

ENCLOSURE 4

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2  
NRC DOCKET NOS. 50-325 & 50-324  
OPERATING LICENSE NOS. DPR-71 & DPR-62  
REQUEST FOR LICENSE AMENDMENT  
CONTROL ROD SCRAM TIME TESTING

MARKED-UP TECHNICAL SPECIFICATION PAGES - UNIT 1

E4-1

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## REACTIVITY CONTROL SYSTEMS

### CONTROL ROD AVERAGE SCRAM INSERTION TIMES

#### LIMITING CONDITIONS FOR OPERATION

3.1.3.3 The average scram insertion time of all OPERABLE control rods from the fully withdrawn position, based on de-energisation of the scram pilot valve solenoids as time zero, shall not exceed any of the following:

| <u>Position Inserted From<br/>Fully Withdrawn</u> | <u>Average Scram Inser-<br/>tion Time (Seconds)</u> |
|---|---|
| 46  | <del>0.91</del> 0.358                               |
| 36  | <del>1.05</del> 1.096                               |
| 26  | <del>1.82</del> 1.860                               |
| 6   | <del>3.37</del> 3.419                               |

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2.

#### ACTION:

With the average scram insertion time exceeding any of the above limits, be in at least HOT SHUTDOWN within 12 hours.

#### SURVEILLANCE REQUIREMENTS

4.1.3.3 All control rods shall be demonstrated OPERABLE by scram time testing from the fully withdrawn position as required by Surveillance Requirement 4.1.3.2.

## REACTIVITY CONTROL SYSTEMS

### FOUR CONTROL ROD GROUP SCRAM INSERTION TIMES

#### LIMITING CONDITION FOR OPERATION

3.1.3.4 The average scram insertion time, from the fully withdrawn position, for the three fastest control rods in each group of four control rods arranged in a two-by-two array, based on deenergization of the scram pilot valve solenoids as time zero, shall not exceed any of the following:

| <u>Position Inserted From</u><br><u>Fully Withdrawn</u> | <u>Average Scram Insertion</u><br><u>Time (Seconds)</u> |
|---|---|
| 46  | <del>0.33</del> 0.379                                   |
| 36  | <del>1.12</del> 1.162                                   |
| 26  | <del>1.93</del> 1.971                                   |
| 6   | <del>3.58</del> 3.624                                   |

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2.

#### ACTION:

With the average scram insertion times of control rods exceeding the above limits, operation may continue and the provisions of Specification 3.0.4 are not applicable provided:

- The control rods with the slower than average scram insertion times are declared inoperable,
- The requirements of Specification 3.1.3.1 are satisfied, and
- If within the preset power level of the RWM, the requirements of Specification 3.1.4.1.d are also satisfied, and
- The Surveillance Requirements of Specification 4.1.3.2.c are performed at least once per 92 days when operation is continued with three or more control rods with slow scram insertion times.

Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

#### SURVEILLANCE REQUIREMENTS

4.1.3.4 All control rods shall be demonstrated OPERABLE by scram time testing from the fully withdrawn position as required by Surveillance Requirement 4.1.3.2.

## POWER DISTRIBUTION LIMITS

### 3/4.2.2 MINIMUM CRITICAL POWER RATIO (ODYN OPTION B)

#### LIMITING CONDITION FOR OPERATION

3.2.2.2 For the OPTION B MCPR limits provided in the CORE OPERATING LIMITS REPORT to be used, the cycle average 20% (Notch 36) scram time ( $\tau_{ave}$ ) shall be less than or equal to the OPTION B scram time limit ( $\tau_B$ ), where  $\tau_{ave}$  and  $\tau_B$  are determined as follows:

$$\tau_{ave} = \frac{\sum_{i=1}^n N_i \tau_i}{\sum_{i=1}^n N_i}, \text{ where}$$

- $i$  = Surveillance test number,  
 $n$  = Number of surveillance tests performed to date in the cycle (including BOC),  
 $N_i$  = Number of rods tested in the  $i^{th}$  surveillance test, and  
 $\tau_i$  = Average scram time to notch 36 for surveillance test  $i$

$$\tau_B = \mu + 1.65 \left( \frac{N_1}{\sum_{i=1}^n N_i} \right)^{1/2} (\sigma), \text{ where:}$$

- $i$  = Surveillance test number  
 $n$  = Number of surveillance tests performed to date in the cycle (including BOC),  
 $N_i$  = Number of rods tested in the  $i^{th}$  surveillance test  
 $N_1$  = Number of rods tested at BOC,  
 $\mu$  = ~~0.813~~ seconds  
 $0.830$  (mean value for statistical scram time distribution from de-energization of scram pilot valve solenoid to ~~pickup~~ dropout on notch 36),  
 $\sigma$  = ~~0.012~~ seconds  
 $0.019$  (standard deviation of the above statistical distribution).

