February 21, 2001

Mr. Nathan L. Haskell, Director
Licensing and Performance Assessment
Palisades Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

SUBJECT: PALISADES PLANT - CORRECTION TO SAFETY EVALUATION REGARDING REVISED INCORE NEUTRON FLUX MONITORING CODE, PIDAL-3, AND INCORE DETECTOR CHANGES (TAC NO. MA8695)

Dear Mr. Haskell:

By letter dated January 31, 2001, the NRC staff forwarded a safety evaluation addressing a report entitled, "The [Palisades Incore Detector Algorithm] PIDAL-3 Full Core System," dated February 2000, describing changes to the incore neutron flux monitoring computer code, PIDAL-3, used at the Palisades Plant, which was forwarded for NRC staff review and approval by your letter dated April 21, 2000, as supplemented on August 11, August 31, November 3, 2000, and January 10, 2001. Your submittals discussed the decision to replace CASMO-3 with CASMO-4 for generating fuel cross-sections, eliminate seven detector strings located in the outer region of the low leakage core design, and decrease the minimum detector operability from 75 percent to 50 percent.

The enclosure corrects page 2 for the NRC staff's safety evaluation. The correction regards the description of the processing of the current produced by the Rhodium detectors, which is passed to the Palisades plant computer. The statement that CASMO-3 replaces CASMO-4 is also corrected. The changes are identified by marginal lines. The revised text is consistent with your submittals and does not change the bases or conclusions in the NRC staff's safety evaluation. Please replace page 2 forwarded by NRC letter dated January 31, 2001, with the enclosed corrected page.

If you have questions regarding this letter, please contact me at (301) 415-3049 or by e-mail at dsh@nrc.gov.

Sincerely,

/RA/

Darl S. Hood, Senior Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure: Corrected Page 2 of Safety Evaluation

cc w/encl: See next page

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Palisades Plant

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rods). The core power distribution is monitored by self-powered Rhodium (Rh) incore detectors in a maximum of 45 instrumented fuel assemblies. Each instrument location contains five axial Rh detectors (40 cm in length), equally spaced, with centers at 10, 30, 50, 70, and 90 percent of the active fuel height. Currently, only 43 incore locations are available because two locations are reserved for use by the reactor vessel level monitoring system. The incore instrumentation is further described in Section 7.6.2.4 of the Palisades Updated Final Safety Analysis Report.

The Rh detectors, of standard design for CE type incore monitoring systems, are manufactured by Reuter-Stokes of Canada. The current practice at Palisades is to replace all incore detectors each operating cycle. These Rh detectors, by a neutron-beta reaction, produce a current that is directly proportional to the incident neutron radiation at each detector location. This current is passed to the Palisades plant computer and converted from an analog to a digital signal. The Palisades plant computer performs the background and depletion sensitivity corrections, and provides the necessary plant data to the PIDAL-3 incore analysis system.

Palisades was originally licensed with a technical specification (TS) requirement for minimum detector operability of 50 percent. At that time, the incore power distribution was determined using 1/8 core symmetry. The 50 percent operability requirement was later changed to 75 percent of the total possible detectors (i.e., previous TS 3.11.1a required the operability of “at least 160 of the 215 possible incore detectors”) to compensate for the change from 1/8 core symmetry to 1/4 core symmetry. Subsequently, following the NRC’s issuance of Amendment No.189 on November 30, 1999, CEC implemented the Improved Technical Specifications (ITS) conversion in late October 2000. In accordance with the ITS format, the previous requirement regarding incore detector operability was relocated to the TS Bases.

3.0 EVALUATION

3.1 Implementation of CASMO-4/SIMULATE-3

CEC’s submittal includes the latest revision to the PIDAL-3 methodology in which CASMO-4 replaces CASMO-3 for the generation of fuel cross-sections. This is in keeping with CEC’s decision to switch to ultra low leakage core designs, beginning with the current operating cycle (Cycle 15), and to maintain such a design for all subsequent operating cycles. The movement to ultra low leakage core designs made it increasingly difficult for CEC to adequately predict core power distributions with the old quarter-core PDG/XTG methodology. Furthermore, previous PDG/XTG quarter-core modeling limited the ability to accurately deal with asymmetric power anomalies such as would result from misaligned control rods. Consequently, expansion of the PIDAL methodology to include the full core CASMO-4 and SIMULATE-3 model both improved the modeling accuracy and provided a tool for monitoring large quadrant power tilts.

Although incorporating the new codes CASMO-4 and SIMULATE-3 into the PIDAL-3 methodology results in a reduction in the measurement uncertainties, CEC elected to retain the current measurement uncertainties given in Table 2.4-2, “Power Distribution Measurement