specific equipment involved.

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An abrupt shutdown could be safely accomplished very rapidly, but would initiate solidification of gaseous UF_6 if power were not restored within 2-3 hours. Should the entire UF_6 inventory solidify, it would take about six months to return to production. Removal of the solidified UF_6 would be accomplished by vacuum vaporization and withdrawal. Since a shutdown of this nature has never occurred, the 6 month estimate is approximate and could vary considerably depending on the extent of possible equipment failure resulting from an extended shutdown.

Potential CRBRP Type Reactor Effects on K-25

The NRC has developed a Site Suitability Source Term (SSST) for the CRBRP which represents an assumed release from the core whose consequences would result in potential hazards not exceeded by those from any accident considered credible. The SSST is used to evaluate the suitability of the Clinch River site to meet the exposure guidelines of the 10CFR100. It is also appropriate to use the SSST to evaluate the potential effects on K-25 operations of a nearby reactor of the general size and type as CRBRP.

In 1976 and again in 1982, the Project evaluated the impact of postulated accidents and SSST radiological releases from CRBRP on K-25 operations. The more recent evaluation uses doses resulting from consideration of the SSST as given in PSAR Appendix 13.3A and concludes that K-25 production could continue with a skeleton emergency operating force protected with respirators.

Mechanistic or pseudo-mechanistic treatments of Class 9 type accident consequences can be found in official Project and NRC documentation, e.g., the PSAR, ER, FES, and CRBRP-3. To date we have not evaluated the impact on K-25 operations caused by a release which is greater than the SSST case. We have, however, examined the national security and enrichment supply impact of an extended shutdown of K-25.

Impact of Loss of K-25 on National Security

There would be essentially no impact on meeting national security enriched uranium requirements as a result of shutdown of K-25. The bulk of natural security needs are for high U-235 assay uranium, which can only be produced at the Portsmouth gaseous diffusion plant.

Enrichment Services Supply/Demand

Enrichment services are measured in terms of separative work units (SWU). A SWU is a measure of the separation achieved in a uranium enrichment plant separating uranium of a given U-235 content into two components, one having a higher percentage of U-235 and one having a lower percentage of U-235. Uranium enrichment services are currently provided by the three gaseous diffusion plants (GDPs) located in Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. These plants have a combined production capacity of 27.3 million SWU per year. In 1982, all enrichment facilities are operating with a combined capacity of 36%.

A large new production facility utilizing gas centrifuge technology is currently under construction at the Portsmouth site. The Gas Centrifuge Enrichment Plant (GCEP) will increase U.S. enrichment capacity to about 40 million SWU per year by the mid-1990's. Since 1977, DOE has been actively building GCEP and to date well over a billion dollars has been spent on the project. A portion of the first process building, "the early train," will be on-line in 1985. The early train will provide first operation of commercially mass-produced and production assembled centrifuges. Production of separative work from the GCEP is scheduled to begin in 1988. Project completion (i.e., eight buildings) is now projected for 1994 with an eventual capacity of 13.2 million SWU's per year.

Since GCEP construction began, successive projections of nuclear power growth have continuously declined as illustrated in Figure 1. Even with the reducing demand, DOE has continued to construct GCEP as lower production costs can be achieved by replacing the very energy intensive gaseous diffusion capacity with equivalent gas centrifuge capacity. This is consistent with the U.S. objective to be a dependable and price competitive long-term enrichment services supplier domestically and abroad.

As a result of this policy, the impact of an extended loss of K-25 capacity due to an unlikely hypothetical CRBR accident is mitigated considerably. It is expected, in fact, that there will be considerable excess installed U.S. enrichment capacity in the future. This is illustrated in Figure 2. The dashed lines in Figure 2 show annual separative work demand in the period FY 1990 through FY 2000 based on the "low" and "mid" August 1981 DOE Office of Uranium Enrichment and Assessment (OUEA) forecast of enrichment services requirements. The upper and lower dashed lines are based on projected year 2000 U.S. and non-U.S. nuclear generating capacities of 266 and 231 gigawatts respectively, for which enrichment services will be supplied by the U.S. DOE is currently updating its forecast and preliminary indications are that the revised forecast will be considerably lower than in August 1981, particularly after 1995. A more recent estimate by GAO, for example, published in a May 25, 1982, report entitled "Issues Concerning The Department of Energy's Justification For Building The Gas Centrifuge Enrichment Plant" (GAO/EMD-82-88) suggests that 217 gigawatts by the year 2000 would be a more appropriate planning figure at this time.

The solid line in Figure 2 represents existing or firmly planned U.S. uranium enrichment capacity over the same FY 1990 to FY 2000 period. As shown, installed enrichment capacity will be significantly greater than requirements over the entire period. This suggests that some GDP capacity should be shutdown in the 1990's and part or all of the K-25 capacity could be a candidate. Also, as noted above, we expect that the revised DOE forecast will result in lower requirements which will further increase this difference particularly after FY 1995.