APPLICABILITY: OPERATIONAL CONDITION 1, when THERMAL POWER is greater than or equal to 25% RATED THERMAL POWER.

## POWER DISTRIBUTION LIMITS

### LIMITING CONDITION FOR OPERATION (Continued)

#### ACTION

Within twelve hours after determining that  $\tau_{ave}$  is greater than  $\tau_B$ , the operating limit MCPRs shall be either:

- a. Adjusted for each fuel type such that the operating limit MCPR is the maximum of the non-pressurization transient MCPR operating limit specified in the CORE OPERATING LIMITS REPORT or the adjusted pressurization transient MCPR operating limits, where the adjustment is made by:

$$MCPR_{adjusted} = MCPR_{option B} + \frac{\tau_{ave} - \tau_B}{\tau_A - \tau_B} (MCPR_{option A} - MCPR_{option B})$$

where:  $\tau_A = 1.096$  seconds, control rod average scram insertion time limit to notch 36 per Specification 3.1.3.3,

MCPR<sub>option A</sub> = Specified in the CORE OPERATING LIMITS REPORT,  
MCPR<sub>option B</sub> = Specified in the CORE OPERATING LIMITS REPORT, or

- b. The OPTION A MCPR limits specified in the CORE OPERATING LIMITS REPORT.

### SURVEILLANCE REQUIREMENTS

4.2.2.2 The values of  $\tau_{ave}$  and  $\tau_B$  shall be determined and compared each time a scram test is performed. The requirement for the frequency of scram time testing shall be identical to Specification 4.1.3.2.

ENCLOSURE 5

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2  
NRC DOCKET NOS. 50-325 & 50-326  
OPERATING LICENSE NOS. DPR-71 & DPR-62  
REQUEST FOR LICENSE AMENDMENT  
CONTROL ROD SCRAM TIME TESTING

MARKED-UP TECHNICAL SPECIFICATION PAGES - UNIT 2

## REACTIVITY CONTROL SYSTEMS

### CONTROL ROD AVERAGE SCRAM INSERTION TIMES

#### LIMITING CONDITIONS FOR OPERATION

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3.1.3.3 The average scram insertion time of all OPERABLE control rods from the fully withdrawn position, based on de-energization of the scram pilot valve solenoids as time zero, shall not exceed any of the following:

| <u>Position Inserted From</u><br><u>Fully Withdrawn</u> | <u>Average Scram Inser-</u><br><u>tion Time (Seconds)</u> |
|---|---|
| 46  | <del>0.31</del> 0.358                                     |
| 36  | <del>1.05</del> 1.096                                     |
| 26  | <del>1.82</del> 1.860                                     |
| 6   | <del>3.37</del> 3.419                                     |

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2.

#### ACTION:

With the average scram insertion time exceeding any of the above limits, be in at least HOT SHUTDOWN within 12 hours.

#### SURVEILLANCE REQUIREMENTS

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4.1.3.3 All control rods shall be demonstrated OPERABLE by scram time testing from the fully withdrawn position as required by Surveillance Requirement 4.1.3.2.



## REACTIVITY CONTROL SYSTEMS

### FOUR CONTROL ROD GROUP SCRAM INSERTION TIMES

#### LIMITING CONDITION FOR OPERATION

3.1.3.4 The average scram insertion time, from the fully withdrawn position, for the three fastest control rods in each group of four control rods arranged in a two-by-two array, based on deenergization of the scram pilot valve solenoids as time zero, shall not exceed any of the following:

| <u>Position Inserted From</u><br><u>Fully Withdrawn</u> | <u>Average Scram Insertion</u><br><u>Time (Seconds)</u> |
|---|---|
| 46  | <del>0.33</del> 0.379                                   |
| 36  | <del>1.12</del> 1.162                                   |
| 26  | <del>1.93</del> 1.971                                   |
| 6   | <del>3.58</del> 3.624                                   |

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2.

