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OSCAR R. LEE
VICE PRESIDENT

June 7, 1985
Fort St. Vrain
Unit No. 1
P-85180

RECEIVED
JUN 12 1985

Regional Administrator
Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Attention: Mr. Eric H. Johnson

Docket No. 50-267

SUBJECT: Technical Specifications for Control Rods

REFERENCES: 1) PSC Letter, Lee to Johnson, date 4/1/85 (P-85098)

2) NRC Letter, Wagner to Holmes, dated 4/17/85 (G-85157)

Dear Mr. Johnson:

Enclosed are the interim Technical Specifications for control rods that Public Service Company of Colorado (PSC) will utilize during plant startup and operations. These Specifications describe PSC's program to assure control rod and reserve shutdown system reliability.

The Specifications contained in Enclosure 1 reflect the organization and the majority of the requirements provided by the Commission in Reference 2). In addition, the enclosed Specifications reflect revisions to the Reference 2) specifications that PSC considers essential to allow continued safe plant operation. These revisions, many of which were discussed with the Commission during a May 3, 1985 meeting, are identified and justified in Enclosure 2 to this letter. To simplify your review efforts, Enclosure 3 is a copy of the Reference 2) specifications marked up to identify changes included in Enclosure 1.

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It is PSC's understanding, based upon discussions during the May 3, 1985 meeting, that if the 250° F maximum operating limit on the control rod motor temperature (Specification LCO 3.1.1) proves to be unduly restrictive to plant operations, the Commission will not withhold technically justified relief from this requirement. PSC anticipates that this limit will be reached and we want to stress our understanding that it will not be unreasonably maintained as a plant operating restriction.

PSC commits to operate the facility in accordance with procedures based upon the enclosed control rod interim Technical Specifications until formal Technical Specifications are approved and implemented. The operating procedures that implement these Specifications are currently being prepared, and will be in place prior to plant restart.

If you have any questions or comments about the enclosures, please contact Mr. M. H. Holmes at (303) 571-8409.

Very truly yours,

O R Lee by J. W. Gahm

O. R. Lee, Vice President
Electric Production

ORL/SC/scm

Enclosures

cc: Tom King, NRC (with enclosures)

Enclosure 1
to P-85180

REACTIVITY CONTROL SYSTEMS

3/4.1.1 CONTROL ROD OPERABILITY

LIMITING CONDITION FOR OPERATION

3.1.1 All control rod pairs not fully inserted shall be OPERABLE with:

A. A scram time less than or equal to 152 seconds,

B. A control rod drive (CRD) motor temperature less than or equal to 250 degrees F.

C. A He purge flow to each CRD penetration when reactor pressure is above 100 psia.

APPLICABILITY: POWER OPERATION, LOW POWER, and STARTUP

ACTION:

A. With one or more rod pairs inoperable due to being immovable (i.e., not capable of being fully inserted) as a result of excessive friction or mechanical interference, immediately initiate a reactor shutdown and be in at least SHUTDOWN within 12 hours.

B. With one rod pair trippable but inoperable due to causes other than addressed by ACTION A. above, operation may continue provided that:

1. The rod is restored to OPERABLE status, or

2. Full insertion of the inoperable rod pair is achieved and verified by OPERABLE rod position indication, or watt meter test, or

3. The SHUTDOWN MARGIN (LCO 3.1.4) is verified to be met with the rod pair considered inoperable in its present position.

If one of the above conditions cannot be met within 24 hours from the time of initial loss of OPERABILITY initiate reactor shutdown and be in at least SHUTDOWN within the subsequent 12 hours.

C. When two or more rod pairs are determined to be inoperable, immediately initiate a reactor shutdown and be in at least SHUTDOWN within 12 hours.

D. The provisions of Specification 3.0.6 are not applicable.

SURVEILLANCE REQUIREMENTS

4.1.1 Each control rod pair shall be demonstrated OPERABLE:

A. At least once per 24 hours by:

1. Verifying that all CRD motor temperatures are less than or equal to 250 degrees F.

a. With one or more CRD motor temperature(s) greater than 215 degrees F, all CRDs with motor temperatures greater than 215 degrees F shall be recorded.

b. With one CRD motor temperature greater than 250 degrees F, a partial scram test as described in Specification 4.1.1 B. shall be performed on that control rod pair once per 24 hours.

c. If CRD motor temperature instrumentation is not available, an engineering evaluation shall be performed to determine CRD motor temperature by comparison.

2. Verifying that the purge flow is maintained to each subheader when reactor pressure is above 100 psia, and that the purge flow is not carrying condensed water.

B. At least once per 7 days by:

1. Performing a partial scram test of at least 10 inches on all partially inserted and fully withdrawn control rods, except the regulating rod, and verifying that the extrapolated scram time is less than or equal to 152 seconds.

2. Performing a partial scram test of approximately 2 inches on the regulating rod and verifying rod movement.

C. Prior to withdrawal of control rod pairs to achieve criticality (if not performed in the previous week) by performing a partial scram test of at least 10 inches on all OPERABLE rod pairs and verifying that the extrapolated scram time is less than or equal to 152 seconds.

D. During each shutdown with a scheduled duration of 10 days or longer (if not performed during the previous month) by performing a full stroke scram test on all control rod pairs and verifying a scram time less than or equal to 152 seconds.

E. Following any maintenance on a CRD mechanism which could affect the control rod scram time, by performing a full stroke scram test and verifying a scram time of less than or equal to 152 seconds.

F. During each REFUELING CYCLE:

1. By performing a CHANNEL CALIBRATION and a CHANNEL FUNCTIONAL TEST of the eight subheader control rod drive purge flow measurement channels.

2. By performing a CHANNEL FUNCTIONAL TEST of the CRD motor temperature and cavity temperature instrumentation.

3. By performing preventive maintenance on each control rod drive in the scheduling sequence stated below. This shall consist of inspecting and replacing as necessary the CRD gears, bearings, brake pads, cables, and position instrumentation. The sequencing of this preventive maintenance shall be such that none of the drives installed in the reactor will have gone more than six REFUELING CYCLES without receiving preventive maintenance. During these six REFUELING CYCLES, no CRD shall be in regulating rod service for more than one REFUELING CYCLE.

4. By performing a CHANNEL CALIBRATION of the CRD motor and cavity temperature instrumentation in support of the CRD preventive maintenance described in Specification 4.1.1.F.3 above.

REACTIVITY CONTROL SYSTEMS

3/4.1.2 ROD POSITION INDICATION SYSTEMS - OPERATION

LIMITING CONDITION FOR OPERATION

3.1.2 The position indication system for each control rod pair (consisting of a rod-in limit indication, a rod-out limit indication, and analog and digital rod position indication) shall be OPERABLE and capable of determining control rod pair position within 10 inches.

APPLICABILITY: POWER OPERATION, LOW POWER and STARTUP

ACTION:

A. If digital indication and/or rod-out limit indications are inoperable, operation may continue provided that analog indication and a rod-in limit indication are OPERABLE.

B. If analog indication is inoperable, operation may continue provided that one of the following conditions is met:

1. When the rod is fully inserted, a rod-in limit indication is OPERABLE or the full-in position has been established by an independent means of verification (e.g., watt-meter test), or

2. When the rod is in a mid-position, rod position is capable of being indicated by OPERABLE digital position indication, and a rod-in limit indication is OPERABLE, or

3. When the rod is in the full-out position, a rod-out limit indication and a rod-in limit indication are OPERABLE.

C. If rod-in limit indication is inoperable, operation may continue provided that one of the following conditions are met:

1. When the rod is fully inserted, the rod-in position has been established by an independent means of verification (e.g., watt-meter test), or

2. When the rod is in a mid or full-out position, both digital and analog indications are OPERABLE and are known to be accurate at the full-in position, and digital indication is capable of indicating the rod's position.

D. If rod pair position cannot be determined in accordance with A, B, or C above within 12 hours, then be in SHUTDOWN within the subsequent 12 hours.

E. The provisions of Specification 3.0.6 are not applicable.

SURVEILLANCE REQUIREMENTS

4.1.2 A. Control rod position instrumentation OPERABILITY shall be verified by performing a CHANNEL CHECK on the control rod position instrumentation, as follows:

1. Prior to withdrawal from the fully inserted position.

2. Upon full withdrawal.

3. At least once per 7 days on all control rod pairs except for fully inserted rod pairs which have been disabled by racking out of the drive power.

Each 7 days, during partial scram surveillance or other rod movement, the OPERABILITY of the analog rod position indication shall be verified by confirming that the change in analog indication is consistent with the direction of rod travel. The analog and digital position indications must agree with each other within 10 inches. If a larger difference is observed, it shall be assumed that the analog indication is the inoperable channel, unless the analog indication can be proven to be accurate and OPERABLE by another means.

B. Prior to each reactor start-up, a full-in limit indication for each control rod pair must be verified as OPERATING when the rod is full-in and OPERABLE by virtue of the change in the indication when the rod is withdrawn a short distance. Alternatively, rod-in position indication OPERABILITY shall be similarly verified the first time during or after start-up that a rod is withdrawn from the full-in position.

C. Prior to each reactor start-up, or during the first outward motion of a rod, the analog and digital position indications must be shown to be OPERABLE at the full-in position and be shown to respond appropriately when the rod is withdrawn a short distance. Upon actuation of the rod-in limit indication, the rod position indications must indicate less than 6 inches, to prevent overtravel that could cause damage to the potentiometers and the associated coupling. If the rod position indications indicate 6 or more inches, an engineering evaluation shall be performed to determine the maximum insertion limit for that control rod pair.

REACTIVITY CONTROL SYSTEMS

3/4.1.3 ROD POSITION INDICATION SYSTEMS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.3 Sufficient position indication instrumentation shall be OPERABLE to be capable of determining control rod pair position within 12 inches.

APPLICABILITY: SHUTDOWN and REFUELING

ACTION: If the required position indication is not OPERABLE, within 12 hours:

A. The inoperable indication shall be restored to OPERABLE status, or

B. Full insertion shall be verified by other independent means (e.g., watt-meter testing), or

C. The rod pair shall be considered fully withdrawn and the SHUTDOWN MARGIN requirements of Specification 3.1.4 shall be met.

SURVEILLANCE REQUIREMENTS

4.1.3 A. Control rod position instrumentation OPERABILITY shall be verified by performing a CHANNEL CHECK on the control rod position instrumentation, as follows:

1. Prior to withdrawal from the fully inserted position.

2. Upon full withdrawal.

3. At least once per 7 days on all control rod pairs except for fully inserted rod pairs which have had the drive motor power supply disabled.

4. After a MODE change to SHUTDOWN from STARTUP.

B. During each REFUELING CYCLE perform a CHANNEL FUNCTIONAL TEST of the rod pair redundant "in" and "out" limit switches and the analog and digital rod position indication systems.

C. A CHANNEL CALIBRATION of the rod pair redundant "in" and "out" limit switches, and the analog and digital rod position indication systems, shall be performed in conjunction with CRD installation in the PCRV.

REACTIVITY CONTROL SYSTEMS

3/4.1.4 SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.1.4 The reactor SHUTDOWN MARGIN shall be greater than or equal to 0.01 delta k.

APPLICABILITY: At all times

ACTION:

A. POWER OPERATION, LOW POWER and STARTUP

With the SHUTDOWN MARGIN less than required, immediately insert sufficient control rod pairs to bring the reactor into compliance with this LCO. If compliance cannot be restored within one hour, initiate a reactor shutdown and be in at least SHUTDOWN within 24 hours.

B. SHUTDOWN

1. With the SHUTDOWN MARGIN less than that required, within 1 hour, either:

a. Fully insert (as verified by OPERABLE rod position indications per Specification 3.1.3) sufficient control rods to achieve the specified SHUTDOWN MARGIN, or

b. Actuate sufficient reserve shutdown material to achieve the specified SHUTDOWN MARGIN.

