NRC Operations Center
U. S. Nuclear Regulatory Commission
Washington, D. C.

Attachment to Siemens Power Corporation - Nuclear Division 10 CFR 21 Report (Fuel Cycle and Materials Event Notification Worksheet/NRC Form 361A) of September 17, 1998

10 CFR Part 21 Notification of Defect Relative to MCPR Operating Limits as Impacted by Gap Conductance of Co-Resident BWR Fuel

For BWR reactors where SPC provides reload fuel, postulated transient events are analyzed each cycle to establish MCPR operating limits. During transition cycles, SPC establishes limits for SPC fuel and also for co-resident fuel manufactured by other fuel vendors. Transient analyses are required to address co-resident fuel as well as SPC fuel because previous co-resident fuel transient analyses and limits may no longer be valid due to changes in core neutronic characteristics. Inputs to the transient analyses include the fuel pellet to cladding gap heat transfer coefficient for both SPC fuel and co-resident fuel. The gap heat transfer coefficient is calculated using the RODEX2 computer code.

An SPC internal licensing methodology review was performed and concerns were identified relative to the values for several fuel rod characteristics used in the RODEX2 analyses to calculate gap conductance values for input to the transient analyses for co-resident fuel. An evaluation of these concerns determined there exists reportable defects. The defects were a consequence of modeling the co-resident fuel with cold-worked cladding - typical of SPC cladding - instead of annealed cladding as it should have been. The gap conductance behavior of the co-resident fuel affected the core wide neutronic behavior through void reactivity feedback during certain transients and, consequently, the calculation of the transient ΔCPR for the limiting SPC fuel.

The defects are non-conservative MCPR operating limits previously provided to ComEd for LaSalle Unit 2 Cycle 8 and Quad Cities Unit 2 Cycle 15. The previously calculated and reported operating limit for LaSalle will be revised before the reactor starts up (anticipated startup in March 1999). The previously calculated and reported operating limits for Quad Cities Unit 2 Cycle 15 were determined at the limiting EOC exposure conditions. Corrected analyses have been performed which demonstrate that the current operating limits are bounding from BOC to a cycle exposure of 8 GWd/MTU. The Quad Cities Unit 2 operating limits will be revised before the cycle reaches 8 GWd/MTU.

FUEL CYCLE FACILITY

EVENT NUMBER: 34791

FACILITY: SIEMENS POWER CORPORATION
RXTYPE: URANIUM FUEL FABRICATION
COMMENTS: LEU CONVERSION (UF6 to UO2)
FABRICATION & SCRAP RECOVERY
COMMERICAL LWR FUEL
CITY: RICHLAND REGION: 4
COUNTY: BENTON STATE: WA
LICENSE#: SNM-1227 AGREEMENT: Y
DOCKET: 07001257

NOTIFICATION DATE: 09/17/98
NOTIFICATION TIME: 18:31 [ET]
EVENT DATE: 09/17/98
EVENT TIME: 12:00[PDT]
LAST UPDATE DATE: 09/17/98

NOTIFICATIONS

MONTE PHILLIPS RDO

VERN HODGE NRR

NRC NOTIFIED BY: HARVEY CURAT
HQ OPS OFFICER: DICK JOLLIFFE

EMERGENCY CLASS: NOT APPLICABLE
10 CFR SECTION:
CCCC 21.21 UNSPECIFIED PARAGRAPH

EVENT TEXT

- 10CFR PART 21 REPORT - DEFECT RELATED TO MCPR OPERATING LIMITS -

FOR BWR REACTORS WHERE SIEMENS POWER CORPORATION (SPC) PROVIDES RELOAD FUEL, POSTULATED TRANSIENT EVENTS ARE ANALYZED EACH FUEL CYCLE TO ESTABLISH MINIMUM CRITICAL POWER RATIO (MCPR) OPERATING LIMITS. DURING TRANSITION CYCLES, SPC ESTABLISHES LIMITS FOR SPC FUEL AND ALSO FOR CO-RESIDENT FUEL MANUFACTURED BY OTHER FUEL VENDORS. TRANSIENT ANALYSES ARE REQUIRED TO ADDRESS CO-RESIDENT FUEL AS WELL AS SPC FUEL BECAUSE PREVIOUS CO-RESIDENT FUEL TRANSIENT ANALYSES AND LIMITS MAY NO LONGER BE VALID DUE TO CHANGES IN CORE NEUTRONIC CHARACTERISTICS. INPUTS TO THE TRANSIENT ANALYSES INCLUDE THE FUEL PELLET TO CLADDING GAP HEAT TRANSFER COEFFICIENT FOR BOTH SPC FUEL AND CO-RESIDENT FUEL. THE GAP HEAT TRANSFER COEFFICIENT IS CALCULATED USING THE RODEX2 COMPUTER CODE.

AN SPC INTERNAL LICENSING METHODOLOGY REVIEW WAS PERFORMED AND CONCERNS WERE IDENTIFIED RELATIVE TO THE VALUES FOR SEVERAL FUEL ROD CHARACTERISTICS USED IN THE RODEX2 ANALYSES TO CALCULATE GAP CONDUCTANCE VALUES FOR INPUT TO THE TRANSIENT ANALYSES FOR CO-RESIDENT FUEL. AN EVALUATION OF THESE CONCERNS DETERMINED THAT REPORTABLE DEFECTS EXIST. THE DEFECTS WERE A CONSEQUENCE OF MODELING THE CO-RESIDENT FUEL WITH COLD-WORKED CLADDING, TYPICAL OF SPC CLADDING, INSTEAD OF ANNEALED CLADDING, AS IT SHOULD HAVE BEEN. THE GAP CONDUCTANCE BEHAVIOR OF THE CO-RESIDENT FUEL AFFECTED THE CORE WIDE NEUTRONIC BEHAVIOR THROUGH VOID REACTIVITY FEEDBACK DURING CERTAIN TRANSIENTS AND, CONSEQUENTLY, THE CALCULATION OF THE TRANSIENT DIFFERENTIAL CRITICAL POWER RATIO FOR THE LIMITING SPC FUEL.

