



**DUKE POWER**

January 20, 1997

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555-0001

SUBJECT: Duke Power Company  
Catawba Nuclear Station - Unit 2  
Docket No. 50-414  
NRC Bulletin 96-01 Test Data  
(TAC M95019)

The purpose of this letter is to provide information on Catawba Unit 2 actions taken during the recent forced outage of December 14, 1996 in response to NRC Bulletin 96-01.

NRC Bulletin 96-01, dated March 8, 1996, requested holders of operating licenses for Westinghouse designed plants to take actions and supply information to the NRC regarding recent control rod insertion problems. The initial Duke Power response to this bulletin was provided by letter dated April 4, 1996 and supplemented with additional information by letters dated April 30, 1996 and June 7, 1996. Catawba Unit 1 refueling outage and Catawba Unit 2 forced outage test data were submitted to your staff by letters dated August 29, 1996 and September 10, 1996.

Restated below are pertinent sections of the NRC Bulletin 96-01 requiring actions during any outages of sufficient length at Catawba during calendar year 1996:

Requested Action (3):

- (3) Measure and evaluate at each outage of sufficient duration during calendar year 1996 (end of cycle, maintenance, etc.), the control rod drop times and rod recoil data for all control rods. If appropriate plant conditions exist where the vessel head is removed, measure and evaluate drag forces for all rodded fuel assemblies.
  - a. Rods failing to meet the rod drop time in technical specifications shall be deemed inoperable.
  - b. Rods failing to bottom or exhibiting high drag forces shall require prompt corrective action in accordance

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with Appendix B to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50).

Required Response Item (3):

- (3) Within 30 days after completing Requested Action (3) for each outage, submit a report that documents and summarizes the data obtained. This is also applicable to Requested Action (4) when any abnormal rod behavior is observed.

Catawba Response to Item (3):

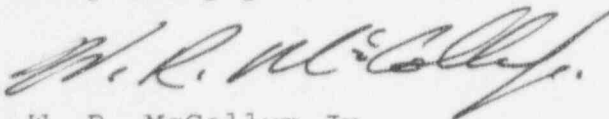
Included as an attachment to this letter is a summary report of the Catawba Unit 2 control rod drop data for Requested Action (3) obtained during the Unit 2 forced outage which began December 14, 1996. This testing was completed on December 21, 1996.

Duke Power continues to have 100% successful rod insertions in Mark BW fuel and continues to have substantial margin to the required Technical Specification insertion times.

Please direct any questions on this matter to Michael S. Kitlan, Jr., at (803) 831-3205.

I declare, under penalty of perjury, that the statements set forth herein are true and correct to the best of my knowledge.

Very truly yours,



W. R. McCollum Jr.

Attachment

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xc: L.A. Reyes, Regional Administrator, Region II

R.J. Freudenberger, Senior Resident Inspector

P.S. Tam, Senior Project Manager, ONRR

**Catawba Nuclear Station  
NRC Bulletin 96-01**

**Attachment**

**Unit 2 Forced Outage Control Rod Drop Testing Results**

On December 21, 1996 Control Rod Drop Timing was performed in accordance with the requirements of NRC Bulletin 96-01. The following is a summary of the data analysis of the control rod drop testing results for Catawba Nuclear Station Unit 2.

During the recent Unit 2 forced outage (December 14, 1996), Control Rod Drop Timing Testing was performed on the Control Rod Drive Lines and Rod Control Cluster Assemblies (RCCAs). This included a detailed analysis of control rod drop times and rod recoil data (see attached table).

Catawba Nuclear Station has trended control rod drop times since initial plant startup in 1986. The data have been consistent during all testing on both Unit 1 and Unit 2.

The test method used consisted of selecting a control rod bank, withdrawing the bank to the hard rod stop (231 steps), removing power from both Digital Rod Position Indication (DRPI) System Data Cabinets (Data A and Data B), dropping the entire bank of rods by opening both Reactor Trip Breakers, recording the voltage profile induced by the RCCA drive shaft as it dropped through the coils of its associated DRPI detector, restoring power to both DRPI Data Cabinets, verifying each RCCA completely inserted, and repeating this test method until all 53 control rods had been tested. All testing was performed at full temperature and pressure with all four Reactor Coolant Pumps running.

The analysis method used consisted of a detailed review of each control rod's time based profile. The individual drop time for each RCCA was determined by analyzing the recorded voltage profile and are shown in the attached table. Two rods, M02 and K02, were observed as having slightly longer drop times. These rods were identified by calculating two standard deviations from the average drop time and comparing the recorded voltage profiles of each rod. All rod drop times were well within the Tech Spec required time of  $\leq 2.2$  sec. The average control rod drop time was 1.58 sec. with an average rod bottom time of 2.12 sec. Catawba rod drop traces did not reveal any change at the top or any point in the fuel assembly.