C. REFUELING

1. With the SHUTDOWN MARGIN less than that required:

a. Immediately suspend all control rod or fuel manipulations involving positive reactivity changes, and

b. Within 1 hour either:

1) Fully insert (as verified by OPERABLE rod position indications per Specification 3.1.3) sufficient control rods to achieve the specified SHUTDOWN MARGIN, or

2) Actuate sufficient reserve shutdown material to achieve the specified SHUTDOWN MARGIN.

SURVEILLANCE REQUIREMENTS

4.1.4 Verification of SHUTDOWN MARGIN shall be performed as follows:

A. When in POWER OPERATION, LOW POWER or STARTUP

1. Once per 7 days.

2. As required by the ACTION statements of LCO 3.1.1.

3. In assessing the SHUTDOWN MARGIN the following conditions shall be assumed:

a. Highest worth rod pair assumed fully withdrawn and not insertable.

b. All OPERABLE rod pairs assumed fully inserted with all inoperable rod pairs in their pre-scram position,

c. A CORE AVERAGE TEMPERATURE of 220 degrees F,

d. No buildup of Xe-135 and Sm-149 and no decay of Pa-233 beyond that present at shutdown (i.e., instantaneous SHUTDOWN MARGIN).

B. When in SHUTDOWN

1. Within 12 hours after each reactor shutdown where all control rods cannot be verified fully inserted, or

2. Prior to control rod withdrawal, if all control rod pairs are not fully inserted prior to withdrawal action, or

3. Prior to control rod withdrawal to achieve criticality, to confirm that upon reaching criticality the SHUTDOWN MARGIN requirement can be met, or

4. As required by the ACTION statement of LCO 3.1.9.

5. In assessing the SHUTDOWN MARGIN the following conditions shall be assumed:

   a. Highest worth rod pair assumed fully withdrawn and not insertable.

   b. All OPERABLE rod pairs assumed fully inserted and inoperable rod pairs in their known position or assumed fully withdrawn.

   c. A CORE AVERAGE TEMPERATURE of 80 degrees F.

   d. Full decay of Xe-135, full buildup of Sm-149, and Pa-233 decay as a function of time after shutdown.

C. When in REFUELING

1. Prior to control rod withdrawal if all control rod pairs are not fully inserted prior to withdrawal action, or

2. Prior to the removal of the control rod pair in a region to be refueled, or

3. As required by the ACTION statement of LCO 3.1.9.

4. In assessing the SHUTDOWN MARGIN the following conditions shall be assumed:

   a. Highest worth rod pair capable of being withdrawn is assumed fully withdrawn and not insertable.

   b. Rod pairs being withdrawn for refueling/repair, for verification of SHUTDOWN MARGIN, or for test purposes are assumed fully withdrawn.

   c. All other OPERABLE rod pairs are assumed fully inserted and incapable of being withdrawn.

   d. Inoperable rod pairs are assumed in their known position or assumed fully withdrawn.

   e. For planned CORE ALTERATIONS, the core shall be in its most reactive configuration.

f. A CORE AVERAGE TEMPERATURE of 80 degrees F.

g. Full decay of Xe-135, full buildup of Sm-149, and Pa-233 decay as a function of time after shutdown.

REACTIVITY CONTROL

3/4.1.5 CONTROL ROD WORTH AND POSITION REQUIREMENTS - OPERATION

LIMITING CONDITION FOR OPERATION

3.1.5 A. Control rod pairs (except the regulating rod pair) shall be withdrawn or inserted in groups (3 rod pairs per group) except during scram or rod runback. All control rod pairs shall be either fully inserted or fully withdrawn except that:

1. One shim group and the regulating rod pair may be in any position.

2. Up to 6 additional control rod pairs may be inserted up to two feet.

B. Maximum calculated control rod pair worth shall not exceed:

1. 0.047 delta k with reactor critical at about E-07 percent RATED THERMAL POWER (source power), and

2. At full power, that worth which would result in rod withdrawal accident consequences equal to those described in FSAR Section 14.2.2.6.

APPLICABILITY: POWER OPERATION, LOW POWER and STARTUP

ACTION: A. With any control rod pair or group not in compliance with its position requirements perform the following:

1. Restore the control rods to an acceptable configuration within 4 hours, or

2. Be in at least STARTUP within the subsequent 12 hours, and SHUTDOWN within the following 12 hours.

B. With any control rod pair not in compliance with its worth limits initiate a reactor shutdown and be in at least SHUTDOWN within 24 hours of determination.

SURVEILLANCE REQUIREMENTS

4.1.5 A. Control rod pair positions shall be monitored via OPERABLE rod position instrumentation (LCO 3.1.2) and verified to be in compliance with the above requirements at least once every 8 hours.

B. At the beginning of each REFUELING CYCLE, the reactivity worth of the control rod groups which are withdrawn from LOW POWER to POWER OPERATION, in the withdrawal sequence, shall be measured. The measured group worths shall be compared with the calculated group worths to verify that the calculated criteria upon which the selection of the rod sequence was based has been satisfied. The measured group worth shall agree with the calculated group worth within plus or minus 20% for all groups except groups 4A and 4D, for which the measured group worth shall be within plus 100%, minus 50% of the calculated group worth.

REACTIVITY CONTROL SYSTEM

3/4.1.6 CONTROL ROD POSITION REQUIREMENTS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.6 A. All control rod pairs shall be fully inserted except:

1. Up to two control rod pairs may be withdrawn for refueling/repair, and

2. Additional control rod pairs may be withdrawn for SHUTDOWN MARGIN verification or tests.

B. All fully inserted control rod pairs shall be made incapable of being withdrawn by:

1. Placing the reactor mode switch in the "off" position, or

2. Disabling the electrical supply to the drive motors.

C. The SHUTDOWN MARGIN requirements of Specification 3.1.4 shall be maintained during all of the above control rod pair configurations.

APPLICABILITY: SHUTDOWN AND REFUELING

ACTION: With less than the above requirements:

A. Immediately suspend all control rod or fuel manipulations involving positive reactivity changes, and

B. Within 12 hours:

1. Insert any rod pair capable of being inserted and verify the SHUTDOWN MARGIN requirements are met (LCO 3.1.4), or

2. Actuate sufficient reserve shutdown material to achieve the specified SHUTDOWN MARGIN.

SURVEILLANCE REQUIREMENTS

4.1.6 A. Control rod pair positions shall be monitored via OPERABLE rod position instrumentation (LCO 3.1.3) for compliance with this LCO at least every 12 hours.

B. Following each reactor shutdown, each rod pair shall be verified to be at the full-in position by one of the following means:

1. The agreement of the analog position indication and the full-in position indications; or

2. The agreement of the analog and digital position indications (that were known both to be OPERABLE prior to the shutdown and to be accurate at the full-in position); or

3. The use of an independent rod position verification method (e.g., watt-meter test).

Rods that were known to be fully inserted into the reactor prior to the shutdown may be excluded from the above verifications.

C. Prior to removal of any control rod drive assembly from the reactor, the SHUTDOWN MARGIN shall be explicitly calculated per the requirements of LCO 3.1.4.

D. Upon full withdrawal of a control rod pair selected for removal from the PCRV, and prior to disabling its scram capabilities, the SHUTDOWN MARGIN shall be verified by withdrawing one or more additional control rod pairs with a calculated worth greater than or equal to 0.01 delta k plus any calculated positive worth of the planned CORE ALTERATION, verifying subcriticality, and then reinserting.

REACTIVITY CONTROL SYSTEMS

3/4.1.7 REACTIVITY CHANGE WITH TEMPERATURE

LIMITING CONDITION FOR OPERATION

3.1.7 The reactivity change due to a CORE AVERAGE TEMPERATURE increase between 220 degrees F to 1500 degrees F, shall be at least as negative as 0.031 delta k but no greater than 0.056 delta k throughout the REFUELING CYCLE.

APPLICABILITY: POWER OPERATION, LOW POWER and STARTUP

ACTION: In the reactivity temperature change outside the range specified, the reactor shall be placed in SHUTDOWN within 12 hours of determination.

SURVEILLANCE REQUIREMENTS

4.1.7 At the beginning of each REFUELING CYCLE the reactivity change as a function of fuel temperature change (temperature coefficient) shall be measured and integrated to verify that the measured reactivity temperature change is within the above limits.

REACTIVITY CONTROL SYSTEMS

3/4.1.8 RESERVE SHUTDOWN SYSTEM - OPERATION

LIMITING CONDITION FOR OPERATION

3.1.8 All reserve shutdown (RSD) units shall be OPERABLE with:

A. At least 1500 psig pressure in their individual He gas bottle supplies.

B. At least 500 psig pressure in the ACM nitrogen bottles which provide a backup means of actuating the RSD hopper pressurization valves.

APPLICABILITY: POWER OPERATION, LOW POWER and STARTUP

ACTION: A. With one RSD unit inoperable, operation may continue provided that the RSD unit is capable of being made OPERABLE within 14 days following a reactor shutdown.

B. With two or more RSD units inoperable, or if the provisions of ACTION A cannot be met, restore the inoperable equipment to as a minimum meet the conditions of ACTION A within 24 hours, or be in at least SHUTDOWN within the next 12 hours.

C. The provisions of Specification 3.0.6 are not applicable.

SURVEILLANCE REQUIREMENTS

4.1.8 The reserve shutdown system shall be demonstrated OPERABLE:

A. At least once per 7 days by verifying that the pressure of the individual hopper He gas bottles is at least 1500 psig.

B. At least once per 7 days by verifying that the pressure of the ACM nitrogen bottles is at least 500 psig.

C. At least once per 92 days by:

1. Pressurizing each of the 37 reserve shutdown hoppers above reactor pressure, as indicated by operation of the hopper pressure switch. OPERABLE reserve shutdown hoppers shall be capable of pressurization.

2. Operating the ACM quick disconnect couplings.

3. Functionally testing the instrumentation which alarms at low pressure in the reserve shutdown actuating pressure lines.

D. At least once per 365 days by performing a CHANNEL CALIBRATION of the gas pressure instrumentation.

E. Following entry of condensed moisture into any reserve shutdown system hopper(s), by visually examining the absorber material from at least two hoppers and verifying their OPERABILITY.

REACTIVITY CONTROL SYSTEMS

3/4.1.9 RESERVE SHUTDOWN SYSTEM - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.9 Reserve shutdown (RSD) units on control rod drive assemblies whose control rod pairs are capable of being withdrawn shall be OPERABLE (except RSD units in any control rod drive assemblies removed for refueling/repair) with:

A. At least 1500 psig pressure in their individual He gas bottle supplies.

B. At least 500 psig pressure in the ACM nitrogen bottles which provide a backup means of actuating the RSD hopper pressurization valves.

APPLICABILITY: SHUTDOWN and REFUELING

ACTION: With less than the required RSD units OPERABLE, within 24 hours:

A. Return all control rod pairs (except the ones removed for refueling/repair) to the full-in position, or

B. Verify SHUTDOWN MARGIN requirements are met (LCO 3.1.4), or

C. Insert sufficient RSD material to maintain SHUTDOWN MARGIN requirements.

SURVEILLANCE REQUIREMENTS

4.1.9 The reserve shutdown system shall be demonstrated OPERABLE:

A. At least once per 7 days by verifying that the pressure of the individual hopper He gas bottles is at least 1500 psig.

B. At least once per 7 days by verifying that the pressure of the ACM nitrogen bottles is at least 500 psig.

C. At least once per 365 days by performing a CHANNEL CALIBRATION of the gas pressure instrumentation.

D. At each refueling outage by:

1. Demonstrating that each subsystem is OPERABLE by actuating each group of pressurizing valves from the Control Room. The capability of pressurizing the corresponding hoppers need not be demonstrated during this test. Valve position indications and fail safe operation shall be observed during this test.

