ENCLOSURE 1
ATTACHMENT 17

NEXTERA ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

LICENSE AMENDMENT REQUEST 261
EXTENDED POWER UPRATE
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

PBNP-994-21-07, REVISION 0, HELB TASK 07 - MASS & ENERGY
RELEASES FOR PRESSURE LIMITING CASES

7 pages follow

Table of Contents

1. Purpose

The purpose of Task 07 of the High Energy Line Break (HELB) Reconstitution Program as defined in Design Input (DI) 1 is to determine the mass and energy (M&E) release data for HELBs in the Primary Auxiliary Building of the Point Beach Nuclear Plant. The limiting HELBs have been defined in Task 06 (DI 2).

The M&E data are required for both pressure and temperature limiting cases. The pressure limiting cases are short term and are most limiting under Hot Zero Power conditions, and the associated M&E data are generated and documented in this calculation. For temperature limiting cases Westinghouse developed the main steam at power M&Es. S&L developed the main steam at power M&Es for the break in the CCW heat exchanger room using Fanno. AES developed the main steam M&Es for the hot standby conditions using the Henry-Fauske and Moody coorelations.

2. Design Input

The Design Input (DI) used in this analysis consists of the following:

1. AES Project Plan PBNP-994-21-01 "Project Plan for HELB Reconstitution Program" December 18, 2007.
2. AES Calculation PBNP-994-21-06 Rev. 0, "HELB Reconstitution Program Task 6 – Break & Crack Size/Location".

3. Assumptions

1. The thermal hydraulic conditions at the location of the break/crack are conservatively assumed to remain constant at their initial conditions.
2. The mass flux at the break/crack location is calculated using the Extended Henry-Fauske critical flow model for sub-cooled liquid conditions and the Moody critical flow model for saturated steam and liquid conditions. The implementations of these models are described in Sections IV.3.1 and IV.3.2 of Reference 1, respectively. The calculations of the mass fluxes were based on the functional fits described in Section IV.3.5 of Reference 1.
3. No credit is taken for isolation of the break/crack flow during the short period of duration until the peak pressure has been reached for these pressure limiting cases.

	Automated Engineering Services Corp.	**CALCULATION SHEET**	**Page:** 6	**of** 7
			Calc. No.: PBNP-994-21-07	
Client: FP&L Energy			**Revision:** 0	
Station: Point Beach Nuclear Plant			**Prepared By: RC Kern**	
Calc. Title: HELB Task 07 – Mass & Energy Releases for Pressure Limiting Cases			**Reviewed By: CD Henry**	
Safety Related **Yes** [X] **No** [ ]			**Date:** 11/12/2008	

4. Acceptance Criteria

There are no acceptance criteria associated with the analyses documented in this calculation.

5. Software

No software was used in the calculations documented herein.

6. Methodology

The mass flux at the break/crack location is calculated using the Extended Henry-Fauske critical flow model for sub-cooled liquid conditions and the Moody critical flow model for saturated steam and liquid conditions. The implementations of these models are described in Sections IV.3.1 and IV.3.2 of Reference 1, respectively. The calculations of the mass fluxes were based on the functional fits described in Section IV.3.5 of Reference 1. The implementation of these functional fits consists of performing the polynomial summations as required by the appropriate equation and using the coefficients shown in the corresponding table. Reference 2 is used along with the fluid properties (absolute pressure and enthalpy) to determine whether the fluid is subcooled or saturated, and this establishes the appropriate equation to be used. This determination is reflected in the value assigned to the parameter ITYPE with 2 for subcooled and 3 for saturated.

7. Analysis

The M&E data to be used for input to the pressure limiting cases are calculated and documented in Attachment A using the methodology described in Section 6.

8. Conclusions

The M&E data to be used for input to the pressure limiting cases are documented in Attachment A.

9. References

1. "RETRAN-3D --- A Program for Transient Thermal-Hydraulic Analysis of Complex Fluid Flow Systems Volume 1: Theory and Numerics" NP-7450(A), Volume 1, Revision 5 Research Project 889-10 Computer Code manual, July 2001.
2. ASME International Steam Tables for Industrial Use based on IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and Steam, published 2000.

Attachment A

Calculation of M&E Data for Pressure Limiting Cases

A. 1 Overview Description

The methodology consists of calculating the mass flux for a given set of thermal hydraulic conditions at the location of the break which are assumed to be constant at their initial conditions (Assumption 1) using the critical flow models identified in Assumption 2. Then these mass fluxes are multiplied by the appropriate areas shown in Table 6.0-1 of DI 2. For the current analyses, no credit is taken for isolation of the break flow during the short period of duration until the peak pressure has been reached for these pressure limiting cases (Assumption 3).

A.2 Calculation of the Mass Fluxes

There are four unique sets of thermal hydraulic conditions at the break locations as seen in Table 6.0-1 of DI 2. These conditions along with the information associated with the critical flow model used and the corresponding critical mass fluxes (G) are given in the following table. These calculations were performed using the methodology described in Section 6. The pressure in psia is obtained by adding 15 to the values in psig shown in Table 6.0-1 of DI 2.

Number	Pressure (psia)	Enthalpy (BTU/lbm)	ITYPE*	G (lbm/ft^2-s)
1	1020	1191	2	2135
2	895	438	3	15108
3	300	249	3	11679
4	1020	546 [1]	3	8018

*ITYPE = 2 for Moody
= 3 for Extended Henry-Fauske

Note 1: The enthalpy used for this calculation was 546 instead of 547 to force subcooled conditions and yield a conservative and slightly larger mass flux.

A.3 Calculation of M&E Data

The following table presents the results for the M&E calculations.

Rooms	Break Size (ft^2)	G (lbm/ft^2-s)	Mass Flow (lbm/s)	Enthalpy (BTU/lbm)
524 and 596 [1]	4.3303	2135	9245	1191
524 and 596 [1]	0.0513	2135	110	1191
524 and 596 [1]	0.0210	8018	168	547
301 and 583 [1]	2.6552	2135	5669	1191
301 and 583 [1]	0.2010	2135	429	1191
224 and 122	0.0513	2135	110	1191
140, 147, 146, 137, 144 and 145	0.0233	11679	272	249
360	0.0167	15108	252	438
237	0.0513	2135	110	1191
271 and 238	0.0012	2135	3	1191
272 and 273	0.0444	2135	95	1191

Note 1 – Different sets of conditions are possible for the HELB in these rooms.