#### ACTION:

With the average scram insertion times of control rods exceeding the above limits, operation may continue and the provisions of Specification 3.0.4 are not applicable provided:

- The control rods with the slower than average scram insertion times are declared inoperable,
- The requirements of Specification 3.1.3.1 are satisfied, and
- If within the preset power level of the RWM, the requirements of Specification 3.1.4.1.d are also satisfied, and
- The Surveillance Requirements of Specification 4.1 3.2.c are performed at least once per 92 days when operation is continued with three or more control rods with slow scram insertion times.

Otherwise, be in at least HOT SHUTDOWN within the next 12 hours.

#### SURVEILLANCE REQUIREMENTS

4.1.3.4 All control rods shall be demonstrated OPERABLE by scram time testing from the fully withdrawn position as required by Surveillance Requirement 4.1.3.2.



## POWER DISTRIBUTION LIMITS

### 3/4.2.2 MINIMUM CRITICAL POWER RATIO (ODYN OPTION B)

#### LIMITING CONDITION FOR OPERATION

3.2.2.2 For the OPTION B MCPR limits provided in the CORE OPERATING LIMITS REPORT to be used, the cycle average 20% (notch 36) scram time ( $\tau_{ave}$ ) shall be less than or equal to the Option B scram time limit ( $\tau_B$ ), where  $\tau_{ave}$  and  $\tau_B$  are determined as follows:

$$\tau_{ave} = \frac{\sum_{i=1}^n N_i \tau_i}{\sum_{i=1}^n N_i}, \text{ where}$$

$i$  = Surveillance test number,

$n$  = Number of surveillance tests performed to date in the cycle (including BOC),

$N_i$  = Number of rods tested in the  $i^{th}$  surveillance test, and

$\tau_i$  = Average scram time to notch 36 for surveillance test  $i$

$$\tau_B = \mu + 1.65 \left( \frac{N_1}{\sum_{i=1}^n N_i} \right)^{1/2} (\sigma), \text{ where:}$$

$i$  = Surveillance test number

$n$  = Number of surveillance tests performed to date in the cycle (including BOC),

$N_i$  = Number of rods tested in the  $i^{th}$  surveillance test

$N_1$  = Number of rods tested at BOC,

$\mu = 0.813$  seconds

0.830 (mean value for statistical scram time distribution from de-energization of scram pilot valve solenoid to pickup on notch 36), dropout

$\sigma = 0.018$  seconds

0.019 (standard deviation of the above statistical distribution)

APPLICABILITY: OPERATIONAL CONDITION 1, when THERMAL POWER is greater than or equal to 25% RATED THERMAL POWER.

## POWER DISTRIBUTION LIMITS

### LIMITING CONDITIONS FOR OPERATION (Continued)

#### ACTION:

Within twelve hours after determining that  $\tau_{ave}$  is greater than  $\tau_B$ , the operating limit MCPRs shall be either:

- a. Adjusted for each fuel type such that the operating limit MCPR is the maximum of the non-pressurization transient MCPR operating limit specified in the CORE OPERATING LIMITS REPORT or the adjusted pressurization transient MCPR operating limits, where the adjustment is made by:

$$MCPR_{adjusted} = MCPR_{option B} \frac{\tau_{ave} - \tau_B}{\tau_A - \tau_B} (MCPR_{option A} - MCPR_{option B})$$

where:  $\tau_A = 1.096$  seconds, control rod average scram insertion time limit to notch 36 per Specification 3.1.3.3,

$MCPR_{option A}$  = Specified in the CORE OPERATING LIMITS REPORT,  
 $MCPR_{option B}$  = Specified in the CORE OPERATING LIMITS REPORT, or,

- b. The OPTION A MCPR limits specified in the CORE OPERATING LIMITS REPORT.

### SURVEILLANCE REQUIREMENTS

4.2.2.2 The values of  $\tau_{ave}$  and  $\tau_B$  shall be determined and compared each time a scram time test is performed. The requirement for the frequency of scram time testing shall be identical to Specification 4.1.3.2.