2. Calibrating the reserve shutdown hopper pressure switches at the time of control rod drive preventive maintenance (Specification 4.1.1).

3. Visually examining the pipe sections which require disassembly and reassembly within the refueling penetrations, after they have been disassembled for preventive maintenance (Specification 4.1.1).

4. Functionally testing two reserve shutdown assemblies out of core. One assembly shall contain 20 weight percent boronated material and the other 40 weight percent boronated material. The tests consist of pressurizing the reserve shutdown hopper to the point of rupturing the disc and releasing the poison material.

   The absorber material from the tested hoppers shall be visually examined for evidence of boric acid crystal formation and chemically analyzed for boron carbide and leachable boron content. Failure of a reserve shutdown assembly to perform acceptably during functional testing or evidence of extensive boric acid crystal formation will be reported to the Commission within 30 days per Specification 6.9.

E. Following entry of condensed moisture into any reserve shutdown system hopper(s), by visually examining the absorber material from at least two hoppers and verifying their OPERABILITY.

SUPPORTIVE JUSTIFICATION

CONTROL ROD OPERABILITY

LCO 3.1.1

Added "not fully inserted" to rods that must be OPERABLE.

JUSTIFICATION: Fully inserted rods do not need scram capability, as agreed to at 5-3-85 meeting.

LCO 3.1.1 B.

Changed 215 degrees F CRD motor temperature to 250 degrees F.

JUSTIFICATION: A 250 degree F motor temperature limitation was agreed to at the 5-3-85 meeting as a compromise between the temperature for which the CRD motors have been qualified by test (215 degrees F) and the temperature for which the CRD motors have been qualified analytically (272 degrees F).

LCO 3.1.1 C.

Deleted moisture and flow requirements for purge flow.

JUSTIFICATION: As agreed to at 5-3-85 meeting, FSV does not presently have the capability to measure moisture and flow to each CRD penetration. PSC will verify flow to the subheaders and verify that the valves to the penetrations are open in order to assure flow. This section is an acceptable measure to ensure CRD penetration purge flow.

LCO 3.1.1 C.

Added the condition that purge flow be checked only if reactor pressure exceeds 100 psia.

JUSTIFICATION: The purified helium header is not OPERABLE below 100 psia.

APPLICABILITY

Changed "POWER" to "POWER OPERATION", both here and in all the Reactivity Control Specifications.

JUSTIFICATION: This is consistent with the FSV mode definitions provided in the 4-1-85 submittal.

ACTION 3.1.1 A.

Added definition of immovable as "not capable of being fully inserted", and deleted the 152 second scram capability from the shutdown action statement.

JUSTIFICATION: Rods that are capable of full insertion or that have a scram time greater than 152 seconds are considered as trippable but inoperable, and thus subject to the requirements of ACTION B. The rod withdrawal accident analyses described in FSAR sections 14.2.2.6 and 14.2.2.7 were done with a scram insertion time of 152 seconds and a ramp reactivity insertion of 0.080 delta k. The total reactivity worth of the bank of 37 control rod pairs is 0.210 delta k (FSAR section 3.5) which is significantly greater than that assumed in the accident analysis. A single rod with scram time greater than 152 seconds, or that is otherwise trippable but inoperable, would have no effect on the calculated accident results.

ACTION 3.1.1 A.

Changed "in the SHUTDOWN MODE within 6 hours" to "in at least SHUTDOWN within 12 hours."

JUSTIFICATION: 12 hours is the minimum time required for an orderly shutdown, as used throughout the 4-1-85 Technical Specification submittal.

ACTION 3.1.1 B.

Changed "POWER OPERATION" to "operation".

JUSTIFICATION: The statement that operation may continue is not intended to restrict the plant to the POWER OPERATION mode.

ACTION 3.1.1 B.

All interim Action times were deleted and the shutdown time was changed from 36 hours to 24 hours to initiate shutdown and 12 hours to be shutdown.

JUSTIFICATION: Interim action times that are not sequential are enveloped by the shutdown time. 24 hours allows for performing a watt meter test and a shutdown margin calculation, and 12 hours is required for an orderly shutdown. The overall time of being in SHUTDOWN within 36 hours is retained.

ACTION 3.1.1 B.2

Added "or watt meter test".

JUSTIFICATION: Use of watt meter test is necessary to verify rod-in position if the rod-in position indication is inoperable.

ACTION 3.1.1 B.3

Deleted "and the discrepancy portion of region peaking factor surveillance of 4.2.3".

JUSTIFICATION: The region peaking factor discrepancy measurement could have been used to evaluate rod position if the rod was inoperable due to position indication deficiencies. However, rod position indication operability requirements are now provided in LCO 3.1.2. In the absence of operable position indication, LCO 3.1.2, ACTION D. requires shutdown in 24 hours, which is more conservative than the Actions described here.

ACTION 3.1.1 D.

Added the exclusion for Specification 3.0.6.

JUSTIFICATION: If control rods meet the conditions of the Action Statements, the capability to move from STARTUP to LOW POWER to POWER OPERATION is required to support FSV operation.

NRC PROPOSED ACTION B.

Moved to SR 4.1.1 A.

JUSTIFICATION: The progression of enhanced monitoring of CRD motor temperatures as temperatures increase was treated as enhanced surveillances. The first requirement to increase monitoring at 215 degrees F would never be reached if it were an Action Statement because the LCO is 250 degrees F.

SR 4.1.1

The entire section was reformatted.

JUSTIFICATION: The section is reformatted for clarity and consistency with the STS.

SR 4.1.1 A.1

Replaced requirement for continuously monitoring CRDs with motor temperatures greater than 215 degrees F with a requirement to record them.

JUSTIFICATION: The word "continuous" is subject to possible misinterpretation. CRD motor temperatures will be frequently recorded on a multi-point recorder when they exceed 215 degrees F and alarmed when they reach 250 degrees F. The alarm feature

will still be "monitoring" the CRD motor temperature during time intervals when the recorder is not operating (e.g. paper changes, adjustments, maintainance).

SR 4.1.1 A.1

Added partial scram test if one CRD motor temperature is greater than 250 degrees F.

JUSTIFICATION: This test verifies that the rod is still trippable after the LCO is exceeded, as agreed to at the 5-3-85 meeting.

SR 4.1.1 A.2

Changed purge flow monitoring to when reactor pressure is above 100 psig.

JUSTIFICATION: The purified helium compressor supplies purge flow. It is not designed to operate below 80 psia. The compressor is normally placed in service at approximately 80-100 psia. Therefore, the limit for monitoring purge flow is set at 100 psia.

SR 4.1.1 B.

Specified a separate scram test for the regulating rod.

JUSTIFICATION: The regulating rod is the only control rod that has automatic response capability to a change in flux (via the flux controller) and is used to offset the negative effects of partial scram tests of other CRDs. A 2" drop test would demonstrate tripability of the rod and not induce unacceptable reactor power transients. Therefore, a partial scram test of approximately 2 inches on the regulating rod was chosen, as discussed at the 5-3-85 meeting.

SR 4.1.1 D.

Deleted "During each refueling outage" for performing a full stroke scram test.

JUSTIFICATION: The full stroke test for each shutdown with a scheduled duration of 10 days or longer encompasses each refueling outage.

SR 4.1.1 F.

Added description of preventive maintenance on control rod drives.

JUSTIFICATION: The preventive maintenance description was added for completeness.

SR 4.1.1.F.3

Added "During these six REFUELING CYCLES, no CRD shall be in regulating rod service for more than one REFUELING CYCLE".

JUSTIFICATION: This ensures that the regulating rod, which encounters relatively severe service, is refurbished before serving as the regulating rod for another refueling cycle.

SUPPORTIVE JUSTIFICATION

ROD POSITION INDICATION SYSTEMS-OPERATING

LCO 3.1.2

Changed "indicator" to "indication" throughout the specification.

JUSTIFICATION: Terminology was made consistent, as agreed to in 5-3-85 meeting.

LCO 3 1.2

Set the rod position accuracy at 10 inches throughout this specification, applicable during operations.

JUSTIFICATION: FSAR section 7.2.2 assumes a long term misalignment of plus or minus 12 inches on control rod position to ensure an acceptable power distribution for core burnup. This allows a 2 foot separation distance for the control rods of any partially inserted shim group. Assuring a position accuracy of plus or minus 10 inches is consistent with this misalignment allowance and provides for a 4 inch margin for operation when manually adjusting the control rods of the shim group. Each shim control rod is normally moved in approximately 2 inch increments

during operation to adjust the regulating control rod to its mid operating position. A 10 inch position accuracy for all control rods is also consistent with a reactivity uncertainty of about 0.003 delta k, which allows for detecting core irregularities, such as occasions of inadvertant release of reserve shutdown material within a single core region. Control rod withdrawal procedures require an evaluation if the actual critical control rod position differs from the predicted position during initial criticality by this reactivity worth.

ACTION 3.1.2

Reorganized Action statements.

JUSTIFICATION: The Action statement that requires shutdown was relocated to follow the Actions that permitted continued operation.

ACTION 3.1.2 D.

Deleted "the rod pair shall be considered not in compliance with LCO 3.1.5 and the action statement of 3.1.5 shall be implemented" and inserted the ACTION statement from 3.1.5, i.e., "in accordance with A, B, or C above within 12 hours, then be in SHUTDOWN within the subsequent 12 hours."

JUSTIFICATION: Per 5-3-85 meeting, and clarification. It is simpler to state the ACTION rather than reference another specification.

ACTION 3.1.2 B. and C. (new draft organization)

Changed "continuously indicated" to "capable of being indicated."

JUSTIFICATION: Digital indication is available for all control rods, but not all at the same time. Rods must be selected either individually or in groups for digital position indication display, as agreed to at 5-3-85 meeting.

ACTION 3.1.2

Added "The provisions of Specification 3.0.6 are not applicable."

JUSTIFICATION: Per 5-3-85 meeting, if continued plant operation is permitted by the Action statement, FSV needs the capability to progress from Startup to Low Power to Power Operation.

SR 4.1.2 A

Changed "surveillance" to "partial scram surveillance or other rod movement."

JUSTIFICATION: As agreed to at 5-3-85 meeting, this provides clarification and also addresses the regulating rod movements.

SR 4.1.2 A

Changed "comparing the change in analog indication with the direction and time duration of the rod travel" to "confirming the change in analog indication is consistent with the direction of rod travel."

JUSTIFICATION: As agreed to at 5-3-85 meeting, directional indication changes demonstrate operability of the analog indication.

SR 4.1.2 A

Changed "it" to "the analog indication."

JUSTIFICATION: Clarification.

SR 4.1.2.B

Changed "each full-in limit indicator" to "a full-in limit indication for each control rod pair".

JUSTIFICATION: One operable full-in limit indication per control rod pair meets the specification requirements

SR 4.1.2 C.

Added "and digital", deleted "The accuracy requirement must be plus or minus ___ inches such that returning the rod to a "0" position, as indicated by the analog RPI, will not result in overtravel that could cause damage to the potentiometers and the associated coupling. The digital indication shall likewise be shown to be OPERABLE and accurate at the full-in position." Replaced this with, "Upon actuation of the rod-in limit indication, the rod position indications must indicate less than 6 inches, to prevent overtravel that could cause damage to the potentiometers and the associated coupling. If the rod position indications indicate 6 or more inches, an engineering evaluation shall be performed to determine the maximum insertion limit for that control rod pair."

JUSTIFICATION: The position indication potentiometers and associated coupling can be damaged by an overtravel of minus 6 inches. This damage is prevented by initially calibrating the rod position indication to the zero position at the rod-in limit indication, and then by procedurally preventing rod insertion past zero, even if rod-in limit indication is not received. Considering the instrumentation inaccuracies, the requirement for position indication to be less than 6 inches when rod-in limit indication is received will prevent rod insertion beyond the minus 6 inch damage limit, if the rod-in limit instrumentation fails.