The rod drop traces were analyzed for rod recoil (an indication that the rod is fully inserted to rod bottom). All the recorded rod drop traces exhibited rod recoil with a minimum of 2 recoils for each RCCA.

Duke Power has detailed information on the testing and analysis methodology. This information is available to the NRC upon request.

Catawba Unit 2 Forced Outage Control Rod Drop Testing Results

| Core Loc | BOC-8       |            |            |         | SHUTDOWN (approximately 230 EFPD) |            |            |         |         | SHUTDOWN    |            |            |         |         |   |
|----------|-------------|------------|------------|---------|-----------------------------------|------------|------------|---------|---------|-------------|------------|------------|---------|---------|---|
|          | 11/26/95    |            | Burnup     |         | 8/11/96                           |            | Burnup     |         | Recoils | 12/21/96    |            | Burnup     |         | Recoils |   |
|          | Time to DPT | Time in DP | Total Time | MWD/MTU | Time to DPT                       | Time in DP | Total Time | MWD/MTU |         | Time to DPT | Time in DP | Total Time | MWD/MTU |         |   |
| H06      | 1.560       | 0.527      | 2.087      | 19640   | 1.565                             | 0.526      | 2.091      | 29790   | 2       | 1.59        | 0.52       | 2.11       | 34700   | 2       |   |
| H10      | 1.537       | 0.512      | 2.049      | 19891   | 1.542                             | 0.508      | 2.050      | 29940   | 3       | 1.54        | 0.51       | 2.05       | 34800   | 3       |   |
| F08      | 1.561       | 0.488      | 2.049      | 19821   | 1.586                             | 0.529      | 2.115      | 29910   | 3       | 1.61        | 0.52       | 2.13       | 34800   | 2       |   |
| K08      | 1.616       | 0.595      | 2.211      | 19626   | new rod                           | 1.564      | 0.593      | 2.157   | 29740   | 2           | 1.58       | 0.60       | 2.18    | 34600   | 3 |
| H02      | 1.600       | 0.630      | 2.230      | 22064   | new rod                           | 1.539      | 0.595      | 2.134   | 30320   | 3           | 1.54       | 0.62       | 2.16    | 34300   | 2 |
| B08      | 1.556       | 0.490      | 2.046      | 21728   |                                   | 1.533      | 0.491      | 2.024   | 30090   | 3           | 1.56       | 0.51       | 2.07    | 34100   | 3 |
| H14      | 1.580       | 0.496      | 2.076      | 21337   |                                   | 1.562      | 0.509      | 2.071   | 29620   | 3           | 1.57       | 0.53       | 2.10    | 33600   | 3 |
| P08      | 1.547       | 0.492      | 2.039      | 21847   |                                   | 1.533      | 0.510      | 2.043   | 30020   | 4           | 1.56       | 0.52       | 2.08    | 33900   | 4 |
| F06      | 1.562       | 0.531      | 2.093      | 24545   |                                   | 1.599      | 0.545      | 2.144   | 34140   | 3           | 1.64       | 0.57       | 2.21    | 38900   | 2 |
| F10      | 1.558       | 0.550      | 2.108      | 24650   |                                   | 1.561      | 0.576      | 2.137   | 34310   | 3           | 1.60       | 0.57       | 2.17    | 35100   | 3 |
| K10      | 1.521       | 0.538      | 2.059      | 24543   |                                   | 1.527      | 0.558      | 2.085   | 33990   | 3           | 1.53       | 0.57       | 2.10    | 33700   | 2 |
| K06      | 1.542       | 0.533      | 2.075      | 24463   |                                   | 1.577      | 0.557      | 2.134   | 34350   | 2           | 1.60       | 0.59       | 2.19    | 39300   | 2 |
| D02      | 1.623       | 0.579      | 2.202      | 21485   |                                   | 1.592      | 0.577      | 2.169   | 26780   | 3           | 1.61       | 0.60       | 2.21    | 29400   | 3 |
| B12      | 1.591       | 0.507      | 2.098      | 21102   |                                   | 1.592      | 0.509      | 2.101   | 26530   | 3           | 1.62       | 0.54       | 2.16    | 29100   | 3 |
| M14      | 1.618       | 0.572      | 2.190      | 21562   |                                   | 1.614      | 0.561      | 2.175   | 26980   | 3           | 1.59       | 0.58       | 2.17    | 29600   | 3 |
| P04      | 1.607       | 0.499      | 2.106      | 21673   |                                   | 1.576      | 0.493      | 2.069   | 27150   | 3           | 1.58       | 0.51       | 2.09    | 29800   | 3 |
| B04      | 1.573       | 0.532      | 2.105      | 21720   |                                   | 1.533      | 0.510      | 2.043   | 27220   | 4           | 1.57       | 0.51       | 2.08    | 29900   | 3 |
| D14      | 1.575       | 0.532      | 2.107      | 21416   |                                   | 1.574      | 0.526      | 2.100   | 26820   | 3           | 1.59       | 0.53       | 2.12    | 29400   | 3 |
| P12      | 1.575       | 0.501      | 2.076      | 21473   |                                   | 1.545      | 0.507      | 2.052   | 26860   | 3           | 1.56       | 0.50       | 2.06    | 29400   | 4 |