In the long term, it is DOE's goal to eventually phase out, to the extent possible, the expensive diffusion capacity with lower cost capacity. DOE has under development advanced gas centrifuge and laser isotope separation technologies which hold great promise for very low cost production. Current expectations are that sufficient data will be available by the end of this decade to enable a decision for new capacity additions in the mid-to-late 1990's

to further replace existing capacity. Thus, the K-25 enrichment capacity itself should become even less of a factor after 2000. Of course, the K-25 site would certainly be a candidate for any new capacity additions and the proximity of any new enrichment site to CRBR would be a factor considered in any site selection criteria.

There are several mechanisms available to the U.S. enrichment enterprise to minimize any short term disruptions. These include: (1) increasing production at the other two sites; (2) increasing product output by increasing the tails assay using any available government natural uranium inventories and by procuring natural uranium; and (3) procuring enriched uranium from competitors, (e.g., Eurodif, Urenco) or from the secondary market.

Summary

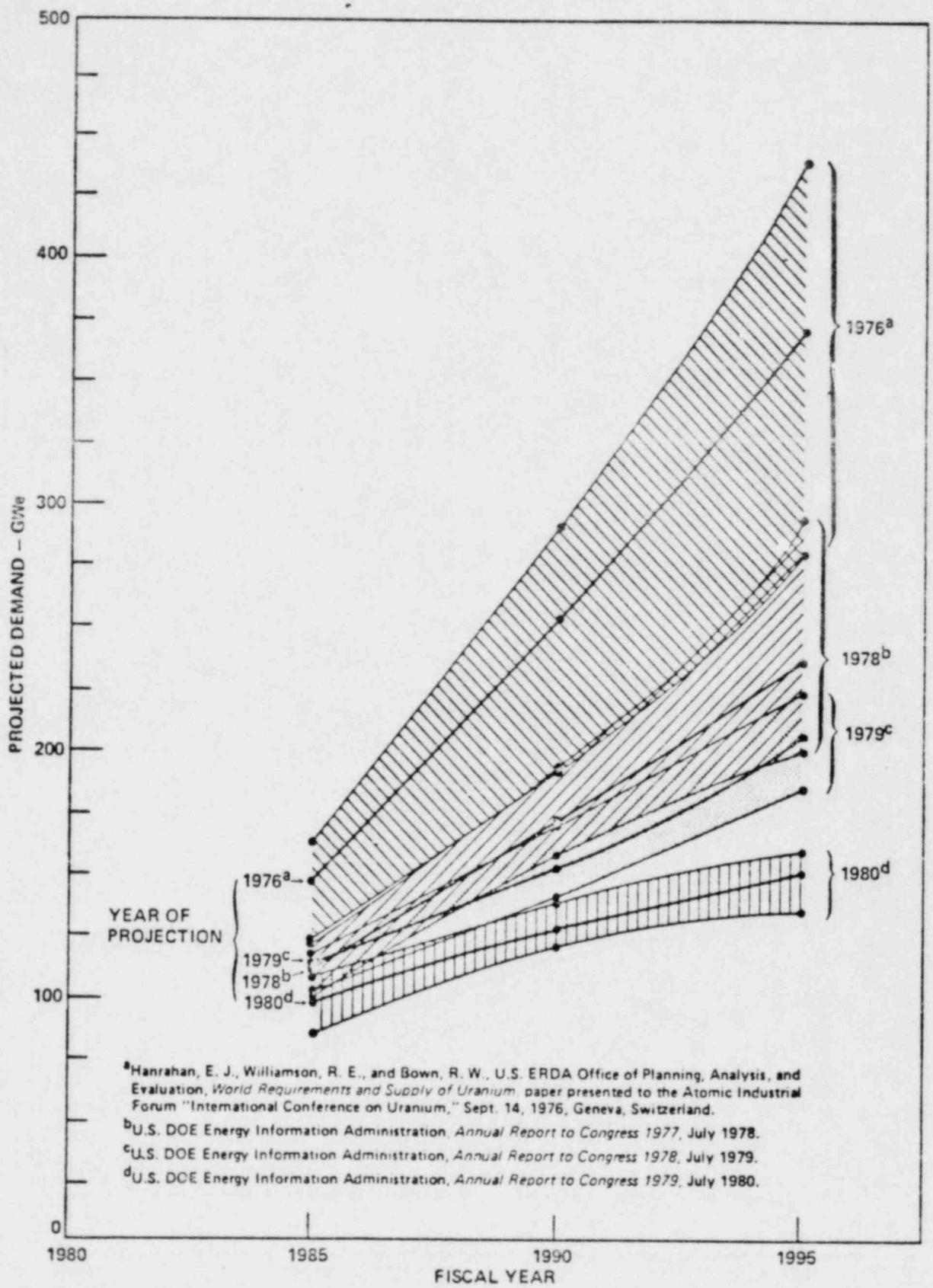
A recent analysis of the potential impact of K-25 operations due to an SSST release at CRBRP has concluded that operations could continue. For more severe radiological release senarios which could lead to the unavailability of the K-25 plant, several options exist within the U.S. enrichment enterprise which would minimize the potential for enrichment supply impacts. There would be no impact on national security.