Since rod position instrumentation cannot be recalibrated without removing the CRD from the PCRV, the engineering evaluation provides the necessary capability to establish individual rod insertion limits for rods whose position indications exceed 6 inches.

SUPPORTIVE JUSTIFICATION

ROD POSITION INDICATION SYSTEMS - SHUTDOWN

LCO 3.1.3

Set the rod position accuracy at 12 inches.

JUSTIFICATION: This specification involves control rods that are either fully inserted or withdrawn, therefore the accuracy requirements are different from those in LCO 3.1.2 for operational considerations. The relative reactivity worth for the total control rod bank as a function of withdrawal position is given in FSAR section 3.5 (Fig. 3.5-2). Experimental results on control rod worth versus withdrawal position has indicated a reduced worth for the first portion of control rod withdrawal. Analyses consistent with those performed in the FSAR have confirmed this, as shown on the attached Figures. From this calculated data and a calculated bank worth of 0.210 delta k, it can be shown that a reactivity uncertainty of 0.003 delta k results in the total bank position uncertainty of 17 inches at full insertion and 13 inches at full withdrawal. The reactivity uncertainty of 0.003 is acceptable for the shutdown margin and is consistent with that used to detect core irregularities, such as occasions of inadvertant release of reserve shutdown material within a single core region. Control rod withdrawal procedures require an evaluation if the actual critical control rod position differs from the predicted position during approach to criticality by this reactivity worth.

LCO 3.1.3

Moved "or verify full insertion by other independent means (watt meter test)" from the LCO to the ACTION statement.

JUSTIFICATION: This is an ACTION statement.

ACTION 3.1.3

Changed ACTION statement from "If rod pair position cannot be determined, the rod pair shall be considered not fully inserted and the action statement of LCO 3.1.6 implemented", to "If the required position indication is not OPERABLE, within 12 hours:

A. The inoperable indication shall be restored to OPERABLE status, or

B. Full insertion shall be verified by other independent means (e.g., watt meter testing), or

C. The rod pair shall be considered fully withdrawn and the SHUTDOWN MARGIN requirements of Specification 3.1.4 shall be met.

JUSTIFICATION: Per 5-3-85 meeting. If the position indication instrumentation is inoperable, full insertion can also be verified by watt meter testing. Reworded ACTION C. per 5-3-85 meeting.

SR 4.1.3

Combined the two statements "Control rod position instrumentation OPERABILITY shall be verified by performing" and "A CHANNEL CHECK on the control rod position instrumentation, as follows" to become 4.1.3 A.

JUSTIFICATION: Editorial clarification.

SR 4.1.3 A.

Changed 3. from "rod pairs which have been disabled by racking out of the drive power." to "rod pairs which have had the drive motor power supply disabled".

JUSTIFICATION: There are other single failure proof ways to disable the control rods, that do not require racking out 37 breakers, such as pulling the scram power fuses, placing the group selector switch to OFF, or removing power to the CRD motor control centers.

SR 4.1.3.A

Added "from STARTUP" to item 4.

JUSTIFICATION: During refueling, operability of the rod position instrumentation is demonstrated by performance of channel functional tests and channel calibrations, per SR 4.1.3.B and C. In addition, the shutdown and refueling evolutions at FSV involve many changes between these two modes (during CRD testing that requires manipulation of the Reactor Mode Switch), and performing channel checks of the rod position instrumentation with each entry into SHUTDOWN would be excessive.

JUSTIFICATION:SR 4.1.3 B.

Changed "CHANNEL CALIBRATION" to CHANNEL FUNCTIONAL TEST".

JUSTIFICATION: The CRD position indicators cannot be calibrated in the PCRV and they are not all removed during each refueling cycle. These that are removed will be calibrated per SR. 4.1.3C.

SR 4.1.3C.

Added C. A CHANNEL CALIBRATION of the rod pair redundant "in" and "out" limit switches, and the analog and digital rod position

indication systems, shall be performed in conjunction with CRD installation in the PCRV.

JUSTIFICATION: Per 5-3-85 meeting, and as discussed above.

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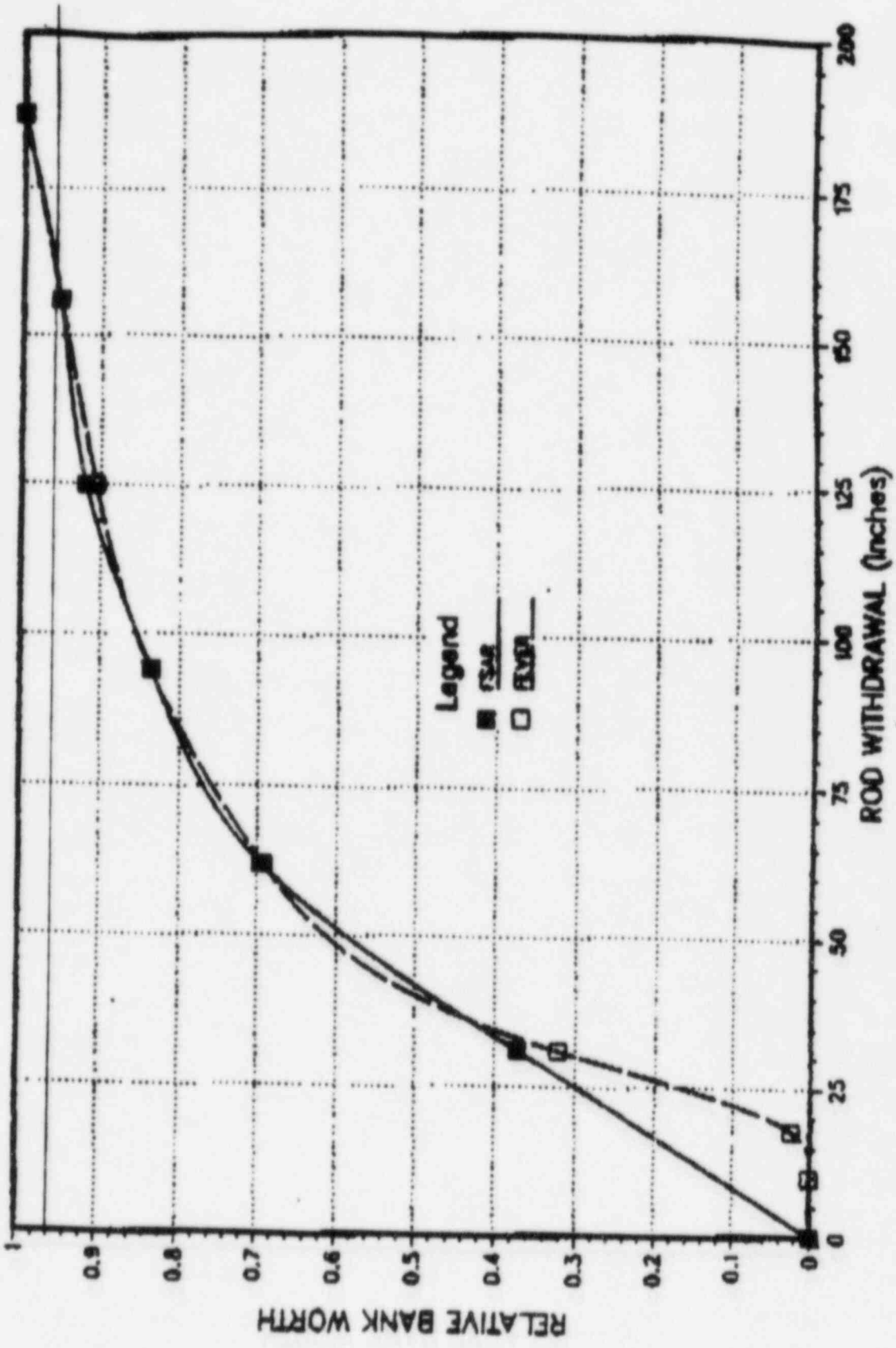
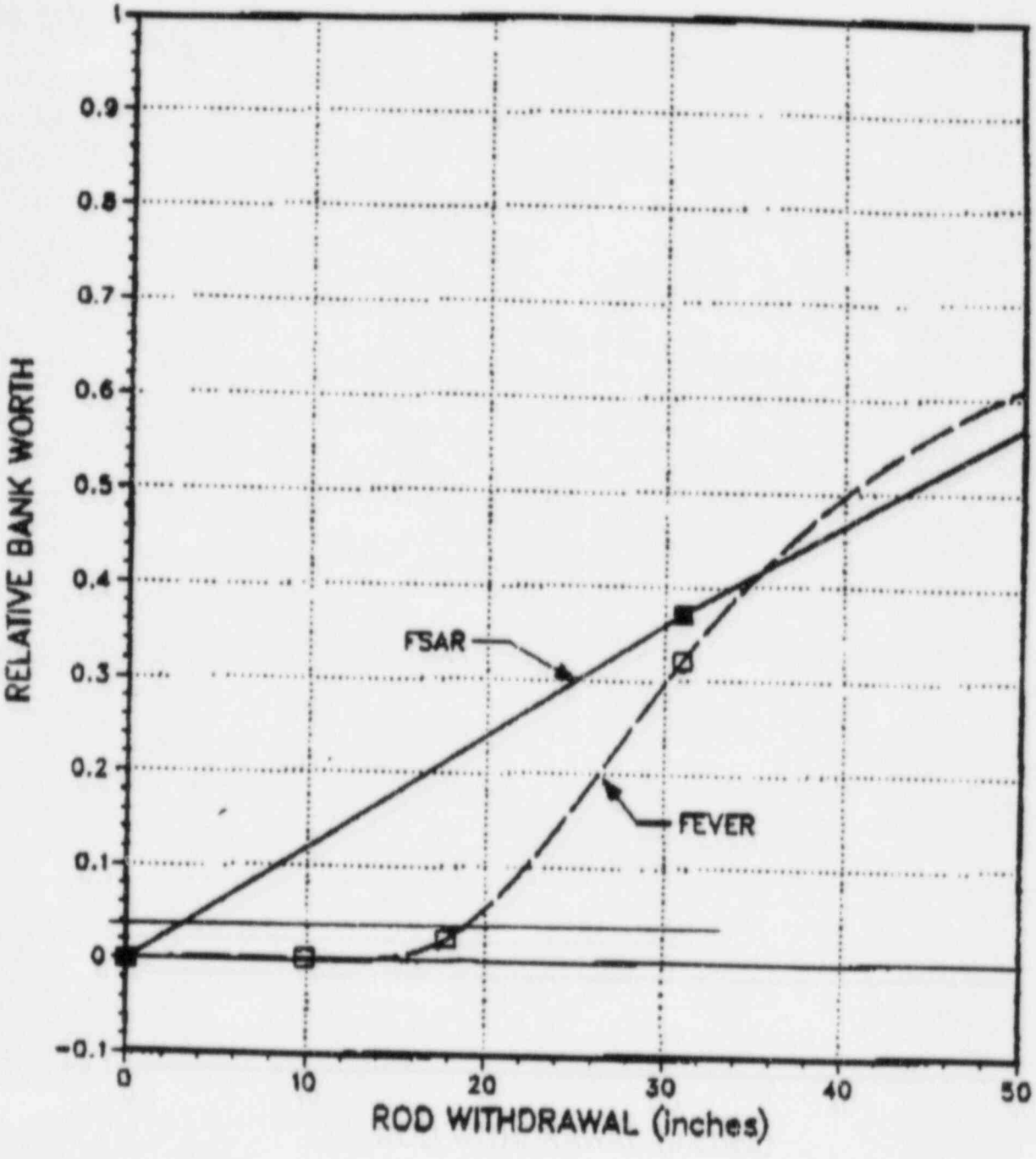
SCRAM WORTH VS WITHDRAWAL DISTANCE
BASIS: FSAR KINETICS CALCULATIONS



SCRAM WORTH VS WITHDRAWAL DISTANCE
DETAIL OF BOTTOM FUEL LAYER



SUPPORTIVE JUSTIFICATION

REACTIVITY CONTROL SYSTEMS

APPLICABILITY 3.1.4

"At all times" was changed from the NRC draft of "All modes."

