Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

May 3, 1993

Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

SUBJECT: Braidwood Station Unit 2
Cycle 4 Reload Description and
Core Operating Limits Report
NRC Docket No. 50-457

REFERENCES: See Attachment C

Dear Dr. Murley:

Braidwood Unit 2 has completed its third cycle of operation and is conducting a refueling outage that began March 5, 1993. Braidwood Unit 2 Cycle 3 attained a final cycle burnup of approximately 16,966 MWD/MTU. Cycle 4 is expected to commence on May 3, 1993. This letter is to summarize Commonwealth Edison Company's (CECo's) evaluation regarding the Braidwood Unit 2 Cycle 4 reload core, and to submit the Core Operating Limits Report.

Attachment A describes the core reload including a summary of CECo's safety evaluation, performed in accordance with the provisions of 10CFR50.59. There are no unreviewed safety issues or Technical Specification changes, as a result of this reload.

Attachment B provides the Core Operating Limits Report (COLR) for Cycle 4 pursuant to Technical Specification 6.9.1.9. CECo and our vendor (Westinghouse) applied NRC approved reload design methodologies developed by Westinghouse as described in Reference 1. Commonwealth Edison performed the neutronic portion of the reload design using the methods and codes described in References 2 & 4 as approved in References 3 & 5, respectively. Specifically, the Braidwood Unit 2 Cycle 4 reload design, including the development of the core operating limits, was generated by Commonwealth Edison using the NRC approved methodologies.

Please direct any questions regarding this notification to this office.

Very truly yours,

Terrence W. Simpkin

T. W. Simpkin
Nuclear Licensing Administrator

cc: R. Assa - Project Manager, NRR
A. B. Davis - Region III Administrator
S. DuPont - NRC Senior Resident Inspector - Braidwood

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ATTACHMENT A

Braidwood Unit 2 Cycle 4 Reload Description

The Braidwood Unit 2, Cycle 4 reload core was designed to perform under current nominal design parameters, Technical Specifications and related bases, and current Technical Specification setpoints such that:

1. Core characteristics will be less limiting than those previously reviewed and accepted; or

2. For those postulated incidents analyzed and reported in the Byron/Braidwood Updated Final Safety Analysis Report (UFSAR) which could potentially be affected by fuel reload, reanalyses or reevaluations have demonstrated that the results of the postulated events are within allowable limits.

The Braidwood Unit 2 Cycle 4 core is a "Low Leakage" design. Previously, Commonwealth Edison has successfully developed and operated similar "Low Leakage" designs at Braidwood as well as CECo's Byron and Zion Stations.

During the Cycle 3/4 refueling outage, eighty-four (84) VANTAGE5 fuel assemblies will be inserted into the core. The Braidwood Unit 2 core will then contain a combination of fresh and previously irradiated VANTAGE5 fuel assemblies. Braidwood Unit 2 Cycle 4 is the first Braidwood reload core containing all VANTAGE5 fuel assemblies. The NRC approved the use of VANTAGE5 at Braidwood Unit 2 for Cycle 2 operations and thereafter, under the provisions of 10CFR50.90 (Reference 6). A mixture of Integral Fuel Burnable Absorber (IFBA) rods and Wet Annular Burnable Absorbers (WABAs) will be used as the burnable poison. The IFBA rods contain fuel pellets with an enriched B-10 coating. Both WABAs and IFBA burnable absorbers are in successful operation in all of CECo's PWR Units.

The reload VANTAGE5 fuel assemblies will incorporate Westinghouse's standardized fuel pellets, reconstitutable top nozzles (RTN), extended burnup design features, modified Debris Filter Bottom Nozzle (DFBN), and snag resistant Intermediate Flow Mixers (IFM) grids. Similar features are in successful operation in CECo's PWR Units, as well as other domestic and overseas reactors.

A full core of Westinghouse Enhanced Performance Rod Cluster Control Assemblies (EP-RCCAs) with silver-indium-cadmium (Ag-In-Cd) absorber material will be utilized commencing with Cycle 4.

The Braidwood Unit 2 Cycle 4 core has been designed and evaluated using NRC licensed and approved methods. Commonwealth Edison requested approval to perform the neutronic portion of the PWR reload design using the methods described in Reference 2, and the NRC has approved this request with Reference 3. Specifically, the Braidwood Unit 2 Cycle 4 reload design, including the development of the core operating limits, were generated and verified by Commonwealth Edison using NRC approved methodology.

The reload fuel's nuclear design is evaluated generically in the UFSAR. As OFA and VANTAGE5 fuel have the same pellet and fuel rod diameters, most reactivity parameters are insensitive to fuel type. Changes in nuclear characteristics due to the transition from OFA to VANTAGE5 fuel are within the range normally seen from cycle to cycle due to fuel management effects. Those parameters dependent on the loading pattern were evaluated in detail in the CECo/Westinghouse reload safety evaluation process.

Commonwealth Edison has determined that all neutronic reload parameters remain within the previously established and recently revised reload safety and transient Safety Parameter Interaction List (SPIL) limits. These include, but are not limited to, SPIL items for UFSAR non-LOCA and LOCA transients.

The thermal-hydraulic design for the Cycle 4 reload core has not significantly changed from that of the previously reviewed and accepted cycle design. The $F_{N\Delta H}$ limit of less than 1.65 for VANTAGE5 assemblies ensures that the DNB ratio of the limiting power rod during Condition I and Condition II events is greater than or equal to the DNBR limit of the DNBR correlation being applied. In addition, the transition core penalty used in the previous cycle DNB analysis has been removed due to the fact that Cycle 4 is a full VANTAGE5 core.

Commonwealth Edison's reload safety evaluation process (SPIL/RSE review) is a verification to ensure that the previously reviewed and approved accident analyses are not adversely impacted by the cycle specific reload core design. Commonwealth Edison's Braidwood Unit 2 Cycle 4 Reload Safety Evaluation relied on previously reviewed and accepted analyses reported in the UFSAR, fuel technology reports, the VANTAGE 5 Reload Transition Safety Report (RTSR), and previous reload safety evaluation reports. A detailed review of the core characteristics was performed to determine those parameters affecting the postulated accident analyses reported in the Braidwood UFSAR. The operation of the Braidwood Unit 2 Cycle 4 has been analyzed in accordance with NRC approved methodologies and satisfies safety analysis limits. The margin of safety, as defined in the bases of the Technical Specifications, is not impacted or reduced.

Finally, verification of the Braidwood Unit 2 Cycle 4 reload core design will be performed per the standard reload startup physics tests. These tests include, but are not limited to:

1. A physical inventory of the fuel in the reactor by serial number and location prior to the replacement of the reactor head;
2. Control rod drive tests and drop times;
3. Critical boron concentration measurements;
4. Control bank worth measurements using the rod swap technique;
5. Moderator temperature coefficient measurements;
6. Startup power distribution measurements using the incore flux mapping system.

In summary, CECo's use of VANTAGE5 fuel and use of advanced neutronics methods (as described in References 7 and 2, respectively) have been previously approved by the NRC (References 6 and 3, respectively).