| M02      | 1.635       | 0.518      | 2.153      | 21297   |                                   | 1.614      | 0.526      | 2.140   | 26690   | 3           | 1.66       | 0.52       | 2.18    | 29300   | 3 |
| E03      | 1.560       | 0.528      | 2.088      | 15587   |                                   | 1.555      | 0.508      | 2.063   | 25150   | 3           | 1.57       | 0.51       | 2.11    | 29600   | 2 |
| C11      | 1.552       | 0.516      | 2.068      | 15402   |                                   | 1.535      | 0.511      | 2.046   | 25300   | 3           | 1.57       | 0.53       | 2.10    | 29900   | 3 |
| L13      | 1.528       | 0.495      | 2.023      | 15726   |                                   | 1.517      | 0.507      | 2.024   | 25580   | 3           | 1.55       | 0.51       | 2.06    | 30200   | 3 |
| N05      | 1.543       | 0.528      | 2.071      | 15713   |                                   | 1.543      | 0.525      | 2.068   | 25490   | 3           | 1.60       | 0.55       | 2.15    | 30100   | 3 |
| C05      | 1.529       | 0.469      | 1.998      | 15800   |                                   | 1.536      | 0.507      | 2.043   | 25670   | 4           | 1.54       | 0.51       | 2.05    | 30300   | 3 |
| E13      | 1.583       | 0.552      | 2.135      | 15880   |                                   | 1.589      | 0.561      | 2.150   | 25730   | 2           | 1.60       | 0.61       | 2.21    | 30300   | 2 |
| N11      | 1.531       | 0.493      | 2.024      | 15288   |                                   | 1.511      | 0.511      | 2.022   | 24960   | 4           | 1.56       | 0.51       | 2.07    | 29500   | 3 |
| L03      | 1.590       | 0.605      | 2.195      | 15960   | new rod                           | 1.555      | 0.611      | 2.166   | 26010   | 2           | 1.58       | 0.60       | 2.18    | 30700   | 2 |
| H04      | 1.546       | 0.559      | 2.105      | 20787   |                                   | 1.567      | 0.542      | 2.109   | 31320   | 2           | 1.59       | 0.57       | 2.16    | 36200   | 2 |
| D08      | 1.555       | 0.545      | 2.100      | 21014   |                                   | 1.561      | 0.542      | 2.103   | 31680   | 3           | 1.59       | 0.54       | 2.13    | 36700   | 2 |
| H12      | 1.553       | 0.498      | 2.051      | 20467   |                                   | 1.571      | 0.494      | 2.065   | 31070   | 2           | 1.63       | 0.53       | 2.16    | 36000   | 2 |
| M08      | 1.584       | 0.556      | 2.140      | 21200   |                                   | 1.564      | 0.526      | 2.090   | 31820   | 2           | 1.61       | 0.54       | 2.15    | 36800   | 2 |
| F02      | 1.589       | 0.506      | 2.095      | 11085   |                                   | 1.562      | 0.526      | 2.088   | 20330   | 3           | 1.61       | 0.54       | 2.15    | 24600   | 3 |
| B10      | 1.563       | 0.515      | 2.078      | 10984   |                                   | 1.532      | 0.525      | 2.057   | 20410   | 3           | 1.60       | 0.51       | 2.11    | 24700   | 4 |
| K14      | 1.564       | 0.515      | 2.079      | 10867   |                                   | 1.535      | 0.508      | 2.043   | 20180   | 4           | 1.58       | 0.53       | 2.11    | 24500   | 3 |
| P06      | 1.515       | 0.529      | 2.044      | 11038   |                                   | 1.507      | 0.509      | 2.016   | 20440   | 4           | 1.55       | 0.53       | 2.08    | 24800   | 3 |
| B06      | 1.572       | 0.550      | 2.122      | 10851   |                                   | 1.571      | 0.541      | 2.112   | 20360   | 3           | 1.59       | 0.56       | 2.15    | 24700   | 3 |
| F14      | 1.574       | 0.529      | 2.103      | 11266   |                                   | 1.558      | 0.524      | 2.082   | 20830   | 3           | 1.61       | 0.52       | 2.13    | 25300   | 3 |
| P10      | 1.536       | 0.500      | 2.036      | 11020   |                                   | 1.515      | 0.493      | 2.008   | 20230   | 3           | 1.55       | 0.51       | 2.06    | 24500   | 4 |
| K02      | 1.617       | 0.522      | 2.139      | 11186   |                                   | 1.593      | 0.527      | 2.120   | 20770   | 3           | 1.64       | 0.55       | 2.19    | 25200   | 3 |
| D04      | 1.548       | 0.481      | 2.029      | 20132   |                                   | 1.549      | 0.506      | 2.055   | 30060   | 4           | 1.56       | 0.52       | 2.08    | 34700   | 3 |
| M12      | 1.582       | 0.617      | 2.199      | 19971   | new rod                           | 1.524      | 0.563      | 2.087   | 29980   | 3           | 1.54       | 0.57       | 2.11    | 34700   | 2 |
| D12      | 1.563       | 0.472      | 2.035      | 19882   |                                   | 1.543      | 0.492      | 2.035   | 29970   | 3           | 1.56       | 0.53       | 2.09    | 34700   | 2 |
| M04      | 1.599       | 0.509      | 2.108      | 19885   |                                   | 1.583      | 0.511      | 2.094   | 29940   | 3           | 1.58       | 0.53       | 2.11    | 34700   | 3 |