JUSTIFICATION: Changed for consistency with 4-1-85 Technical Specification submittal (i.e. - editorial).

ACTION 3.1.4 A.

"At least SHUTDOWN" was changed from the NRC draft "the SHUTDOWN MODE."

JUSTIFICATION: Changed to reflect the Fort St. Vrain mode applicabilities contained in the 4-1-85 Technical Specification submittal (i.e. editorial).

ACTION 3.1.4 B.

"Shutdown" and "Refueling" Actions were separated.

JUSTIFICATION: SHUTDOWN and REFUELING MODE actions have been separated for clarity in order to differentiate between degraded SHUTDOWN MARGIN conditions for each mode.

ACTION 3.1.4 B.1.b

Changed "Actuate the reserve shutdown system" to "Actuate sufficient reserve shutdown material to achieve the specified SHUTDOWN MARGIN".

JUSTIFICATION: Per FSAR Section 3.5.3, the reserve shutdown system provides additional reactivity control in the absence of control rod insertion. For those regions with control rods already inserted, very little additional SHUTDOWN reactivity is obtained from adding RSD material. Therefore, only regions where control rods are not known to be inserted require RSD material. This was agreed to in the 5-3-85 meeting.

ACTION 3.1.4 C.1.a

Added "Immediately suspend..."

JUSTIFICATION: This differentiates this action from those required within 1 hour.

SR 4.1.4 A.3.a

Added "and not insertable."

JUSTIFICATION: As agreed to in 5-3-85 meeting.

SR 4.1.4 A.3.d

Added "i.e., instantaneous SHUTDOWN MARGIN".

JUSTIFICATION: Reworded for additional clarity (i.e. editorial).

SR 4.1.4 B and C

Separated shutdown and refueling surveillances. Specifically, those requirements relating to removal of control rod pairs were included in the refueling section and those to be performed prior to rod withdrawal to achieve criticality were included in the shutdown section.

JUSTIFICATION: This separation was made to clearly distinguish the requirements for performing Shutdown Margin verifications during the Refueling mode versus the Shutdown mode.

SR 4.1.4 B.

Added "Within 12 hours after each reactor shutdown where all control rods cannot be verified fully inserted, or"

JUSTIFICATION: Determination of shutdown margin within 12 hours after shutdown is required to assure that sufficient shutdown margin can be maintained during the shutdown period.

SR 4.1.4 B and C

Changed "full decay of Pa-233" to "Pa-233 decay as a function of time after shutdown".

JUSTIFICATION: The majority of the positive reactivity changes associated with maintaining the shutdown margin during either SHUTDOWN or REFUELING occur within the first few days to 2 weeks. The initial buildup and subsequent full decay of Xe-135 occurs within a few days, and the core cooldown to a core average temperature less than 220 degrees occurs within a few weeks depending upon the decay heat level of the core. (See Justification for Core Average Temperatures, SR 4.1.4.C.4). However, the decay of Pa-233 to the fissile U-233 occurs slowly and predictably and requires about 4 weeks for 50 percent decay and about 100 days for full decay. This decay process occurs over a sufficiently long time period that reactivity control measures, either the insertion of more control rods or reserve shutdown material, can be undertaken on a time dependent basis.

SR 4.1.4.C.4

Added "Rod pairs being withdrawn for refueling/repair, for verification of shutdown margin, or for test purposes are assumed fully withdrawn".

JUSTIFICATION: This requirement assures that the 0.01 delta k shutdown margin is maintained during all control rod operations permitted by LCO 3.1.6.

SR 4.1.4.C.4

Added "For planned core alterations, the core shall be in its most reactive configuration".

JUSTIFICATION: Added for completeness and conservatism in performing shutdown margin verifications during the refueling mode.

SR 4.1.4.C.4

Changed Core Average Temperature from 220 degrees F to 80 degrees F.

JUSTIFICATION: Although the refueling temperature is commonly referred to as a core average temperature of 220 degrees F, it takes about two weeks to cool down to this temperature. After an extended outage of longer than two weeks, the core average temperature will be somewhere between the condensate temperature and 220 degrees, depending on the decay heat and the coolant flow capacity. It has been conservatively assumed that the core will cooldown to 80 degrees during any outage for SHUTDOWN or REFUELING.

SR 4.1.4.C.5

Changed "highest worth rod pair" to "highest worth rod pair capable of being withdrawn".

JUSTIFICATION: During REFUELING, the actual highest worth rod does not necessarily have to be included in the SHUTDOWN MARGIN if it has been electrically disabled and is incapable of being withdrawn. LCO 3.1.6 requires that all control rods not involved in the planned refueling mode evolutions have the electrical supply to the drive motors disabled.

SUPPORTIVE JUSTIFICATION

CONTROL ROD WORTH AND POSITION REQUIREMENTS - OPERATION

LCO 3.1.5.A

Added "(except the regulating rod pair)".

JUSTIFICATION: The regulating rod pair is not manipulated as a part of a control rod group.

LCO 3.1.5.A.1

"Up to two shim groups" replaced by "One shim group". Omitted "provided the shim groups have an axial separation of at least 10 feet."

JUSTIFICATION: Analysis for 2 shim groups separated by 10 feet was done for the initial core only. Because of rod position uncertainty of 10 inches, a separation distance of about 8 feet cannot be justified. Since this configuration has only been used once during previous operating history, it has been deleted.

LCO 3.1.5 A.2

"6 rod pairs" replaced by "up to 6 additional rod pairs."

JUSTIFICATION: To clarify that less than 6 rod pairs are acceptable.

LCO 3.1.5 B. (line 1)

"calculated" inserted between "maximum" and "control rod pair worth."

JUSTIFICATION: The word "calculated" is inserted because no measurements are made of maximum control rod pair worth. Measurements are made of the worth of control rod groups withdrawn in the prescribed sequence for that cycle, and confirmation of calculated worth is verified by comparison with the measured value.

LCO 3.1.5 B.

LCO divided into subsections 1 and 2.

JUSTIFICATION: Clarity required by lengthier revised LCO, as described below.

LCO 3.1.5 B.1

"zero power" replaced by "reactor critical at about E-07 percent RATED THERMAL POWER (Source Power)."

JUSTIFICATION: FSAR Section 14.2.2.7 provides an 0.047 delta k limit in the source range, which is about E-07 percent RATED THERMAL POWER.

LCO 3.1.5 B.2

"0.012 delta k" replaced by "that worth which would result in rod withdrawal accident consequences equal to those described in FSAR Section 14.2.2.6."

JUSTIFICATION: At any given time in any refueling cycle, the consequences of the accidental withdrawal of the maximum worth control rod pair are a function of the rod pair worth, power distribution, core kinetics parameters, and temperature defect, all of which vary with burnup during the cycle. Thus, the maximum allowable rod pair worth that would result, upon withdrawal in consequences less than or equal to those described in FSAR Section 14.2.1 varies with burnup. Recognizing these circumstances in the LCO will provide flexibility in reload segment design while assuring that the RWA consequences are consistent with those approved by the NRC in the original licensing of FSV. For example, FSAR section 14.2.1 states that since the temperature coefficients are greater at the beginning of the equilibrium cycle, the consequences of withdrawal of a maximum single control rod pair worth of 0.016 delta k are less severe than that of a rod withdrawal accident with a control rod worth of 0.012 delta k at the end of the equilibrium cycle. The worst case in the equilibrium core was withdrawal of 0.012 delta k at the end of the cycle with a reactivity temperature defect of 0.028 delta k, and this is the accident described in FSAR Section 14.2.2.6. A reactivity temperature defect at least as negative as 0.028 delta k throughout the cycle is assured by LCO 3.1.7, (which requires at least 0.031 delta k).

LCO 3.1.5 ACTION B. (line 2)

"immediately" omitted.

JUSTIFICATION: In accordance with the guidelines for upgrading the FSV Technical Specifications, PSC has eliminated terms that are ambiguous and subject to interpretation. The requirement to be shutdown with 24 hours of determination is the major overriding concern.

LCO 3.1.5 A. and B. (lines 2 and 3)

"at least" inserted before "SHUTDOWN", and "of determination" added after "within 24 hours."

JUSTIFICATION: Clarity - consistent with 4/1/85 submittal.

SR 4.1.5 A.

Changed time from 4 hours to 8 hours.

JUSTIFICATION: The only automatic insertion of control rods besides scram is Rod Runback. When this happens, there is a substantial perturbation of reactor power, and restoration is required in 4 hours. All other operation of control rods is

manual except for the regulating control rod pair which can be in any position per this specification. Therefore, since the reactor operator adjusts the control rods manually, he is well aware of the control rod configuration and compliance is maintained. A control rod configuration not in compliance with this specification would effect the individual core region outlet temperatures. These region outlet temperatures are limited by specification LCO 3.2.2, which has an 8 hour surveillance frequency. Therefore, an 8 hour surveillance frequency for this specification is both consistent and adequate.

SUPPORTIVE JUSTIFICATION

CONTROL ROD POSITION REQUIREMENTS - SHUTDOWN

LCO 3.1.6 A.2, B., and C.

The last half of 3.1.6 A. and all of 3.1.6 B. were replaced by the following:

"2. Additional control rod pairs may be withdrawn for SHUTDOWN MARGIN verification or tests.

"B. All fully inserted control rod pairs shall be made incapable of being withdrawn by:

"1. Placing the reactor mode switch in the "off" position, or

"2. Disabling the electrical supply to the drive motors.

"C. The SHUTDOWN MARGIN requirements of Specification 3.1.4 shall be maintained during all of the above control rod pair configurations."

JUSTIFICATION: Prior to withdrawal or removal of any control rod pairs from the reactor, an explicit nuclear analysis is made to determine SHUTDOWN MARGIN. Two or more control rod pairs are allowed to be withdrawn or removed only when they are not high worth control rod pairs and the shutdown requirements of Specification 3.1.4 will be maintained. Regions being refueled generally involve low worth control rod pairs because of fuel burnup and fission product poison buildup. The added precaution of disabling all other control rod pairs assures that no uncalculated configuration can occur.

LCO 3.1.6 ACTION (first line)

"With less than the above requirements" inserted as a preamble.

JUSTIFICATION: Organizational clarity, consistent with 4-1-85 submittal.

LCO 3.1.6 ACTION A.

Inserted new ACTION A. - "Immediately suspend all control rod or fuel manipulations involving positive reactivity changes, and"

JUSTIFICATION: Consistent with the requirements of LCO 3.1.4, ACTION C.

LCO 3.1.6 ACTION B. (line 1)

Changed "one hour" to "12 hours."

JUSTIFICATION: After suspending all control rod or fuel manipulation involving positive reactivity insertions, the only other positive reactivity addition can result from decay of Pa-233 or additional core cooldown. Both of these are slowly varying, involving several days in the HTGR. Therefore, 12 hours is sufficient ACTION time requirement.

LCO 3.1.6 ACTION B.1

Reworded "Fully insert the sufficient control rods to establish compliance, or" to "Insert any rod pair capable of being inserted and verify the SHUTDOWN MARGIN requirements are met (LCO 3.1.4), or"

JUSTIFICATION: Clarity, and the rewording takes into consideration that certain control rod pairs may be incapable of insertion due to the refueling or repairs underway. It also refers to the LCO section where shutdown margin is specified.