I hope this information is adequate for your records.

Sincerely,

John R. Longenecker

John R. Longenecker
Acting Director, Office of the
Clinch River Breeder Reactor
Plant Project
Office of Nuclear Energy



PROJECTED GROWTH OF NUCLEAR POWER DEMAND, 1985 THROUGH 1995, AS REFLECTED BY YEAR OF PROJECTION

OUEA August 1981 Separative Work Capacity/Demand Projection

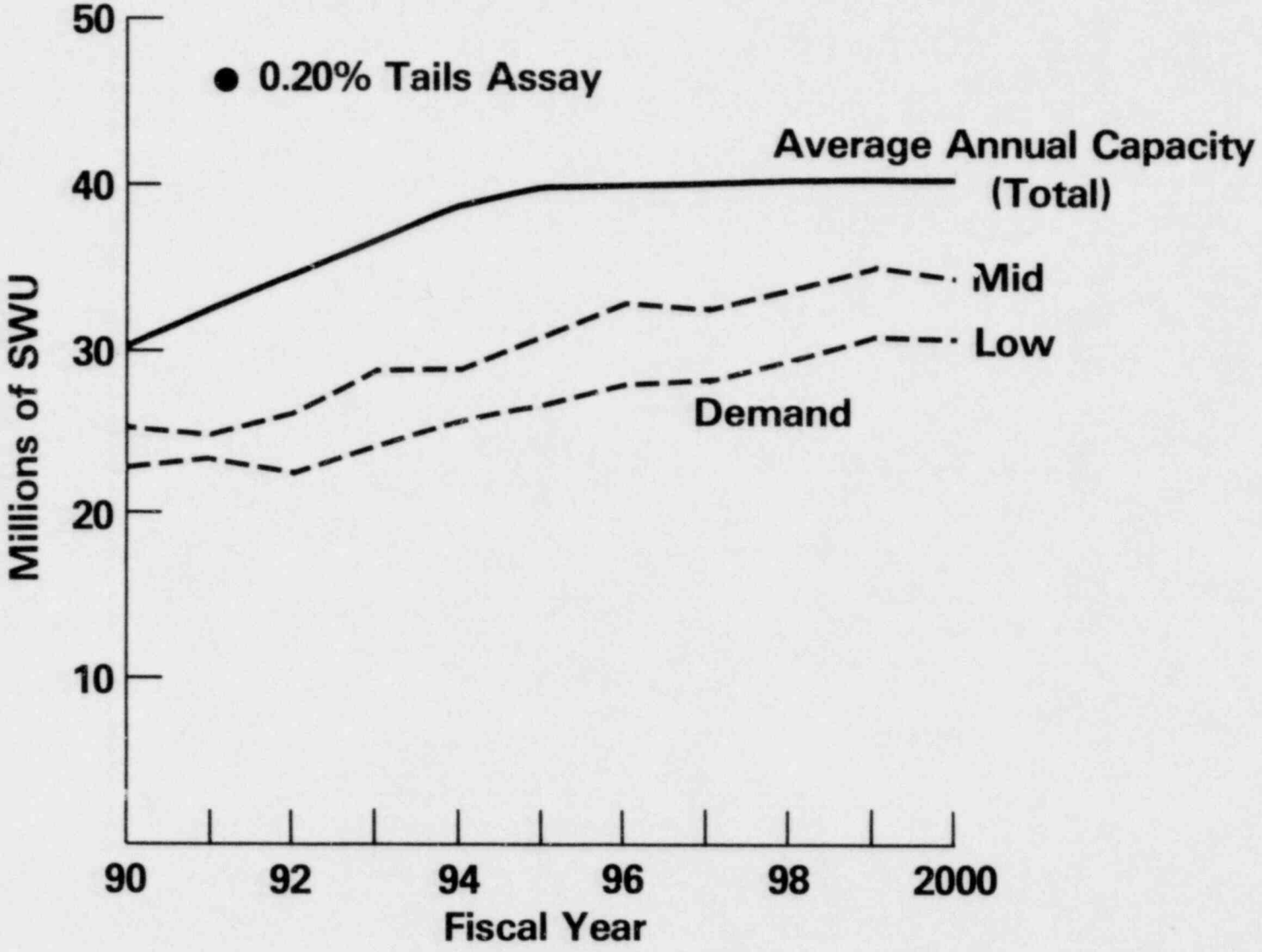


Figure 2