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Joseph M. Farley Nuclear Plant
30-Day Response After Follow-up Testing for NRC Bulletin 96-01
"Control Rod Insertion Problems"

Ladies and Gentlemen:

By letter dated March 8, 1996, the NRC issued Bulletin 96-01, "Control Rod Insertion Problems." This bulletin requires licensees to determine the susceptibility of the Rod Control System to the phenomena of control rod failure to completely insert. The initial 30-day response was submitted by Southern Nuclear Operating Company (SNC) on April 4, 1996.

In response to the bulletin, SNC committed to measuring and evaluating the control rod drop times and rod recoil data for all control rods during the first outage on each unit of sufficient duration during calendar year 1996. Within 30 days after completing such measurements, the bulletin requires a report that summarizes the data and documents the results obtained to be submitted. Provided in the Attachment is the 30-day follow-up response for Farley Nuclear Plant (FNP) Unit 1. Should you have any questions, please advise.

Respectfully submitted,

DM Morey

Dave Morey

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Sworn to and subscribed before me this 31st *day of* May *1996*

Martha Gayle Dow
Notary Public

My Commission Expires: November 1, 1997

WAS/maf:96-01sup.doc
Attachment

cc: Mr. S. D. Ebneter, Region II Administrator
Mr. B. L. Siegel, NRR Senior Project Manager
Mr. T. M. Ross, FNP Sr. Resident Inspector

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ATTACHMENT
UNIT 1 ROD DROP TESTING

Pursuant to the Joseph M. Farley Nuclear Plant response to NRC Bulletin 96-01, "Control Rod Insertion Problems," control rod testing and evaluation was conducted on Unit 1 during the May 4-5, 1996 planned maintenance shutdown. The test program included verification of timely rod insertion when the reactor trip breakers were opened, rod drop time testing under hot, full RCS flow conditions, examination of the rod drop traces for indications of normal rod recoil, and comparison of the rod drop traces with the beginning-of-cycle rod drop test results. The testing was performed with a maximum rodded assembly burnup of just under 36,000 and an average core burnup of 6871.9 MWD/MTU (~ 36% through the current fuel cycle).

On May 4, 1996, Unit 1 was ramped to approximately 5% reactor power and the reactor trip breakers were opened to shut down the reactor. Observation of the shutdown on the DRPI display confirmed that all control and shutdown rods inserted into the core as expected when the trip breakers were opened. There was no evidence of dragging, sticking or other anomalies.

The rod drop time test was conducted with RCS Tavg ≥ 541 °F and all reactor coolant pumps operating. The test utilized a multiple rod drop test system which permitted testing an entire bank (8 rods) at a time. All rod drop times were less than the Technical Specification 2.7 second rod drop time limit. The average rod drop time from opening of the trip breakers to dashpot entry (average time T1) was 1.629 seconds. The average time from dashpot entry to dashpot bottom (average time T2) was 0.626 second. The slowest falling rod was B06, for which the time (T1) to dashpot bottom was 1.862 seconds, and the time from dashpot entry to dashpot bottom (T2) was 0.653 second.

Comparing these results with the times from the beginning-of-cycle rod drop test, the average beginning-of-cycle time to dashpot entry (T1) was 1.636 seconds, and the average beginning-of-cycle time from dashpot entry to dashpot bottom (T2) was 0.609 seconds. The slowest falling rod in the beginning-of-cycle test was also B06, for which the time T1 was 1.848 seconds, and the time T2 was 0.655 seconds.

The following is a detailed listing of the Unit 1, May 4, 1996 rod drop test results:

	Drop Time (sec)		
Rod ID	T1(sec)	T2(sec)	Total(sec)
F02	1.628	0.636	2.264
B10	1.703	0.615	2.318
K14	1.743	0.636	2.379
P06	1.648	0.612	2.260
K02	1.673	0.638	2.311
B06	1.862	0.653	2.515
F14	1.678	0.603	2.281
P10	1.642	0.616	2.258
F04	1.627	0.639	2.266
D10	1.615	0.670	2.285
K12	1.578	0.598	2.176
M06	1.642	0.642	2.284
K04	1.665	0.676	2.341
D06	1.587	0.619	2.206
F12	1.622	0.701	2.323

	Drop Time (sec)		
Rod ID	T1(sec)	T2(sec)	Total(sec)
M10	1.611	0.664	2.275
D04	1.620	0.634	2.254
D12	1.649	0.666	2.315
M12	1.603	0.622	2.225
M04	1.652	0.633	2.285
H06	1.588	0.641	2.229
F08	1.591	0.639	2.230
H10	1.587	0.677	2.264
K08	1.555	0.574	2.129
H02	1.606	0.661	2.267
B-8	1.729	0.616	2.345
H14	1.661	0.611	2.272
P08	1.604	0.665	2.269
F06	1.582	0.603	2.185
F10	1.628	0.639	2.267
K10	1.614	0.651	2.265
K06	1.629	0.612	2.241
G03	1.632	0.596	2.228
C09	1.622	0.601	2.223
J13	1.622	0.584	2.206
N07	1.604	0.567	2.171
J03	1.613	0.572	2.185
C07	1.656	0.570	2.226
G13	1.673	0.600	2.273
N09	1.606	0.572	2.178
E05	1.641	0.626	2.267
E11	1.598	0.658	2.256
L11	1.625	0.722	2.347
L05	1.635	0.673	2.308
G07	1.572	0.621	2.193
G09	1.563	0.573	2.136
J09	1.556	0.599	2.155
J07	1.549	0.566	2.115

Following the rod drop test, the rod drop traces were examined for indications of dragging, especially in the dashpot region. Dragging would lengthen the time required for a rod to fall and, thus, would increase either the time to dashpot entry (T1), the time from dashpot entry to dashpot bottom (T2), or possibly both. As the data demonstrate, there are no significant differences between rods in these times. The two slowest falling rods, B06 and K14, were also the slowest during the beginning-of-cycle rod drop test. In the May 4th test, the total (T1 + T2) drop times for these rods increased only slightly above the times for the beginning-of-cycle test and were still well within the 2.7 second Technical Specification limit for T1.

The rod drop traces were also examined for indications of rod recoil (a further indication that the rods are moving freely in the dashpot region). The traces showed strong recoil waveforms, which were quite consistent for all rods, providing a further indication that there was no binding or dragging in the dashpot region.