LCO 3.1.6 ACTION B.2

Reworded from "Initiate the reserve shutdown system", to "Actuate sufficient reserve shutdown material to achieve the specified shutdown margin."

JUSTIFICATION: The reserve shutdown material is an effective form of reactivity control when inserted into core regions where the control rods have not been fully inserted. Because of the proximity to the control rods, it has almost no additional worth when inserted in regions where the control rods are inserted. Therefore, to insure an adequate SHUTDOWN MARGIN, it need only be inserted into those core regions where full insertion of the control rods cannot be demonstrated.

SR 4.1.6 A. (line 3)

Changed time from 4 hours to 12 hours.

JUSTIFICATION: Once per 12 hours is sufficient to monitor rod pair positions during refueling or repair. LCO 3.1.6 B. disables withdrawal capability. See also new SR 4.1.6 C. and D. discussed below.

SR 4.1.6 B. (first and last lines, and B.2 line 3)

"scram" replaced by "shutdown."

JUSTIFICATION: It is important to perform this surveillance not only for reactor scrams, but for all reactor shutdowns.

SURVEILLANCE 4.1.6 C. and D. (new)

Added new restrictions on shutdown margin verification prior to control rod drive assembly removal and disabling the scram capabilities of withdrawn rods.

JUSTIFICATION: These new requirements provide additional assurance that shutdown requirements will be maintained and verified.

SUPPORTIVE JUSTIFICATION

REACTIVITY CHANGE WITH TEMPERATURE

LCO 3.1.7

Changed "fuel temperature" to "CORE AVERAGE TEMPERATURE."

JUSTIFICATION: Core average temperature indicates fuel temperature, per Specification 1.0, and defines the parameter to be considered for the LCO.

LCO 3.1.7

Changed "in going from refueling temperature to rated power conditions," to "due to a temperature increase between 220 degrees F to 1500 degrees F."

JUSTIFICATION: These temperatures are consistent with those in the FSAR. The refueling temperature is not limited to 220 degrees F. It depends on the core decay heat but is always greater than 220 degrees F for the first few weeks and can be maintained above this value for longer periods if required.

LCO 3.1.7

A maximum reactivity change of 0.056 delta k is specified.

JUSTIFICATION: The minimum reactivity temperature change of 0.031 delta k (0.028 delta k plus 0.003 delta k for uncertainty) assures temperature coefficients at least as negative as that used in the rod withdrawal accidents, FSAR 14.2.2.6 and 14.2.2.7. The maximum reactivity temperature change of 0.056 delta k assures that there is sufficient reactivity control to ensure reactor SHUTDOWN in the unlikely event that no control rod pairs can be inserted and the reserve shutdown system has been activated.

This value is determined from the following calculated data:

RSD Reactivity Worth (FSAR 3.5.3)	.120 deltak
Maximum Excess Reactivity (220 degrees F, Xe-135 decayed, 2 weeks Pa-233 decay, FSAR 3.5.3)	-.102 delta k
Excess Shutdown Margin	.018delta k
Calculated Reactivity Change (FSAR Table 3.5.4)	+.044 delta k
Maximum Reactivity Change	.062 delta k
Allowing 10% Uncertainty	-.006 delta k
Specified Maximum	.056 delta k

This value ensures reactor shutdown for at least 2 weeks even for the unlikely event that all control rods failed to insert, and the reserve shutdown system was activated. This 2 weeks is adequate time to take corrective action.

ACTION 3.1.7

Changed "temperature defect" to "reactivity temperature change".

JUSTIFICATION: This change is for clarity and consistency. Temperature defect is not defined and reactivity change is already used.

ACTION 3.1.7

Action statement specifies SHUTDOWN within 12 hours of determination (versus 12 hours).

JUSTIFICATION: It takes 12 hours from determination for an orderly shutdown.

SR 4.1.7

Changed "to obtain the measured reactivity temperature defect" to "to verify measured reactivity temperature change is within the above limits".

JUSTIFICATION: This was changed to clarify the intent of the SR.

SUPPORTIVE JUSTIFICATION

RESERVE SHUTDOWN SYSTEM-OPERATION

LCO 3.1.8

Deleted "of the 7 hopper subsystem and of the 30 hopper subsystem".

JUSTIFICATION: Operability of the 7 hopper and 30 hopper subsystems is encompassed by the requirement that all reserve shutdown units be operable. This specification addresses RSD units rather than hopper subsystems to utilize the available system redundancy to permit continued safe plant operation in the event of the failure of a single RSD unit.

ACTION 3.1.8 A.

Revised Action to: "With one RSD unit inoperable, operation may continue provided that the RSD unit is capable of being made OPERABLE within 14 days following a reactor shutdown."

JUSTIFICATION: The reserve shutdown system worth accounts for reactivity temperature changes and the decay of Xe-135 and Pa-233 following reactor shutdown to 80 degrees F. A single hopper may be inoperable until 14 days following shutdown due to the time it takes for Pa-233 to decay. For the first 14 days following shutdown, the reserve shutdown system with one hopper failing to discharge into the core can maintain the SHUTDOWN MARGIN as specified in LCO 3.1.4.

ACTION 3.1.8 B.

Added Action B.

JUSTIFICATION: Analysis demonstrates one hopper may be inoperable for a period of time up to 14 days following shutdown and SHUTDOWN MARGIN maintained per LCO 3.1.4. Two hoppers inoperable require restoration to OPERABLE of at least one hopper within 24 hours or be in SHUTDOWN within the subsequent 12 hours. This is in keeping with conservative practices for maintaining adequate SHUTDOWN MARGIN capability independent of the primary means of reactivity control (control rods).

SR 4.1.8.C.1

Deleted specification for___psi pressurization above reactor pressure.

JUSTIFICATION: Pressurization is indicated by operation of the pressure switch versus a stated differential pressure above reactor pressure because pressure switch tolerances vary but they are calibrated prior to insertion of a CRD assembly into the PCRV penetration. The surveillance as proposed by PSC verifies actuation of the key component necessary to assess system operability.

SR 4.1.8 E

Changed "Following any exposure to high moisture..." to "Following entry of condensed moisture into any RSD hopper..."

JUSTIFICATION: Condensed moisture is a known contributor to boric acid crystal formation and its entry should result in an examination of the RSD material. There is no known quantifiable level of high moisture that produces boric acid crystals. Condensed moisture would most likely come from the purge system, which includes knock-out pots and level indication.

SUPPORTIVE JUSTIFICATION

RESERVE SHUTDOWN SYSTEM-SHUTDOWN

LCO 3.1.9

Changed "At least 6...and 29...hoppers shall be OPERABLE (Including any control rod pair removed for refueling)" to "Reserve shutdown (RSD) units on control rod drive assemblies whose control rod pairs are capable of being withdrawn, shall be OPERABLE (except RSD units in any control rod drive assemblies removed for refueling/repair)".

JUSTIFICATION: Those CRD assemblies removed from the PCRV for refueling/repair also include the reserve shutdown hoppers, and therefore these RSD units cannot be operable. All other control rod pairs, with the exception of rod pairs being removed for Shutdown Margin verification or tests, are inserted and electrically disabled, per LCO 3.1.6, and RSD material is not needed. CRD assemblies whose control rod pairs are capable of being withdrawn are the only ones where the RSD system would be used. Per FSAR section 3.5.3, the reserve shutdown system provides additional reactivity control in the absence of control rod insertion. For those regions with control rods already inserted, insertion of the reserve shutdown material has almost no additional worth because of the proximity of the control rods. Therefore, to insure an adequate SHUTDOWN MARGIN, reserve shutdown material need only be inserted into those core regions where full insertion of the control rods cannot be demonstrated.

ACTION 3.1.9

Re-organized into three statements with a 24 hour action time.

JUSTIFICATION: Editorial clarification.

SR 4.1.9.D

Changed calibration of RSD pressure switches from "of those control rod drives removed for preventive maintenance" to "at the time of control rod drive preventive maintenance.

JUSTIFICATION: The pressure switch calibration will be performed at some time during the CRD preventive maintenance process, but this will not necessarily be during a refueling outage, as is implied by SR 4.1.9.E.

SR 4.1.9

Deleted the once per 92 day functional tests.

JUSTIFICATION: In the Shutdown and Refueling modes, at any given time, all the control rod pairs except those few removed for refueling/repair, or withdrawn for Shutdown margin verification are fully inserted. With the rod pairs inserted, the RSD units have almost no additional worth. Functional testing to verify operability of RSD units that have no significant worth is not meaningful.

SR 4.1.9.E

Changed "Following any exposure to high moisture..." to "Following entry of condensed moisture into any RSD hopper..."

JUSTIFICATION: This change was also made in SR 4.1.8.F and is justified in that section.

Enclosure 3
to P-85180

REACTIVITY CONTROL SYSTEMS

3/4.1.1 CONTROL ROD OPERABILITY

LIMITING CONDITION FOR OPERATION

not fully inserted

3.1.1 All control rod pairs shall be OPERABLE with:

A. ~~1.~~ A scram time less than or equal to 152 seconds,

B. ~~2.~~ A control rod drive (CRD) motor temperature less than or equal to ~~278°F.~~ ~~215°F.~~ 250 degrees F.

C. ~~2.~~ A ~~dry~~ He ~~(<10 ppm H2O)~~ purge flow to each CRD penetration ~~of at least ___ SCFM.~~ when reactor pressure is above 100 psia.

APPLICABILITY: POWER, LOW POWER, AND STARTUP ~~MODES~~ OPERATION

ACTION:

A. With one or more rod pairs inoperable due to being immovable as a result of excessive friction or mechanical interference (i.e., not capable of being fully inserted) ~~or known to have a scram time in excess of 152 seconds~~ immediately initiate a reactor shutdown and be in the SHUTDOWN MODE within ~~6~~ 12 hours. at least

B. ~~A.~~ With one rod pair trippable but inoperable due to causes other than addressed by ACTION A., above, ~~POWER OPERATION~~ may continue provided that: ~~or B~~ or

1. The rod is restored to OPERABLE status ~~within one hour~~, or

2. Full insertion of the INOPERABLE rod pair is achieved ~~within 12 hours~~ and verified by OPERABLE rod position indication, or ~~per LCO 3.1.2~~ test with met

3. The SHUTDOWN MARGIN (LCO 3.1.4) ~~and the discrepancy portion of the region peaking factor surveillance of 4.2.3 are~~ is verified to be met ~~within 24 hours~~ with the rod pair considered inoperable in its present position.

If one of the above conditions cannot be met, ~~place~~ the reactor ~~in the SHUTDOWN MODE within 36 hours from~~ time of initial loss of operability initiate reactor shutdown and be in at least SHUTDOWN within the subsequent 12 hours. With 24 hours from

~~B. With one or more control rod drive motor temperature(s) in the range from 215°F but less than 250°F, Power Operation may continue provided the drive motor temperature is continuously monitored and the results reported to the NRC on a monthly basis. If the drive motor temperature exceeds 250°F, initiate a reactor shutdown and be in the SHUTDOWN MODE within 12 hours.~~

DRAFT

C. When two or more rod pairs are determined to be inoperable, ~~due to causes other than addressed by ACTION A. above,~~ immediately initiate a reactor shutdown and be in ~~the~~ at least SHUTDOWN ~~MODE~~ within 12 ~~6~~ hours.

