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Attachment 1

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Hope Creek Cycle 17
Stability Results for GE14i Support

HITACHI

GE Hitachi Nuclear Energy
P.O. Box 780
3901 Castle Hayne Rd
Wilmington, NC 28401

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Stability Results for GE14i Support

Principal Contributor
Yingzhen Yang

Principal Verifier
Necdet Kurul

Approving Manager
Juswald Vedovi

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15. Stability Analysis Results

15.1 Stability Option III Solution

Hope Creek has implemented BWROG Long Term Stability Solution Option III using the Oscillation Power Range Monitor (OPRM) as described in Reference 1 in Section 15.4. The plant specific Hot Channel Oscillation Magnitude (HCOM) (Reference 2 in Section 15.4) and other cycle specific stability parameters are used in the Cycle 17 Option III stability evaluation. Backup Stability Protection (BSP) regions are used by the plant in the event that the Option III OPRM system is declared inoperable.

The following Option III OPRM stability setpoint determination described in Section 15.2 and the implementation of the associated BSP Regions described in Section 15.3 provide the stability licensing bases for Hope Creek Cycle 17.

15.2 Detect and Suppress Evaluation

A reload Option III evaluation has been performed in accordance with the licensing methodology described in Reference 3 in Section 15.4. The stability based OLMCPR is determined for two conditions as a function of OPRM amplitude setpoint. The two conditions evaluated are: (1) a postulated oscillation at 45% rated core flow quasi steady-state operation (SS), and (2) a postulated oscillation following a two recirculation pump trip (2PT) from the limiting rated power operation state point.

The OPRM-setpoint-dependent OLMCPR(SS) and OLMCPR(2PT) values are calculated for Cycle 17 in accordance with the BWROG regional mode DIVOM guidelines described in Reference 4 in Section 15.4. The Cycle 17 Option III evaluation provides adequate protection against violation of the SLMCPR for the two postulated reactor instability events as long as the plant OLMCPR is equal to or greater than OLMCPR(SS) and OLMCPR(2PT) for the selected OPRM setpoint in Table 15-2.

The relationship between the OPRM Successive Confirmation Count Setpoint and the OPRM Amplitude Setpoint is provided in Reference 3 in Section 15.4 and Table 15-1. For intermediate OPRM Amplitude Setpoints, the corresponding OPRM Successive Confirmation Count Setpoints have been obtained by using linear interpolation.

The OPRM setpoints for TLO are conservative relative to SLO and are, therefore, bounding.

The 0.01 OLMCPR adder for void fraction uncertainty required by IMLTR Limitation 19 in Reference 6 of Section 15.4 has been addressed in Table 15-2 to prevent a setpoint credit as described by MFN 08-693. Therefore, Table 15-2 is compatible with the OLMCPRs provided in the Section 11 OLMCPR summary tables.

Table 15-1 Relationship between OPRM Successive Confirmation Count Setpoint and OPRM Amplitude Setpoint

Successive Confirmation Count Setpoint	OPRM Amplitude Setpoint
6	≥1.04
8	≥1.05
9	≥1.06
10	≥1.07
11	≥1.08
12	≥1.09
13	≥1.10
14	≥1.11
15	≥1.13
16	≥1.14
17	≥1.16
18	≥1.18
19	≥1.21
20	≥1.24

Table 15-2 OPRM Setpoint Versus OLMCPR[1]

OPRM Amplitude Setpoint	OLMCPR(SS)	OLMCPR(2PT)
1.05	1.281	1.235
1.06	1.307	1.261
1.07	1.337	1.290
1.08	1.369	1.321
1.09	1.394	1.345
1.10	1.410	1.360
1.11	1.427	1.376
1.12	1.444	1.393
1.13	1.461	1.410
1.14	1.479	1.427
OLMCPR Acceptance Criteria	**Off-rated OLMCPR @45% flow**	**Rated Power OLMCPR (see Section 11)**

15.3 Backup Stability Protection

The BSP region boundaries were calculated for Hope Creek Cycle 17 for normal feedwater temperature operation. The endpoints of the regions are defined in Table 15-3. The region boundaries, shown in Figure 2, are defined using the Generic Shape Function (GSF). See Reference 5 in Section 15.4.

[1] The OLMCPR values presented in the OPRM Setpoint Versus OLMCPR table have been adjusted to include a 0.01 adder in accordance with extended operating domain licensing commitments.

Table 15-3 BSP Region Intercepts for Normal Feedwater Temperature

Region Boundary Intercept	Power (%)	Flow (%)	Core DR	Highest Channel DR
A1	58.2	40.0	< 0.799	< 0.437
B1	44.7	35.0	< 0.798	< 0.447
A2	66.4	50.0	< 0.799	< 0.404
B2	32.2	36.3	< 0.790	< 0.391

Appendix A contains the calculated BSP region end points and decay ratios for Nominal Feedwater Temperature.

The OPRM Trip-Enabled Region for Nominal Feedwater Temperature is confirmed to be less than or equal to 60% rated core flow and greater than or equal to 26.1% rated power.