THE DEFECTS ARE NON-CONSERVATIVE MCPR OPERATING LIMITS PREVIOUSLY PROVIDED TO COMMONWEALTH EDISON FOR LASALLE UNIT 2 CYCLE 8 AND QUAD CITIES UNIT 2

(Continued on next page)

CYCLE 15. THE PREVIOUSLY CALCULATED AND REPORTED OPERATING LIMIT FOR LASALLE WILL BE REVISED BEFORE THE REACTOR STARTS UP (ANTICIPATED STARTUP IN MARCH, 1999). THE PREVIOUSLY CALCULATED AND REPORTED OPERATING LIMITS FOR QUAD CITIES UNIT 2 CYCLE 15 WERE DETERMINED AT THE LIMITING END-OF-CYCLE EXPOSURE CONDITIONS. CORRECTIVE ANALYSES HAVE BEEN PERFORMED WHICH DEMONSTRATE THAT THE CURRENT OPERATING LIMITS ARE BOUNDING FROM BEGINNING-OF-CYCLE TO A CYCLE EXPOSURE OF 8 GWd/MTU. THE QUAD CITIES UNIT 2 OPERATING LIMITS WILL BE REVISED BEFORE THE CYCLE REACHES 8 GWd/MTU.

SPC EVALUATED THIS ISSUE UNDER SPC CONDITION REPORT #6565, DATED 03/02/98, AND PREVIOUSLY INFORMED THE NRC OF THIS ISSUE VIA SPC INTERIM REPORT #98-004, DATED 07/22/98.

NRC FORM 361A (11/94) U.S. NUCLEAR REGULATORY COMMISSION

FUEL CYCLE AND MATERIALS EVENT NOTIFICATION WORKSHEET

LICENSE NUMBER: SNM-1227 (NRC Docket No. 70-1257)

REPORT TIME	FACILITY OR ORGANIZATION	NAME OF CALLER	CALLBACK TELEPHONE NUMBER
1831	SIEMENS POWER CORPORATION - NUC. DIV.	HARVEY H. D. Curet	(509) 375-8563

EVENT TIME	EVENT DATE **	LOCATION OF EVENT (INCLUDE COUNTY AND STATE)	PORTION OF PLANT AFFECTED
N/A	9 / 17 / 98	Richland, Benton County, WA	N/A

EVENT CLASSIFICATION		EVENT TYPES		INCIDENT REPORTS (30.52, 40.60, 70.50)				
	GENERAL EMERGENCY*	X	FUEL CYCLE		20.2201	LOSS/THEFT		(a) PROTECTIVE ACTION PREVENTED
	SITE AREA EMERGENCY		MEDICAL/ACADEMIC		20.2202	ACTUAL/THREATENED OVEREXPOSURE		(b) (1) UNPLANNED CONTAMINATION
	ALERT		TRANSPORTATION		20.2202	ACTUAL/THREATENED RELEASE		(b) (2) SAFETY EQUIPMENT FAILURE
	NOTIFICATION OF UNUSUAL EVENT*		WASTE MANAGEMENT	X	21.21	DEFECT/ NONCOMPLIANCE		(b) (3) MEDICAL TREATMENT WITH CONTAMINATION
X	INCIDENT REPORT		INDUSTRIAL/COMMERCIAL		26.73	FITNESS FOR DUTY		(b) (4) FIRE / EXPLOSION
	TRANSPORTATION EVENT		FOREIGN EVENT		35.33	MISADMINISTRATION		70.52 CRITICALITY / SNM LOST
	INFORMATION ONLY		OTHER (Specify)		36.83	IRRADIATOR EVENT		70.52 ACTUAL / ATTEMPTED THEFT
	OTHER (Specify)				39.77	RUPTURED WELL LOGGING SOURCE		CRITICALITY CONTROL + 4-HOUR (BULLETIN 91-01)
					39.77	IRRETRIEVABLE WELL LOGGING SOURCE		CRITICALITY CONTROL +24-HOUR (BULLETIN 91-01)
* ONLY UNDER OLD 1981 ORDER					40.26	TAILINGS/WASTE DAM FAILURE		OTHER NON-CFR REQUIREMENT

NOTIFICATIONS	YES	NO	WILL BE			
NRC REGION?			X	ANYTHING UNUSUAL OR NOT UNDERSTOOD?		YES (Explain below)
					X	NO
STATE?		X		DID ALL SYSTEMS FUNCTION AS REQUIRED?		YES (N/A)
LOCAL?		X				NO (Explain below)
OTHER GOVERNMENT AGENCIES?		X		ADDITIONAL INFORMATION ON BACK?	X	YES (Attached)
PRESS RELEASE?		X				NO

EVENT DESCRIPTION (*Continue on separate sheet if necessary*)

See attached summary of defect related to MCPR operating limits. Affected customer (Commonwealth Edison / Quad Cities Unit 2 (operating) and LaSalle Unit 2 (not operating)). The NRC was previously informed of the issue via SPC Interim Report 98-004 (7/22/98).

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** Date of reporting to NRC Operation Center. Defect was evaluated under SPC Condition Report 6565 initiated March 2, 1998.

Duty Officer: Report #