D. The provisions of Specification 3.0.6 are not applicable.

SURVEILLANCE REQUIREMENTS

SR is totally rewritten

4.1.1

~~A.~~ Each control rod pair shall be demonstrated OPERABLE: ~~by verifying:~~

A. At least once per 24 hours

1. ~~Once per 24 hours~~ Verifying that all ~~control rod drive~~ motor temperatures ~~and are being continuously mo~~ are less than or equal to ~~272~~ 250 degrees F. If the motor temperature instrumentaiton is not available, ~~CRD cavity ambient temperature shall be less that ___ °F,~~ an engineering evaluation shall be performed. ~~if the t exceeds~~

Add 215°F recording and partial scram surveillances

2. Once per 24 hours that purge flow is maintained to each ~~CRD penetration~~ subheader ~~is at least ___ SCFM, and contains less than 10 ppm H_2O.~~ when reactor pressure is above 100 psia, and that purge flow is not carrying condensed water.

C 3. Prior to withdrawal of control rod pairs to achieve criticality (if not performed in the previous week) that a partial scram test of at least 10 inches on all OPERABLE rod pairs results in an extrapolated scram time less than or equal to 152 seconds.

3. At least once per 7 days by:

~~4.~~ 1. ~~Weekly by~~ Performing a partial scram test of at least 10 inches on all partially inserted and fully withdrawn control rods, except the regulating rod, and verifying that the extrapolated scram time is less than or equal to 152 seconds.

D ~~5.~~ ~~During each refueling outage and~~ During each shutdown with a scheduled duration of 10 days or longer (if not performed during the previous month) that a full stroke scram test on all control rod pairs results in a scram time less than or equal to 152 seconds.

6. During each REFUELING CYCLE that preventive maintenance has been performed on control rod drives consisting of ___. The sequencing of this preventive maintenance shall be such that none of the drives installed in the reactor will have gone more than six REFUELING CYCLES without receiving preventive maintenance. During these six REFUELING CYCLES, no CRD shall be in regulating rod service for more than one REFUELING CYCLE.

Rewritten

7. A control rod scram time of less than 152 seconds following any maintenance on a CRD mechanism which could affect the control rod scram time.

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B. A ~~CHANNEL~~ CALIBRATION and a CHANNEL FUNCTIONAL TEST of the ~~eight subheader~~ control rod drive purge flow measurement channels shall be performed during each REFUELING CYCLE.

STET

C. ~~A CHANNEL CALIBRATION and A~~ CHANNEL FUNCTIONAL TEST of the CRD motor temperature and cavity temperature instrumentation shall be performed during each REFUELING CYCLE.

~~Add~~ Channel Calibration of temperature instrumentation in support of CRD preventive maintenance.

DRAFT

REACTIVITY CONTROL SYSTEMS

3/4.1.2 ROD POSITION INDICATION SYSTEMS - OPERATION

LIMITING CONDITION FOR OPERATION

3.1.2 The position indication system for each control rod pair (consisting of a rod-in limit indication, a rod-out limit indication and analog and digital rod position indicators) shall be OPERABLE and capable of determining control rod pair position within 12 inches.

APPLICABILITY: POWER, LOW POWER and STARTUP

ACTION:

A. If rod pair position cannot be determined the rod pair shall be considered not in compliance with LCO 3.1.5 and the action statement of 3.1.5 shall be implemented.

B. If a digital indicator and/or a "rod-out" limit switch are inoperable operation may continue provided that the analog indicator and the "rod-in" limit switch are OPERABLE.

C. If analog indicator is inoperable, operation may continue provided that one of the following conditions are met:

1. When the rod is fully inserted, the rod-in limit indication is OPERABLE or the full-in position has been established by an independant means of verification (watt-meter test), or
2. When the rod is in a mid-position, rod position is continuously indicated by an OPERABLE digital position indicator and the rod-in limit indicator is OPERABLE, or
3. When the rod is in the full-out position, the rod-out and rod-in position limit indicators are OPERABLE.

D. If the rod-in indicator is inoperable, operation may continue provided that one of the following conditions are met:

1. When the rod is fully inserted, the rod-in position has been established by an independent means of verification (watt-meter test), or
2. When the rod is in a mid or full-out position, both the digital and analog indicators are OPERABLE and are known to be accurate at the full-in position, and a digital indicator is continuously indicating the rod's position.

E. The provisions of Specification 3.0.6 are not applicable

SURVEILLANCE REQUIREMENTS

4.1.2 A. Control rod position instrumentation OPERABILITY shall be verified by performing a CHANNEL CHECK on the control rod position instrumentation, as follows:

1. Prior to withdrawal from the fully inserted position.
2. Upon full withdrawal.
3. At least once per ~~week~~ 7 days on all control rod pairs except for fully inserted rod pairs which have been disabled by racking out of the drive power.

~~During each weekly~~ 7 days during partial scram or other rod movement surveillance, the OPERABILITY of the analog ~~RPI~~ rod position indication shall be verified by ~~comparing~~ the change in analog indication with ~~the direction and time duration of the~~ rod travel. The analog and digital position indications must agree with each other within ~~about~~ inches. If a larger difference is observed, it shall be assumed that the analog indicator is the inoperable channel, unless ~~it~~ the analog indication can be proven to be accurate and OPERABLE by another means.

B. Prior to each reactor start-up, ~~each~~ a full-in limit indicator ~~must~~ shall be verified as OPERATING when the rod is full-in and OPERABLE by virtue of the change in the indication when the rod is withdrawn a short distance. Alternatively, rod-in position indication OPERABILITY may be similarly verified the first time during or after start-up that a rod is withdrawn from the full-in position.

C. Prior to each reactor start-up, or during the first outward motion of a rod, the analog and digital position indicators must be shown to be OPERABLE at the full-in position and be shown to respond appropriately when the rod is withdrawn a short distance. ~~The accuracy requirement must be + — inches such that returning the rod to a "0" position, as indicated by the analog RPI, will not result in overtravel that could cause damage to the potentiometers and the associated coupling. The digital indication should likewise be shown to be OPERABLE and accurate at the full-in position.~~ Upon actuation of the rod-in limit indication the rod position indicators must indicate less than 6 inches, to prevent

~~If~~ the rod position indications indicate 6 or more inches, an engineering evaluation shall be performed to determine the maximum insertion limit for that control rod pair.

DRAFT

REACTIVITY CONTROL SYSTEMS

3/4.1.3 ~~ROD~~ POSITION INDICATION SYSTEMS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.3 ~~Sufficient position indication instrumentation~~ shall be OPERABLE to be capable of determining control rod pair position within 12 inches.

APPLICABILITY: SHUTDOWN and REFUELING ~~MODES~~

ACTION:

Totally rewritten

If rod pair position cannot be determined the rod pair shall be considered not fully inserted and the action statement of LCO 3.1.6 implemented.

SURVEILLANCE REQUIREMENTS

4.1.3 A. Control rod position instrumentation OPERABILITY shall be verified by performing a

1. ~~a~~ CHANNEL CHECK on the control rod position instrumentation, as follows:

   1. ~~a~~. Prior to withdrawal from the fully inserted position.

   2. ~~b~~. Upon full withdrawal.

   3. ~~c~~. At least once per ~~week~~ 7 days on all control rod pairs except for fully inserted rod pairs which have ~~been disabled by racking out of the drive power.~~ had the motor power supply disabled.

   d. After a MODE change to SHUTDOWN, from STARTUP.

b. During each REFUELING CYCLE perform a CHANNEL ~~CALIBRATION~~ FUNCTIONAL TEST of the rod pair redundant "in" and "out" limit switches and the analog and digital rod position indication systems.

c. A CHANNEL CALIBRATION of the rod pair redundant "in" and "out" limit switches, and the analog and digital rod position indication systems, shall be performed in conjunction with CRD installation in the PCRV.

DELETE

REACTIVITY CONTROL SYSTEMS

3/4.1.4 SHUTDOWN MARGIN

LIMITING CONTROL FOR OPERATION

3.1.4 The reactor SHUTDOWN MARGIN shall be greater than or equal to 0.01 delta k.

APPLICABILITY: ~~ALL MODES~~ At all times

ACTION:

A. POWER, LOW POWER and STARTUP ~~MODES~~ OPERATION:
With the SHUTDOWN MARGIN less than required, immediately insert sufficient control rod pairs to bring the reactor into compliance with this LCO. If compliance cannot be restored within one hour, initiate a reactor shutdown and be in ~~the~~ SHUTDOWN MODE within 24 hours.

B. SHUTDOWN ~~and REFUELING MODES~~:
With the SHUTDOWN MARGIN less than that required, within 1 hour, either:

~~a.~~ 1. Suspend all control rod or fuel manipulations involving positive reactivity changes, and

~~b.~~ 2. Within one hour either:

a. Fully insert (as verified by operable rod position indications per ~~LCO~~ 3.1.3) sufficient control rods to achieve the specified SHUTDOWN MARGIN, or

b. Actuate the reserve shutdown ~~system.~~ material to achieve the specified SHUTDOWN MARGIN.

specification

C. REFUELING

b. With the SHUTDOWN MARGIN less than that required:

a. Immediately suspend all control rod or fuel manipulations involving positive reactivity changes, and

b. Within 1 hour ~~either~~:

1) Fully insert (as verified by OPERABLE rod position indications per Specification 3.1.3) sufficient control rods to achieve the specified SHUTDOWN MARGIN, or

2) Actuate sufficient reserve shutdown material to achieve the specified SHUTDOWN MARGIN.

DRAFT

SURVEILLANCE REQUIREMENTS

4.1.4 Verification of SHUTDOWN MARGIN shall be performed as follows:

A. When in ~~the~~ POWER OPERATION, LOW POWER or STARTUP ~~MODES~~

1. Once per ~~week~~. 7 days.

2. As required by the ACTION statements of LCO 3.1.1.

3. In assessing the SHUTDOWN MARGIN the following conditions shall be assumed:

a. Highest worth rod pair assumed fully withdrawn and not insertable,

b. All OPERABLE rod pairs assumed fully inserted with all inoperable rod pairs in their pre-scram position,

c. A CORE AVERAGE TEMPERATURE of 220 degrees F,

d. No buildup of Xe-135, Sm-149 ~~beyond that present at shutdown. No~~ and no decay of Pa-233 beyond that present at shutdown (i.e., instantaneous SHUTDOWN MARGIN

B. When in ~~the SHUTDOWN or REFUELING MODES~~

1. Within 12 hours after each reactor shutdown where all control rods cannot be verified fully inserted, or

2. Prior to control rod withdrawal, if all control rod pairs are not fully inserted prior to withdrawal action, or

~~2. Prior to the removal of the control rod pair in the region to be refueled, or~~

3. Prior to control rod withdrawal to achieve criticality, to confirm that upon reaching criticality the SHUTDOWN MARGIN requirement can be met, or

4. As required by the ACTION statement of LCO 3.1.9. ~~or~~

5. In assessing the SHUTDOWN MARGIN the following conditions shall be assumed:

a. Highest worth rod pair assumed fully withdrawn and not insertable.

b. All OPERABLE rod pairs assumed fully inserted and inoperable rod pairs in their known position or assumed fully withdrawn.

~~c. During refueling the rod pair in the region being fully withdrawn.~~

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c. ~~e.~~ A CORE AVERAGE TEMPERATURE of~~X~~ 80 degrees F.

~~- 80°F (SHUTDOWN)~~
~~- 220°F (REFUELING)~~

d. ~~e.~~ Full decay of Xe-135 and Pa-233 ~~and the full~~ buildup of Sm-149.

decay as a function of time

C. When in REFUELING

1.

Totally rewritten

DRAFT

REACTIVITY CONTROL SYSTEMS

3/4.1.5 CONTROL ROD WORTH AND POSITION REQUIREMENTS - OPERATION

LIMITING CONDITION FOR OPERATION

3.1.5 (except the regulating rod pair).

A. Control rod pairs[1] shall be withdrawn or inserted in groups (3 rod pairs per group) except during scram or rod runback. All rod pairs shall be either fully inserted or fully withdrawn except that: control

1. ~~Up to two~~ one shim group and the regulating rod pair may be in any position. ~~provided the shim groups have an axial separation of at least 10 feet.~~

2. upto additional control 6 rod pairs may be inserted up to two feet.