15.4 References

1. *BWR Owners' Group Long-term Stability Solutions Licensing Methodology*, NEDO-31960-A, November 1995 (including Supplement 1).
2. *Reactor Long-Term Stability Solution Option III: Licensing Basis Hot Channel Oscillation Magnitude for Hope Creek*, GENE-A13-00381-04, R1, September 2004.
3. *Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications, Licensing Topical Report*, NEDO-32465-A, August 1996.
4. *Plant-Specific Regional Mode DIVOM Procedure Guideline*, GE-NE-0000-0028-9714-R1, June 2005.
5. *Backup Stability Protection (BSP) for Inoperable Option III Solution*, OG-02-0119-260, July 2002.
6. *Final Safety Evaluation by the Office of Nuclear Reactor Regulation, Licensing Topical Report NEDC-33173P, Applicability of GE Methods to Expanded Operating Domains*, July 2009.

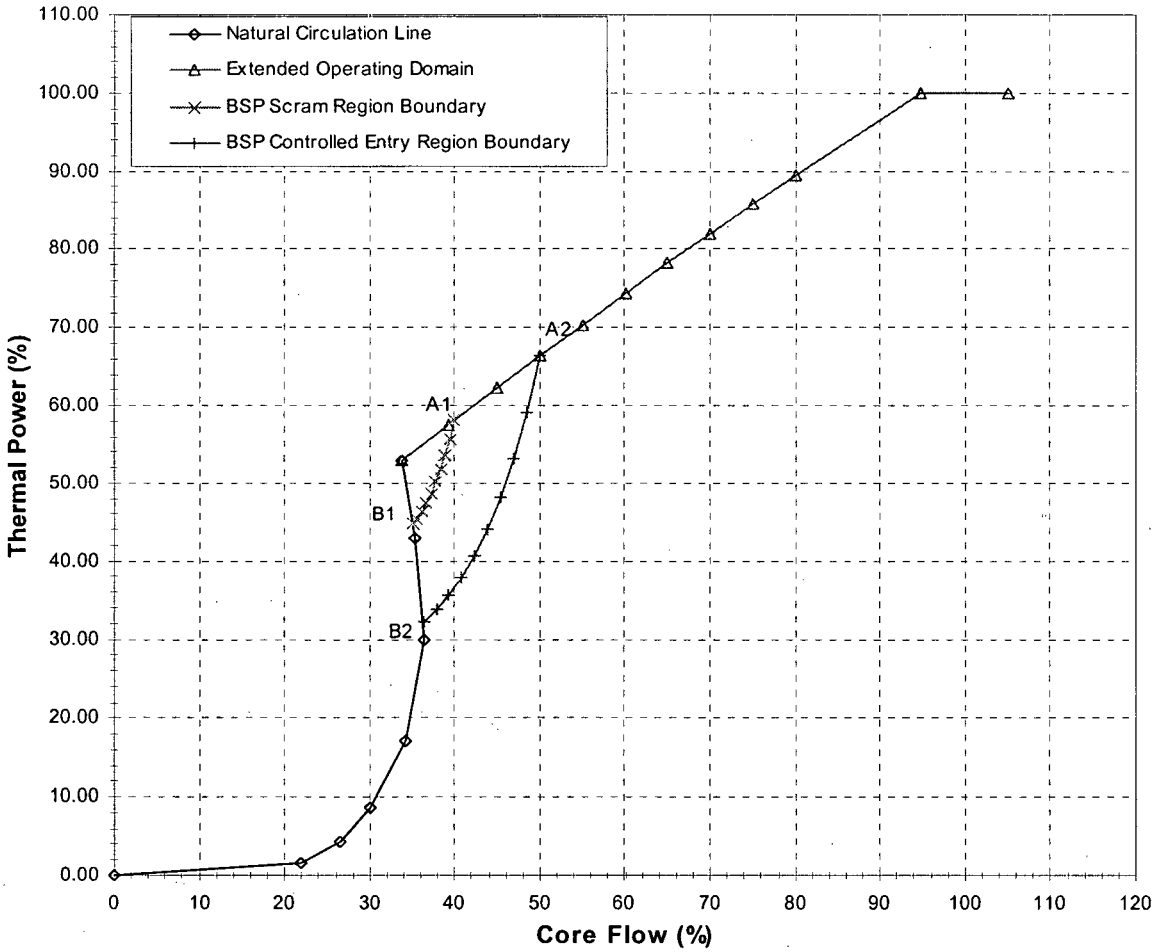

Figure 2 BSP Region Boundaries for Normal Feedwater Temperature Operation

Appendix A
Calculated BSP Region End Points

The BSP region end points reported in Section 15 represent the proposed BSP region. The proposed BSP region is conservative and bounds the calculated BSP region end points.

To support the initial introduction of GE14i Isotope Test Assemblies (ITAs), this appendix provides the calculated BSP region end points and decay ratios. These calculated power/flow points and decay ratios represent typical calculations for Hope Creek. The plant- and cycle-specific calculations provide reasonable assurance that the thermal hydraulic stability as prescribed by Option III with respect to the size of the BSP regions is maintained with ITAs in the Hope Creek core.

Table A-1 BSP Region Calculated Intercepts for Normal Feedwater Temperature

Region Boundary Intercept	Power (%)	Flow (%)	Core DR	Highest Channel DR
A1	58.1	39.9	0.799	0.437
B1	47.7	34.6	0.798	0.447
A2	66.1	49.7	0.799	0.404
B2	39.2	35.7	0.790	0.391