Catawba Unit 2 Forced Outage Control Rod Drop Testing Results

| Core Loc | BOC-8      |            |            |         | SHUTDOWN (approximately 230 EFPD) |            |            |         |         | SHUTDOWN   |            |            |         |         |   |
|----------|------------|------------|------------|---------|-----------------------------------|------------|------------|---------|---------|------------|------------|------------|---------|---------|---|
|          | 11/26/95   |            |            |         | 8/11/96                           |            |            |         |         | 12/21/96   |            |            |         |         |   |
|          | Time to DP | Time in DP | Total Time | MWD/MTU | Time to DP                        | Time in DP | Total Time | MWD/MTU | Recoils | Time to DP | Time in DP | Total Time | MWD/MTU | Recoils |   |
| H08      | 1.602      | 0.521      | 2.123      | 32941   | 1.631                             | 0.542      | 2.173      | 41170   | 3       | 1.63       | 0.55       | 2.18       | 45400   | 2       |   |
| G03      | 1.530      | 0.622      | 2.152      | 17733   | new rod                           | 1.518      | 0.594      | 2.112   | 27680   | 2          | 1.54       | 0.61       | 2.15    | 32400   | 2 |
| C09      | 1.531      | 0.521      | 2.052      | 17633   |                                   | 1.543      | 0.509      | 2.052   | 27600   | 3          | 1.55       | 0.54       | 2.09    | 32400   | 2 |
| J13      | 1.540      | 0.555      | 2.095      | 17958   |                                   | 1.536      | 0.527      | 2.063   | 27930   | 3          | 1.55       | 0.55       | 2.10    | 32700   | 2 |
| N07      | 1.530      | 0.507      | 2.037      | 17644   |                                   | 1.513      | 0.492      | 2.005   | 27630   | 4          | 1.53       | 0.51       | 2.04    | 32400   | 3 |
| C07      | 1.534      | 0.513      | 2.047      | 17823   |                                   | 1.552      | 0.508      | 2.060   | 27920   | 3          | 1.58       | 0.53       | 2.11    | 32700   | 3 |
| G13      | 1.542      | 0.500      | 2.042      | 17616   |                                   | 1.521      | 0.507      | 2.028   | 27640   | 3          | 1.55       | 0.52       | 2.07    | 32400   | 3 |
| N09      | 1.529      | 0.523      | 2.052      | 17565   |                                   | 1.511      | 0.523      | 2.034   | 27440   | 3          | 1.54       | 0.52       | 2.06    | 32100   | 3 |
| J03      | 1.575      | 0.506      | 2.081      | 17556   |                                   | 1.522      | 0.540      | 2.062   | 27560   | 3          | 1.58       | 0.53       | 2.11    | 32300   | 2 |
| Average  | 1.565      | 0.528      | 2.093      | 18629   |                                   | 1.554      | 0.529      | 2.082   | 27681   | 3          | 1.58       | 0.54       | 2.12    | 31979   | 3 |