B. ~~Maximum~~ calculated control rod pair worth shall not exceed 0.047 delta k with reactor critical at about E-07 percent RATED THERMAL POWER (source power), and ~~zero power and 0.012 delta k at full power.~~

2. At full power, that worth which would result in rod withdrawal accident consequences equal to those described in FSAR section 14.2.2.6.

APPLICABILITY: POWER OPERATION, LOW POWER and STARTUP

ACTION:

A. With any control rod pair or group not in compliance with its position requirements perform the following:

1. Restore the control rods to an acceptable configuration within 4 hours, or

2. Be in at least STARTUP within the subsequent 12 hours, and SHUTDOWN within the following 12 hours.

B. With any control rod pair not in compliance with its worth limits ~~immediately~~ initiate a reactor shutdown and be in ~~the~~ at least SHUTDOWN ~~MODE~~ within 24 hours of determination.

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SURVEILLANCE REQUIREMENTS

4.1.5

A. Control rod pair positions shall be monitored via OPERABLE rod position instrumentation (LCO 3.1.2) and verified to be in compliance with the abo ~~this LCO at least once every 4 hours~~. requirements at least once eve ~~8~~ 8 hours. groups

B. At the beginning of each REFUELING CYCLE, the reactivity worth of the control rods which are withdrawn from LOW POWER to POWER OPERATION, in the withdrawal sequence, shall be measured. The measured group worths shall be compared with the calculated group worths to verify that the calculated criteria upon which the selection of the rod sequence was ~~was been~~ based has been satisfied. The measured group worth shall agree with the calculated group worth within plus or minus 20% for all groups except groups 4A and 4D, for which the measured group worth shall be within plus 100%, minus 50% of the calculated group worth.

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REACTIVITY CONTROL SYSTEMS

3/4.1.6 ~~CONTROL ROD WORTH AND~~ POSITION REQUIREMENTS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.6

A. All control rod pairs shall be fully inserted, except: ~~that~~ up to two control rod pairs ~~(including any removed for refueling)~~ may be ~~fully~~ withdrawn ~~when the CORE AVERAGE TEMPERATURE is greater than or equal to 220°F.~~ for refueling/repair, and

2. Additional control rod pairs may be withdrawn for SHUTDOWN MARGIN verification or tests.

B. ~~All control rod pairs shall be fully inserted, except that a single control rod pair (including any removed for refueling) may be fully withdrawn when the CORE AVERAGE TEMPERATURE is less than 220°F.~~ made incapable of being withdrawn by:

fully inserted

Totally Rewritten

1. 2. see below.

APPLICABILITY: SHUTDOWN and ~~REFUELING MODES~~

ACTION: With less than the above requirements:

C.

~~With control rod position not in compliance with the LCO, within one hour either:~~

A Immediately suspend all control rod or fuel manipulations involving positive reactivity changes; and

~~a. Fully insert the sufficient control rods to establish compliance, or~~

~~b. Initiate the reserve shutdown system.~~

B Within 12 hours:

1. Insert any rod pair capable of being inserted and verify the SHUTDOWN MARGIN requirements are met (LCO 3.1.4), or
2. Actuate sufficient reserve shutdown material to achieve the specified SHUTDOWN MARGIN.

SURVEILLANCE REQUIREMENTS

4.1.6

A. Control rod ~~positions~~ pair shall be monitored via OPERABLE rod position instrumentation (LCO 3.1.3) for compliance with this LCO at least every ~~4~~ 12 hours.

B. Following each reactor ~~scram~~ shutdown, each rod pair shall be verified to be at the full-in position by one of the following means:

1. The agreement of the analog position indication and the full-in position indications; or

DRAFT

1. Placing the reactor mode switch in the "off" position, or
2. Disabling the electrical supply to the drive motors.

C. The SHUTDOWN MARGIN requirements of Specification 3.1.4 shall be maintained during all of the above control rod pair configurations

2. The agreement of the analog and digital position indications (that were known both to be OPERABLE prior to the ~~scram~~ shutdown and to be accurate at the full-in position); or

3. The use of an independent rod position verification method (e.g., watt-meter test).

Rods that were known to be fully inserted into the reactor prior to the ~~scram~~ shutdown may be excluded from the above considerations.

C.

D. Totally rewritten (see below)

C. Prior to removal of any control rod drive assembly from the reactor, the SHUTDOWN MARGIN shall be explicitly calculated per the requirements of LCO 3.1.4.

D Upon full withdrawal of a control rod pair selected for removal from the PCRV, and prior to disabling its scram capabilities, the SHUTDOWN MARGIN shall be verified by withdrawing one or more additional control rod pairs with a calculated worth greater than or equal to 0.01 delta k plus any calculated positive worth of the planned CORE ALTERATION, verifying subcriticality, and then reinserting.

DRAFT

REACTIVITY CONTROL SYSTEMS

3/4.1.7 REACTIVITY CHANGE WITH TEMPERATURE

LIMITING CONDITION FOR OPERATION

Delete

due to a CORE AVERAGE TEMPERATURE increase between 220 degrees F to 1500 degrees F,

~~in going from~~

3.1.7 The reactivity change ~~due to a fuel temperature increase between 220 degrees F and 1600 degrees F, from refueling temperature to rated power conditions~~, shall be at least as negative as 0.031 delta k but no greater than 0.056 delta k throughout the REFUELING CYCLE.

APPLICABILITY: POWER OPERATION, LOW POWER, and STARTUP

ACTION: With the reactivity ~~temperature defect~~ change outside the range specified, the reactor shall be placed in SHUTDOWN within 12 hours of determination.

SURVEILLANCE REQUIREMENTS

Delete

4.1.7 At the beginning of each REFUELING CYCLE the reactivity change as a function of fuel temperature change (temperature coefficient) shall be measured and integrated to ~~obtain~~ verify that the measured reactivity temperature ~~defect~~ change is within the above limits.

DRAFT

REACTIVITY CONTROL SYSTEMS

3/4.1.8 RESERVE SHUTDOWN SYSTEM - OPERATION

LIMITING CONDITION FOR OPERATION

Delete

3.1.8 All reserve shutdown (RSD) units ~~of the 7 hopper subsystem and of the 30 hopper subsystem~~ shall be OPERABLE with:

A ~~a~~. At least 1500 psig pressure in their individual He gas bottle supplies.

B ~~b~~. At least 500 psig pressure in the ACM nitrogen bottles which provide a backup means of actuating the RSD hopper pressurization valves.

APPLICABILITY: POWER OPERATION, LOW POWER and STARTUP

TOTALLY REWRITTEN

ACTION: With less than the required RSD units operable in either subsystem, restore the required number of RSD units to an OPERABLE status within 24 hours or be in SHUTDOWN within the subsequent 24 hours.

A.
B.
C.

SURVEILLANCE REQUIREMENTS

Delete

4.1.8 The reserve shutdown system shall be demonstrated OPERABLE:

A. At least once per ~~week~~ 7 days by verifying that the pressure of the individual hopper He gas bottles is at least 1500 psig.

B. At least once per ~~week~~ 7 days by verifying that the pressure of the ACM nitrogen bottles is at least 500 psig.

C. At least once per 92 days by:

1. Pressurizing each of the 37 reserve shutdown hoppers ~~PSI~~ above reactor pressure, as indicated by operation of the hopper pressure switch. Operable reserve shutdown hoppers shall be capable of pressurization.
2. Operating the ACM quick disconnect ~~valves~~ couplings.

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3. Functionally testing the instrumentation which alarms at low pressure in the reserve shutdown actuating pressure lines.

D. At least once per ~~year~~ 365 days by performing a CHANNEL CALIBRATION of the ~~test pressurizing~~ gas pressure ~~indicators.~~ instrumentation.

E. ~~Following any exposure to high moisture by visually examining the boron balls from at least two hoppers and verifying their operability.~~

Following entry of condensed moisture into any reserve shutdown system hopper(s), by visually examining the absorber material from at least two hoppers and verifying their OPERABILITY.

DRAFT

REACTIVITY CONTROL SYSTEMS

3/4.1.9 RESERVE SHUTDOWN SYSTEM - SHUTDOWN

LIMITING CONDITION FOR OPERATION

Delete

on control rod drive assemblies whose control rod pairs are capable of being withdrawn shall be OPERABLE (except RSD units in any control rod drive assemblies removed for refueling/repair)

R

3.1.9 ~~At least 6~~ reserve shutdown (RSD) units ~~of the 7 hopper subsystem and at least 29 units of the 30 hopper subsystem shall be OPERABLE whenever one or more control rod pairs are not fully inserted (including any control rod pair removed for refueling)~~ with:

A. At least 1500 psig pressure in their individual He gas bottle supplies.

B. At least 500 psig pressure in the ACM nitrogen bottles which provide a backup means of actuating the RSD hopper pressurization valves.

APPLICABILITY: SHUTDOWN and REFUELING

ACTION: COMPLETELY REWRITTEN

~~With more than one RSD unit inoperable in either subsystem, return all control rod pairs (except the one removed for refueling) to the full-in position. If this is not possible verify SHUTDOWN MARGIN requirements are met (LCO 3.1.4) or initiate the RSD within 24 hours.~~

With less than the required RSD units OPERABLE, within 24 hours:

A.

B.

C.

SURVEILLANCE REQUIREMENTS

Delete

4.1.9 The reserve shutdown system shall be demonstrated OPERABLE:

A. At least once per ~~week~~ 7 days by verifying that the pressure of the individual hopper He gas bottles is at least 1500 psig.

B. At least once per ~~week~~ 7 days by ~~determining~~ verifying that the pressure of the ACM nitrogen bottles is at least 500 psig.

~~C. At least once per 92 days by:~~

~~1. Pressurizing each of the 37 reserve shutdown hoppers above reactor pressure, as indicated by operation of the hopper pressure switch. OPERABLE reserve shutdown hoppers shall be capable of pressurization.~~

ORIGINAL

~~2. Operating the ACN quick disconnect valves.~~

~~3. Functionally testing the instrumentation which alarms at low pressure in the reserve shutdown actuating pressure lines.~~

C B. At least once per ~~year~~ 365 days by performing a CHANNEL CALIBRATION of the ~~test pressurizing~~ gas pressure ~~indicators.~~ instrumentation.

~~E. Following any exposure to high moisture by visually examining the boron balls from at least two hoppers and verifying their operability.~~

D ~~F~~. At each refueling outage by:

1. Demonstrating that each subsystem is OPERABLE by actuating each group of pressurizing valves from the Control Room. The capability of pressurizing the corresponding hoppers need not be demonstrated during this test. Valve position indications and fail safe operation shall be observed during this test.

2. Calibrating the reserve shutdown hopper pressure switches ~~of those~~ control rod drives ~~removed for~~ preventive maintenance (Specification 4.1.1).

3. Visually examining the pipe sections which require disassembly and reassembly within the refueling penetrations, after they have been disassembled for preventive maintenance (Specification 4.1.1).

4. Functionally testing two reserve shutdown assemblies out of core. ~~off line.~~ One assembly shall contain 20 weight percent boronated material and the other 40 weight percent boronated material. The tests consist of pressurizing the reserve shutdown hopper to the point of rupturing the disc and releasing the poison material.

   The absorber material from the tested hoppers shall be visually examined for evidence of boric acid crystal formation and chemically analyzed for boron carbide and leachable boron content. Failure of a reserve shutdown assembly to perform acceptably during functional testing or evidence of extensive boric acid crystal formation will be reported to the Commission within 30 days per Specification 6.9.

E. Following entry of condensed moisture into any reserve shutdown system hopper(s), by visually examining the absorber material from at least two hoppers and verifying their OPERABILITY.

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